

Integrating Hazard Mitigation into Comprehensive Planning

Glades County Profile

Florida Department of Community Affairs

Executive Summary

The experiences of the 2004 hurricane season epitomize the importance of better integrating hazard mitigation activities into local comprehensive planning. That fall, residents all over the state experienced significant damages from Hurricanes Charley, Frances, Jeanne, and Ivan as a result of winds, tornadoes, surge, and/or flooding. But this was not the only time we have experienced natural disasters, nor will it be the last. In 1992, Hurricane Andrew devastated South Florida. In 1998 and 1999, most counties in Florida experienced wildfires. In some cases, despite firefighters' best efforts, fires advanced through neighborhoods and homes were lost. Every year in Central Florida, new sinkholes emerge, swallowing homes and damaging infrastructure. The cost of recovery for these various disasters ranges from hundreds of thousands to billions of dollars, significantly taxing local, State, and federal financial sources. Losses covered through federal funding as a result of the 2004 hurricanes alone could reach as high as \$7 billion. Worst of all, however, are the many lives that, directly or indirectly, are lost due to natural disasters. It is imperative that we reduce the human and financial costs of natural disasters. Through better integration of natural hazard considerations into local comprehensive planning, we can build safer communities.

This Glades County Profile has been prepared as part of a statewide effort by the Florida Department of Community Affairs to guide local governments in integrating hazard mitigation principles into local Comprehensive Plans. Information provided in this profile will enable planners to (1) convey Glades County's existing and potential risk to identified hazards; (2) assess how well local hazard mitigation principles have been incorporated into the County's Comprehensive Plan; (3) provide recommendations on how hazard mitigation can be better integrated into the Comprehensive Plan; and (4) determine if any enhancements could be made to the Local Mitigation Strategy (LMS) to better support comprehensive planning. Best available statewide level data are provided to convey exposure and risk as well as illustrate the vulnerability assessment component of the integration process.

In this profile, we present an argument for why hazard mitigation needs to be a part of comprehensive planning through an examination of population growth, the hazards that put the County at risk, the special needs population and structures that could be affected by these hazards, and the distribution of existing and future land uses in different hazard areas. We hope that this analysis will serve as an example of the issues each jurisdiction should consider as they update their plans to include hazard mitigation. The profile also contains a review of the LMS and the Comprehensive Plan. Based on the analysis and review, we were able to develop specific options for the County on how to incorporate more hazard mitigation into the Comprehensive Plan and how to enhance the LMS so that it is also a better tool for local planners.

During our review, we found that Glades County had many strengths regarding hazard mitigation in both its LMS and Comprehensive Plan, and these are outlined in the profile. There are always ways to further strengthen such plans, however, and the following is a summary of some of the options that would enable the County to do so.

GLADES COUNTY GENERAL RECOMMENDATIONS

- The County could include involvement of emergency managers when making land use decisions. Emergency managers may provide insight that can reduce risk to persons or properties prior to a disaster. Emergency managers may also have suggestions as how to best plan for emergency staging areas, debris sites, and safe zones in the event of a natural disaster. Planners could help locate these sites and help disseminate information to county personnel and to the public.

- The Comprehensive Plan and the LMS can reference each other to create a more unified hazard mitigation strategy. The Comprehensive Plan could support the use of the LMS in land use decisions as a way to analyze the location of future development. The LMS could reference the Comprehensive Plan as a way to implement the hazard mitigation strategy and secure ongoing hazard mitigation practices and principles for the future.
- The Comprehensive Plan could integrate hazard mitigation criteria into the analysis of capital improvements projects and can list LMS projects into the schedule. This is considered a best practice from *Protecting Florida's Communities* (FDCA, 2005b).
- Wildfires pose a threat to a majority of residents in the County, as shown in this analysis. There were few policies that directly address this hazard. The County could explore the promotion of Firewise communities as a way to educate homeowners and business owners on ways to protect their property from wildfires. Also, the County may consider requiring the removal of wildfire fuels adjacent to developable property prior to development as a way of creating a buffer of defensible space.
- The Comprehensive Plan could support Objective 1.8 of the LMS by adding a policy that promotes disaster preparedness public information and education programs as well. The County could explore regional resources including cooperation with neighboring counties and the RPC for information dissemination.
- The Comprehensive Plan could support the LMS by adding a policy for relocating or retrofitting private and public structures in hazard areas much like Objectives 1.9, 1.10, 1.12 of the LMS. Addressing at-risk structures prior to a storm event may ensure critical facilities will stay in operation during a natural disaster as well as reduce damages and expenses to County property.
- Due to the amount of land and structures in the flood plain, the County could explore the Land Development Regulations that establish minimal elevations of structures. The analysis in this report shows there are 7,661 structures in the floodplain. More than half of these structures are homes. The land development regulations can be analyzed in order to determine if standards adequately address hazard mitigation issues, specifically flooding.
- The LMS could include an analysis of historic structures and recommend hazard mitigation measures if needed. This would support the policies in the Comprehensive Plan that aim to protect historic, archeological, and cultural sites in the County.
- Currently, there are no policies in the Comprehensive Plan that address post-disaster redevelopment. Specifically, policies could require redevelopment of damaged structures to conform to current building standards and land use regulations or could create overlay districts for high-risk or repeat damage areas in which rebuilt or improved structures must meet higher codes.

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1. County Overview

Geography and Jurisdictions

Glades County is located in South-Central Florida along the west coast of Lake Okeechobee. It covers a total of 774 square miles with an average population density of 13.7 people per square mile (U.S. Census, 2000).



Moore Haven is the only incorporated municipality within the County, as shown in **Table 1.1**.

Population and Demographics

Official 2004 population estimates for all jurisdictions within Glades County as well as the percent change in population from the 2000 U.S. Census are presented in **Table 1.1**. The most current estimated countywide population of Glades County is 10,733 people (University of Florida, Bureau of Economic and Business Research, 2004). Approximately 84.6% of the countywide population lives in the unincorporated portion of the County. Between 1990 and 2000, Glades County as a whole had a growth rate of 39.3%, which was far greater than the statewide growth rate of 23.5% in those 10 years.

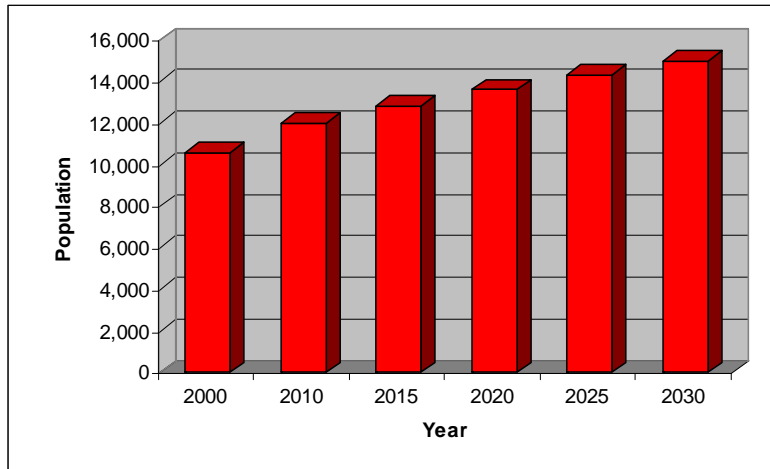
Table 1.1 Population Estimates by Jurisdiction

Jurisdiction	Population, Census 2000	Population Estimate, 2004	% Change, 2000-2004	% of Total Population (2004)
UNINCORPORATED	8,941	9,083	1.6%	84.6%
Moore Haven	1,635	1,650	0.9%	15.4%
Countywide Total	10,576	10,733	1.5%	100.0%

Source: University of Florida, Bureau of Economic and Business Research, 2004.

According to the University of Florida, Bureau of Economic and Business Research (2004), Glades County’s population is projected to grow steadily for the next 25 years, reaching 15,000 people by the year 2030. **Figure 1.1** illustrates medium population projections for Glades County based on 2004 calculations.

Figure 1.1 Medium Population Projections for Glades County, 2010-2030



Source: University of Florida, Bureau of Economic and Business Research, 2004.

Of particular concern within Glades County's population are those persons with special needs and/or limited resources such as the elderly, disabled, low-income, or language-isolated residents. According to the 2000 U.S. Census, 18.8% of Glades County residents are listed as 65 years old or over, 24.1% are listed as having a disability, 15.2% are listed as below poverty, and 18.8% live in a home with a primary language other than English.

2. Hazard Vulnerability

Hazards Identification

The following are natural hazards that pose a risk for the County as identified in the County's Local Mitigation Strategy (LMS): coastal storms, tornados, floods, wildfires, thunderstorms and high winds, drought and heat waves, and freezes. The LMS did not prioritize these hazards, however, the hazard profiles did include a discussion of the potential future risk of each hazard affecting the County. Storm surge and sinkholes do not pose a threat to Glades County. (Glades County, 2005)

The LMS explains that between 1873 and 1993 Southwest Florida experienced 49 hurricanes. The 2004 hurricane season was especially brutal to Glades County and the City of Moore Haven. Charley, Frances, and Jeanne caused crop-damage, power losses, flooding, and property damage to these areas. The County also is susceptible to wildfire. In 2001 Lake Bottom Fire burned 30,000 acres. The LMS also identifies seven floods between 1994 and 2004 totaling \$530,000 in damages. Fortunately, no injuries or deaths were reported from the floods. (Glades County, 2005)

Hazards Analysis

The following analysis looks at two major hazard types: flooding and wildfire. All of the information in this section, except the evacuation and shelter estimates, was obtained through the online Mapping for Emergency Management, Parallel Hazard Information System (MEMPHIS). MEMPHIS was designed to provide a variety of hazard related data in support of the Florida Local Mitigation Strategy DMA2K revision project. It was created by Kinetic Analysis Corporation under contract with the Florida Department of Community Affairs (FDCA). Estimated exposure values were determined using the Federal Emergency Management Agency's (FEMA's) designated 100-year flood zones (A, AE, V, VE, AO, 100 IC, IN, AH) and levels of concern 5 through 9 for wildfire. For more details on a particular hazard or an explanation of the MEMPHIS methodology, consult the MEMPHIS Web site (<http://lmsmaps.methaz.org/lmsmaps/index.html>) or your countywide LMS.

Existing Population at Risk

Table 2.1 presents the estimated countywide population at risk from hazards, as well as a breakdown of the sensitive needs populations at risk. The first column in the table summarizes the residents of Glades County that live within FEMA Flood Insurance Rate Map zones that signify special flood hazard areas. According to these maps, 64.8% of the population, or 6,856 people, are within the 100-year flood zone. A majority of those at risk of flooding are either elderly and/or disabled. These special-needs citizens require extra planning by local governments to ensure their safety. Wildfire is also a hazard of concern to the County, with 39.0% of the population living in medium to high-risk wildfire zones. Forty percent of those at risk from wildfire are disabled, making a quick evacuation more difficult.

Table 2.1 Estimated Number of Persons at Risk from Selected Hazards

Population	Flood	Wildfire (medium-high risk)
Minority	1,253	1,157
Over 65	1,378	801
Disabled	2,944	1,649
Poverty	972	397
Language Isolated	0	0
Single Parent	309	125
Countywide Total	6,856	4,129

Source: Florida Department of Community Affairs, 2005a.

Evacuation and Shelters

As discussed in the previous sections, population growth in Glades County has been steady, and this trend is projected to continue, although the county will remain rural for the foreseeable future. As the population increases, the demand for shelter space and the length of time it takes to evacuate the County may increase. Currently, evacuation clearance times for Glades County are estimated to be 3 hours for Category 3 hurricanes and 9 hours for Category 4 and 5 hurricanes, as shown in **Table 2.2**. These data were derived from 11 regional Hurricane Evacuation Studies that have been produced by FEMA, the U.S. Army Corps of Engineers, and Florida Regional Planning Councils. The study dates range from 1995 to 2004 and are updated on a rotating basis. According to Rule 9J-5, counties must maintain or reduce hurricane evacuation times. Some experts have suggested that counties should try to achieve 12 hours or less clearance time for a Category 3 hurricane. This is due to the limited amount of time between the National Hurricane Center issuing a hurricane warning and when the tropical storm-force winds make landfall. Glades County is able to meet this recommendation and should continue to maintain or improve their current evacuation times in the future since projected growth will increase the demand for evacuation route capacity. Additionally, storm events requiring evacuation typically impact larger areas, often forcing multiple counties to issue evacuation orders and placing a greater number of evacuees on the major roadways, further hindering evacuation progress. Thus, it is important to not only consider evacuation times for Glades County, but also for other counties in the region as shown in **Table 2.2**.

Table 2.2 County Evacuation Clearance Times in Hours (High Tourist Occupancy, Medium Response)

County	Hurricane Category				
	1	2	3	4	5
Desoto	18	18	18	18	18
Glades	3	3	3	9	9
Hardee	5	5	5	5	5
Hendry	6	6	6	6	6
Highlands	2	2	2	2	2
Polk	13	13	13	13	13

Note: Best available data as of 7/05

Source: State of Florida, 2005

(some counties may be in the process of determining new clearance times)

Coupled with evacuation is the need to provide shelters. If adequate space can be provided in safe shelters for Glades County residents, then this could be a partial solution to eventual increase in clearance times for evacuation. Currently, the State Shelter Plan reports that there is space for 607 people in the County's shelters, and there are 5,293 more people that will need sheltering in the case of a Category 5 hurricane. It is projected that by 2009 the deficit will

increase to 6,295 people in need of space (FDCA, 2004). The County will need to address this deficiency but might also try to decrease the demand for public shelters by encouraging new homes to be built with safe rooms if they are outside of flood zones. Residents who are further inland in the County and not in a flood zone could shelter in place if they had a safe room that could withstand hurricane-force winds. Safe rooms could at least be a last option for residents who cannot evacuate in time, especially in the case of a tornado.

Existing Built Environment

While the concern for human life is always of utmost importance in preparing for a natural disaster, there also are large economic impacts to local communities, regions, and even the State when property damages are incurred. To be truly sustainable in the face of natural hazards, we must work to protect the residents and also to limit, as much as possible, property losses that slow down a community’s ability to recover from a disaster. **Table 2.3** presents estimates of the number of buildings in Glades County by structure type that are at risk from each of the four hazards being analyzed.

Table 2.3 shows 4,664 structures within medium to high-risk wildfire areas, with 59.9% of those structures being single-family or mobile homes. Single-family homes are also at risk from floods. **Table 2.3** shows that 39.7% of the total 7,661 structures within the flood plain are single-family homes. Also, there are 1,751 mobile homes located within the 100-year flood plain, placing a significant amount of property and persons at risk. According to the latest National Flood Insurance Program Repetitive Loss Properties list, there are no homes in unincorporated Glades County that were reported to have had flood damage and received insurance payments.

Table 2.3 Estimated Number of Structures at Risk from Selected Hazards

Structure Type	Flood	Wildfire (medium-high risk)
Single-Family Homes	3,038	1,246
Mobile Homes	1,751	1,549
Multi-Family Homes	310	77
Commercial	480	270
Agriculture	1,184	820
Gov./Institutional	898	702
Total	7,661	4,664

Source: Florida Department of Community Affairs, 2005a.

In addition to understanding exposure, risk assessment results must also be considered for prioritizing and implementing hazard mitigation measures. The risk assessment takes into account not only the people and property in a hazard area, but also the probability of occurrence that is necessary to understand the impacts to people and property. Although people and property are exposed to hazards, losses can be greatly reduced through building practices, land use, and structural hazard mitigation measures. The next section of this report examines the existing and future land use acreage in hazard areas. This information can be useful in considering where to implement risk reducing comprehensive planning measures.

Analysis of Current and Future Vulnerability

The previous hazards analysis section discussed population and existing structures at risk from flooding and wildfire. This section demonstrates the County's vulnerabilities to these hazards spatially and in relation to existing and future land uses. The following maps and tabulations of existing land use within hazard areas are based on the 2004 geographic information system (GIS) shapefiles from the Glades County Property Appraiser Office. Maps and tabulations of future land uses in hazard areas were developed using the Glades County future land use map obtained January 2005.

In **Attachment A**, two maps present the existing and future land uses within a 100-year flood zone. Much of the eastern portion of the county bordering Lake Okeechobee is within the 100-year flood zone. The entire City of Moore Haven is within the zone. As shown in **Table 2.4**, most of the land, approximately 64.5%, of the 296,231 acres within the zone are used for agricultural. Government and institutional and conservation uses compose another 32.9% of the 100-year flood plain. This is positive since development density and intensity on property with these land uses is often limited. Only 3,061 acres are vacant. **Table 2.5** shows a significant increase in future residential land within the flood zone, largely near already developed areas. Only 350 acres of future residential land are currently vacant. Residential land use will be allowed along the border of Lake Okeechobee near Moore Haven. Mitigative measures should be taken prior to development in order to protect property from potential flood damage.

In **Attachment B**, maps present the land uses associated with high-risk wildfire zones. Most of the land at risk from wildfires is located outside the 100-year floodplain in the western portion of the county. **Table 2.4** shows that nearly all of this land, or 95.6%, is used for agricultural, government, or conservation uses, or it is vacant. **Table 2.5** shows that of the 1,111 currently vacant acres within the zone, 579 acres, or 52.1% are designated for future residential uses while the remainder of vacant land will remain low intensity with the exception of 7 commercial acres.

Table 2.4 Total Unincorporated Acres in Hazard Areas by Existing Land Use Category

Existing Land Use Category		Flood Zones	Wildfire Susceptible Areas
Agriculture	Acres	190,988.4	33,069.7
	%	64.5	75.6
Attractions, Stadiums, Lodging	Acres	49.7	17.2
	%	0.0	0.0
Places of Worship	Acres	45.9	11.8
	%	0.0	0.0
Commercial	Acres	84.9	15.8
	%	0.0	0.0
Government, Institutional, Hospitals, Education	Acres	43,482.5	3,953.0
	%	14.7	9.0
Industrial	Acres	141.6	10.9
	%	0.0	0.0
Parks, Conservation Areas, Golf Courses	Acres	54,015.7	3,679.5
	%	18.2	8.4
Residential Group Quarters, Nursing Homes	Acres	103.9	270.9
	%	0.0	0.6
Residential Multi-Family	Acres	12.0	3.8
	%	0.0	0.0
Residential Mobile Home, or Commercial Parking Lot	Acres	1,058.2	754.2
	%	0.4	1.7
Residential Single-Family	Acres	604.4	513.0
	%	0.2	1.2
Submerged Lands (Water Bodies)	Acres	9.1	0.0
	%	0.0	0.0
Transportation, Communication, Rights-of-Way	Acres	2,558.3	314.3
	%	0.9	0.7
Utility Plants and Lines, Solid Waste Disposal	Acres	15.4	5.1
	%	0.0	0.0
Vacant	Acres	3,060.8	1,110.6
	%	1.0	2.5
Total Acres	Acres	296,230.8	43,729.8
	%	100.0	100.0

Table 2.5 Total and Undeveloped Acres in Hazard Areas by Future Land Use Category for the Unincorporated County

Future Land Use Category		Flood Zones		Wildfire Susceptible Areas	
		Total	Undev.	Total	Undev.
AgResidential	Acres	4,935.9	267.3	2,284.4	133.8
	%	1.7	8.7	5.2	12.0
Agriculture/Open	Acres	223,468.2	1,873.5	33,731.5	340.0
	%	75.4	61.2	77.1	30.6
Commercial	Acres	72.0	8.9	88.5	7.6
	%	0.0	0.3	0.2	0.7
Conservation	Acres	12,102.6	207.5	1,565.9	15.6
	%	4.1	6.8	3.6	1.4
Conservation Easement	Acres	45,177.2	94.3	3,500.7	18.1
	%	15.3	3.1	8.0	1.6
Industrial	Acres	757.1	27.9	135.8	2.0
	%	0.3	0.9	0.3	0.2
Institutional	Acres	331.1	0.0	26.5	4.7
	%	0.1	0.0	0.1	0.4
Landfill	Acres	0.0	0.0	12.5	0.0
	%	0.0	0.0	0.0	0.0
Park	Acres	145.8	1.1	78.9	0.0
	%	0.0	0.0	0.2	0.0
Residential	Acres	6,727.8	350.0	2,088.6	578.9
	%	2.3	11.4	4.8	52.1
Transition	Acres	2,506.0	230.3	216.5	10.0
	%	0.8	7.5	0.5	0.9
Utilities	Acres	7.4	0.0	0.0	0.0
	%	0.0	0.0	0.0	0.0
Total	Acres	296,230.9	3,060.8	43,729.7	1,110.6
	%	100.0	100.0	100.0	100.0

Table 2.6 presents the total numbers of acres in a hazard zone in Glades County’s incorporated area and how many of those acres are currently undeveloped. Moore Haven is completely within the flood zone and entirely outside the wildfire susceptible area. Mitigative measures should be taken before development occurs in and around the city to protect residents and property from flood hazards. Minimum structure elevations and flood-proofing of structures should be analyzed prior to a flood event.

Table 2.6 Total and Vacant Incorporated Acres in Hazard Areas

Jurisdiction		Flood Zones		Wildfire Susceptible Areas	
		Total	Vacant	Total	Vacant
Moore Haven	Acres	101.7	16.7	0.0	0.0
	%	100.0	16.4	0.0	0.0
Total Acres	Acres	101.7	16.7	0.0	0.0
	%	100.0	16.4	0.0	0.0

3. Existing Mitigation Measures

Local Mitigation Strategy

The LMS is an ideal repository for all hazard mitigation analyses, policies, programs, and projects for the County and its municipalities due to its multi-jurisdictional and intergovernmental nature. The LMS identifies hazard mitigation needs in a community and structural or non-structural initiatives that can be employed to reduce community vulnerability. Communities can further reduce their vulnerability to natural hazards by integrating the LMS analyses and mitigation objectives into their Comprehensive Plans.

An LMS prepared pursuant to the State’s 1998 guidelines has three substantive components (FDCA, 2005b):

Hazard Identification and Vulnerability Assessment (HIVA). This section identifies a community’s vulnerability to natural hazards. Under Florida rules, the HIVA is required to include, at a minimum, an evaluation of the vulnerability of structures, infrastructure, special risk populations, environmental resources, and the economy to any hazard the community is susceptible to. According to FEMA, LMSs revised pursuant to the Disaster Mitigation Act of 2000 (DMA 2000) criteria must include maps and descriptions of the areas that would be affected by each hazard, information on previous events, and estimates of future probabilities. Vulnerability should be assessed for the types and numbers of exposed buildings, infrastructure, and critical facilities with estimates of potential monetary losses. Plan updates will be required to assess the vulnerability of future growth and development.

Guiding Principles. This section lists and assesses the community’s existing hazard mitigation policies and programs and their impacts on community vulnerability. The Guiding Principles typically contain a list of existing policies from the community’s Comprehensive Plan and local ordinances that govern or are related to hazard mitigation. Coastal counties frequently include policies from their Post-Disaster Redevelopment Plans (PDRPs).

Mitigation Initiatives. This component identifies and prioritizes structural and non-structural initiatives that can reduce hazards vulnerability. Proposals for amendments to Comprehensive Plans, land development regulations, and building codes are often included. Structural projects typically address public facilities and infrastructure, and buy-

outs of private structures that are repetitively damaged by flood. Many of these qualify as capital improvement projects based on the magnitude of their costs and may also be included in the capital improvements elements of the Counties' and Cities' Comprehensive Plans. The LMS Goals and Objectives will guide the priority of the mitigation initiatives.

The Glades County LMS (adopted in 2005) was used as a source of information in developing this profile and was also reviewed for any enhancements that could be made to allow better integration with other plans, particularly the local Comprehensive Plans.

Hazard Identification and Vulnerability Assessment

This section of the LMS was briefly reviewed for its ability to provide hazard data that can support comprehensive planning. The Risk Assessment section of the LMS includes hazard identification and vulnerability assessment for each natural hazard. The analysis includes a risk assessment for structures including critical facilities, top employers, and dwelling units. Potential monetary losses are included in tables, graphs, and charts to illustrate the amount of damage caused by varying intensities for each disaster. The City of Moore Haven is also included in this analysis. This section also includes historical records for each hazard type. Finally, an analysis of future population trends and land use demand is also included. (Glades County, 2005) This section of the LMS can provide planners with useful information on high-risk areas and vulnerabilities associated with natural hazards. A HIVA, such as this one, is an excellent tool for making future land use decisions and determining shelter and evacuation route capacity for future populations.

Guiding Principles

Section V of the Glades LMS list policies from other plans, programs, and ordinances that relate to hazard mitigation. It summarizes the mitigation related topics of the Comprehensive Plan and CEMP, as well as several flood-related ordinances and programs. It also lists an emergency preparedness education program that the County has and references the building code as a mitigation component. A flood ordinance and drainage grant for the City of Moore Haven are included as well. The LMS states that this section is a work in progress and that it is there intent to also integrate the LMS into these planning mechanisms. As this section is enhanced, they should be sure to include Moore Haven's Comprehensive Plan. (Glades County, 2005)

LMS Goals and Objectives

The LMS Goals and Objectives can be found in **Attachment C**. The goals and objectives are also summarized in **Section 5** as part of the recommendations analysis. The following is a summary of how well the LMS has addressed mitigation issues that coincide with planning concerns.

The LMS goals and Objectives create a multi-dimensional approach to hazard mitigation. Objective 1.1 and 1.2 are general, aiming to protect and reduce losses due to natural disasters. Objective 1.3 aims to protect natural resources to maximize natural mitigative benefits of the environment. Several objectives are geared towards the built environment and address the protection of public facilities, post-disaster redevelopment, and rehabilitation of existing facilities, structures, and buildings. Interagency coordination and consistency between planning documents and procedures are also included as objectives. Finally, acquiring funding for storm shelters and emergency generators are also objectives for Glades County. (Glades County, 2005)

Comprehensive Emergency Management Plan

The Mitigation Annex of the 2001 Glades County CEMP was reviewed for consistency with the other plans and evaluated in its effectiveness as a tool for planners. The Annex gives little direction to planners about mitigation but does offer a post-disaster redevelopment plan. The

Glades County Disaster Task Force is responsible for public awareness and education, and seeking out mitigation activities “to improve the community”. After a disaster, this team will be responsible for the protection of critical facilities, safe housing, mitigation and awareness programs, and enhancement of operations after a disaster, (Glades County, 2001).

Post-Disaster Redevelopment Plan

A PDRP for Glades County, other than that found in the CEMP, was not available for review at the time this profile was drafted. If Glades County has a current PDRP, this will be obtained and reviewed for the final version of this document.

National Flood Insurance Program/Community Rating System

Both Glades County and the City of Moore Haven participate in the National Flood Insurance Program. Neither jurisdiction participates in the Community Rating System.

4. Comprehensive Plan Review

Glades County’s Comprehensive Plan (adopted in 1990) was reviewed in order to see what the County has already done to integrate their LMS policies, and hazard mitigation in general, into their planning process. A list of the goals, objectives, and policies currently in the plan that contribute to hazard mitigation is found in **Attachment D**. These policies are also presented in **Section 5**. The following is a summary of how well the plan addressed the four hazards of this analysis.

Flooding Hazards

Flooding was addressed in the Comprehensive Plan in multiple policies. There are policies that employ conservation, acquisition, and consistency with the Kissimmee River Floodplain District to preserve wetlands and to limit development near hazard areas. A policy states the Land Development Code and / or Land Development Regulations shall manage development within the 100-year floodplain. Also, there are policies that require adequate stormwater management for new and existing development in order to protect homes and businesses. (Glades County. 1990)

Wildfire Hazards

There was one policy that supports forest management programs and several policies that support water conservation. Water conservation can indirectly support wildfire mitigation in the event water is conserved for fire suppression during drought conditions. (Glades County. 1990)

Other Hazard Mitigation Policies

There were several policies that addressed emergency shelters and evacuation routes in the plan. Also, several policies aimed to protect cultural and historic resources by restricting urban growth from encroachment to these amenities.

5. Recommendations

For the LMS to be effective in the decision-making process of growth management, its objectives and policies must be integrated into the Comprehensive Plan. The Plan is the legal basis for all local land use decisions made. If hazard mitigation is to be accomplished beyond the occasional drainage project, these hazards must be addressed in comprehensive planning, where development can be limited or regulated in high-risk hazard areas just as sensitive environments are routinely protected through growth management policies. Mitigation of hazards is considerably easier and less expensive if done when raw land is being converted into

development. Retrofitting structure and public facilities after they have been built is significantly more expensive. However, if older neighborhoods or communities are scheduled to be revitalized or redeveloped, hazard mitigation needs to be an aspect considered and integrated into the project prior to the time of development approval.

Glades County has begun this process of integrating hazard mitigation throughout its Plan's elements. The prior section summarized how the major hazards for the County have been for the most part well-addressed. There is, however, still some disconnection between the LMS objectives and initiatives, and the policies in the Comprehensive Plan. By tightening the connection between these documents, the County will find it easier to implement hazard mitigation, and there will be higher awareness of these issues within more departments of the County government. **Table 5.1** presents options for further integration as well as the basis for these recommendations.

NOTE: The recommendations set out in this section are only suggestions. Through the workshop process and contact with the local governments, the goal of this project is to result in specific recommendations tailored and acceptable to each county. While the profile addresses hurricanes, flooding, wildfire, and sinkholes, the County should consider other hazards, if appropriate, such as tornadoes and soil subsidence, during the update of the local Comprehensive Plan.

Table 5.1 Options for Integrating LMS Hazard Mitigation Principles into Glades County's Comprehensive Plan (DRAFT)

Strategies & Integration Topics	Current LMS Information, Goals, or Objectives	Current Comprehensive Plan Policies	Options for Further Integration into the Comprehensive Plan	Options for Enhancement of the LMS	Basis For Suggested Options
Strategy 1 - Collaboration, coordination, and education					
<p>a) Is there information sharing &/or involvement in plan development between planners & emergency managers?</p>	<p>Objective 1.7: Ensure current mitigation programs are coordinated with appropriate departments.</p>		<p>The County could explore the involvement of emergency managers when making land use decisions. There was no information found that suggested cooperation between planners and emergency managers or information sharing between the LMS and Comprehensive Plan.</p>		<p>Emergency managers may provide insight that can reduce risk to persons or properties prior to a disaster.</p>
<p>b) Do the Comp Plan, LMS, CEMP, & other local and regional plans cross-reference each other & include consistent data on hazardous locations?</p>			<p>The Comprehensive Plan could support the use of the LMS in land use decisions as a way to analyze future development.</p>	<p>The LMS could reference the Comprehensive Plan as a way to implement the hazard mitigation strategy and secure ongoing hazard mitigation practices and principles for the future.</p>	<p>The Comprehensive Plan and the LMS can reference each other to create a more unified hazard mitigation strategy.</p>
<p>c) Are hazard mitigation projects addressed in the 5-year schedule of Capital Improvement Projects?</p>			<p>The Comprehensive Plan could integrate hazard mitigation criteria into the analysis of capital improvements projects and can list LMS projects into the schedule.</p>		
<p>d) Are there measures to educate residents, homeowner/property associations, & the business community of ways they can mitigate against hazards?</p>	<p>Objective 1.8: Continue disaster preparedness public information and education programs.</p>		<p>The Comprehensive Plan could support Objective 1.8 of the LMS by adding a policy that promotes hazard mitigation public education.</p>		

Strategy 2 - Get out of the way: provide evacuation and sheltering services					
<p>a) Are there measures to provide adequate evacuation clearance time to support current population and population growth?</p>	<p>Objective 1.5: Coordinate with all levels of governmental agencies where appropriate to prepare advance plans for the safe evacuation and sheltering of county and city residents from disasters.</p>	<p>HE Objective 5 To the extent possible, protect the residents of Glades County from the effects of natural disasters. HE Objective 5 Policy (a) Require that adequate precautions against storm damage be implemented in all residential developments. Action 1: The Board of County Commissioners shall maintain a current emergency management program providing adequate shelters, provisions, evacuation routes, emergency equipment, and personal to assist County residents in emergencies. Action 2: By year-end 2005, the Planning and Zoning Board shall adopt language in the LDC or Regulations requiring future mobile home parks to design support buildings such as laundry and recreational facilities to also function as windstorm shelters for park residents. Action 3: The Planning and Zoning Board shall require all residential development to comply with the standards of the National Flood Insurance Program. Action 4: The County Emergency Management Coordinator shall implement their responsibilities of the approved regional hurricane evacuation plan for Southwest Florida.</p>			

<p>b) Are there measures to provide adequate shelter space to meet population growth and special needs?</p>	<p>Objective 1.5: Coordinate with all levels of governmental agencies where appropriate to prepare advance plans for the safe evacuation and sheltering of county and city residents from disasters. Objective 1.13: Glades County shall actively seek funding, and shall initiate the placement of emergency electrical generators in designated public shelters and critical public facilities.</p>	<p>HE Objective 5 To the extent possible, protect the residents of Glades County from the effects of natural disasters. HE Objective 5 Policy (a) Require that adequate precautions against storm damage be implemented in all residential developments. Action 1: The Board of County Commissioners shall maintain a current emergency management program providing adequate shelters, provisions, evacuation routes, emergency equipment, and personal to assist County residents in emergencies. Action 2: By year-end 2005, the Planning and Zoning Board shall adopt language in the LDC or Regulations requiring future mobile home parks to design support buildings such as laundry and recreational facilities to also function as windstorm shelters for park residents. Action 3: The Planning and Zoning Board shall require all residential development to comply with the standards of the National Flood Insurance Program.</p>			
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Strategy 3 - Make the environment less hazardous: Protect and enhance natural protective features					
<p>a) Are there measures to protect and/or restore natural resources that might in turn decrease the risk from natural hazards?</p>	<p>Objective 1.3: Require the protection of natural resources (such as environmentally sensitive lands) in order to maximize their mitigative benefits and to safeguard them from damage caused by natural disasters.</p>	<p>Objective 4 Policy (e) (7) Conservation Land areas designated for the purpose of conserving or protecting natural resources or environmental quality and includes areas designated for such purposes as flood control, protection of quality or quantity of groundwater or surface water, wetlands, floodplain management, fisheries management, or protection of unique vegetative communities or protected wildlife habitats. Maximum densities shall be up to 1 unit per 20 acres. The units allowed by these densities shall be transferred and clustered on adjacent non-conservation areas.. FLUE Objective 7 Policy (b) Encourage forest management programs. FLUE Objective 8 Promote appropriate land uses within the Kissimmee River Floodplain consistent with the Resource Management Plan for the Lower Kissimmee River and Taylor Creek Drainage Basins.</p>			

		<p>FLUE Objective 5 Glades County will continue to review distribution, rate, and type of growth and development to ensure it is consistent with the supportive capacities of natural and manmade systems while ensuring the protection of natural and historic resources</p> <p>.HE Objective 4 To encourage environmentally responsible and energy-efficient residential development that will not adversely affect natural systems.</p> <p>IE Goal (1) Ensure that the potable water, sanitary sewer, stormwater management, solid waste, and natural groundwater aquifer recharge needs of the residents of glades county are met economically and efficiently, while protecting the county's natural resources and environmental quality.</p> <p>IE Objective 3 Policy (d) Promote sound water conservation practices for all new development and assist the SFWMD in the implementation of water conservation plans.</p> <p>CE Goal (1) Provide for the management enhancement and protection of the natural resources of Glades County.</p> <p>CE Objective 4 Policy (e) Continue to support the SFWMD efforts in identifying and protecting by acquisition lands necessary for water management, water supply, and the conservation and protection of water resources.</p> <p>CE Objective 5 Policy (a) Encourage the public acquisition or formal protection of the County's rare and unique areas and participate in protection plans for the protection of unique vegetative communities which are located within more than one jurisdiction.</p>			
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Strategy 4 - Make structures more resistant to natural hazard forces					
<p>a) Are there measures that support relocating or retrofitting private &/or public structures in hazard areas?</p>	<p>Objective 1.9: Reduce the vulnerability of critical public facilities from disasters. Objective 1.10: Incorporate hazard mitigation measures where feasible in any rehabilitation or reuse of existing public facilities, structures, and buildings. Objective 1.12: Glades County shall actively pursue funding for the purpose of retrofitting public and suitable private buildings to enable these structures to meet State public shelter criteria for wind speed. At such time as funding has been secured, the County shall initiate retrofitting.</p>		<p>The Comprehensive Plan could support the LMS by adding a policy for relocating or retrofitting private &/or public structures in hazard areas much like Objectives 1.9, 1.10, 1.12 of the LMS.</p>		<p>Addressing structures at risk prior to an storm event may ensure critical facilities will stay in operation during a natural disaster as well as reduce damages and expenses to County property.</p>
<p>b) Are there measures to require compliance with or exceed building codes &/or design standards for certain hazard areas?</p>	<p>Objective 1.4: Ensure that County and City codes and standards are enforced to protect public safety and property.</p>	<p>IE Objective 5 The County will continue to make provisions for adequate management of stormwater runoff to protect the public health, safety and welfare. IE Objective 5 Policy (a) The County will continue to manage stormwater and regulate stormwater management in a manner consistent with the public heal and safety and in a manner consistent with the other elements of the Plan. IE Objective 5 Policy (b) Ensure that new development have adequate stormwater management systems.</p>	<p>Due to the amount of land and structures in the flood plain, the County could explore the Land Development Regulations that establish minimal elevations of structures. The analysis in this report shows there are 7,661 structures in the floodplain. More than half of these structures are homes. The land development regulations can be analyzed in order to determine if standards adequately address hazard mitigation issues.</p>		

<p>c) Are there measures to protect cultural resources from natural disasters?</p>		<p>FLUE Objective 5 Glades County will continue to review distribution, rate, and type of growth and development to ensure it is consistent with the supportive capacities of natural and manmade systems while ensuring the protection of natural and historic resources. FLUE Objective 5 Policy (d) Restrict urban growth and development to protect significant historical/ archaeological resources, as depicted on the FLUM or discovered by construction or development survey, consistent with the Florida Department of State guidelines. CE Objective 5 Policy (d) Preserve the County's historic and archaeological sites.</p>	<p>The LMS could include an analysis of historic structures and recommend hazard mitigation measures if needed. This would support the policies in the Comprehensive Plan that aim to protect historic, archeological, and cultural sites in the County.</p>		
<p>Strategy 5 - Manage the development and redevelopment of land in hazardous areas</p>					
<p>a) Are there measures to limit population densities in high-hazard areas?</p>			-		
<p>b) Are there measures to limit public expenditures that subsidize development in high-hazard areas?</p>					
<p>c) Are there creative neighborhood design solutions or development regulations that mitigate hazards, such as clustering or transfer of development rights?</p>			-		

<p>d) Are there measures to limit redevelopment in hazard areas and procedures for post-disaster recovery that will lead to a more disaster-resistant community?</p>	<p>Objective 1.11: Provide guidance for responsible post-disaster redevelopment.</p>		<p>Currently, there are no policies in the Comprehensive Plan that addresses post disaster redevelopment. Specifically, policies could require redevelopment of damaged structures to conform to existing building standards or to newly established structure elevations and flood proofing code.</p>		
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Abbreviations: G= Goal; O= Objective; P=Policy; PDRP= Post-Disaster Redevelopment Plan; HVZ= Hurricane vulnerability zone; CHHA= Coastal High Hazard Area; LMS= Local Mitigation Strategy; CEMP= Comprehensive Emergency Management Plan; DEM= Department of Emergency Management; LDRs= Land Development Regulations; ESLs= Environmentally Sensitive Lands; ULDC= Unified Land Development Code; SFWMD= South Florida Water Management District; TDR= Transfer of Development Rights.

CE= Conservation Element; CME= Coastal Management Element FLUE= Future Land Use Element; ; CIE= Capital Improvements Element; ICE= Intergovernmental Coordination Element; ROSE= Recreational and Open Space Element; PWWSE= Potable Water and Wastewater Sub-Element; HHSE=Health and Human Services Element; SE= School Element; FRSE= Fire-Rescue Services Element

6. Sources

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Attachment A

**Maps of the Existing and Future Land Uses
within the 100-year Floodplain**

Attachment B

**Maps of the Existing and Future Land Uses
within Wildfire Susceptible Areas**

Attachment C

Glades County Local Mitigation Strategy Goals and Objectives

GOAL: CREATE A DISASTER RESISTANT COMMUNITY WHERE FEASIBLY POSSIBLE.

Objective 1.1: Maximize the protection of the public's health, safety, and welfare as they are related to disasters.

Objective 1.2: Reduce the loss of personal and public property due to disasters.

Objective 1.3: Require the protection of natural resources (such as environmentally sensitive lands) in order to maximize their mitigative benefits and to safeguard them from damage caused by natural disasters.

Objective 1.4: Ensure that County and City codes and standards are enforced to protect public safety and property.

Objective 1.5: Coordinate with all levels of governmental agencies where appropriate to prepare advance plans for the safe evacuation and sheltering of county and city residents from disasters.

Objective 1.6: Maintain existing plans and policies to protect public and private property and human lives from the effects of disasters.

Objective 1.7: Ensure current mitigation programs are coordinated with appropriate departments.

Objective 1.8: Continue disaster preparedness public information and education programs.

Objective 1.9: Reduce the vulnerability of critical public facilities from disasters.

Objective 1.10: Incorporate hazard mitigation measures where feasible in any rehabilitation or reuse of existing public facilities, structures, and buildings.

Objective 1.11: Provide guidance for responsible post-disaster redevelopment.

Objective 1.12: Glades County shall actively pursue funding for the purpose of retrofitting public and suitable private buildings to enable these structures to meet State public shelter criteria for wind speed. At such time as funding has been secured, the County shall initiate retrofitting.

Objective 1.13: Glades County shall actively seek funding, and shall initiate the placement of emergency electrical generators in designated public shelters and critical public facilities.

Objective 1.14: Glades County shall increase implementation of strategies to prevent or reduce the potential for hazardous materials incidents.

Attachment D

Glades County Comprehensive Plan Excerpts Related to Hazard Mitigation

Future Land Use Element

- Objective 4 Policy (e) (7) Conservation Land areas designated for the purpose of conserving or protecting natural resources or environmental quality and includes areas designated for such purposes as flood control, protection of quality or quantity of groundwater or surface water, wetlands, floodplain management, fisheries management, or protection of unique vegetative communities or protected wildlife habitats. Maximum densities shall be up to 1 unit per 20 acres. The units allowed by these densities shall be transferred and clustered on adjacent non-conservation areas.
- Objective 5 Glades County will continue to review distribution, rate, and type of growth and development to ensure it is consistent with the supportive capacities of natural and manmade systems while ensuring the protection of natural and historic resources.
- Objective 5 Policy (c) Restrict urban growth and development within conservation lands to densities specified in objective 1, Policy (e) and prohibit the storage and handling of hazardous wastes and materials within conservation lands to ensure compatibility with and protection of environmentally sensitive lands and potable water well fields. The proper temporary storage and handling of Environmental Protection Agency (EPA) approved agricultural materials listed as hazardous, however, may be allowed following approved EPA standards and guidelines.
- Objective 5 Policy (d) Restrict urban growth and development to protect significant historical/ archaeological resources, as depicted on the FLUM or discovered by construction or development survey, consistent with the Florida Department of State guidelines.
- Objective 5 Policy (h) Require development to be consistent with the suitability of soils and their development potential.
- Objective 5 Policy (j) For the purposes of this Plan, environmentally sensitive lands shall include wetlands, unique vegetative communities containing State and Federal listed plant species and habitats for State and Federal listed wildlife species.
- Objective 7 Policy (b) Encourage forest management programs.
- Objective 8 Promote appropriate land uses within the Kissimmee River Floodplain consistent with the Resource Management Plan for the Lower Kissimmee River and Taylor Creek Drainage Basins.

Objective 8 Policy (a)

The County will continue to utilize the following guidelines and standards in the determinations of the uses and structures within the Kissimmee River Flood Plain District, as defined in Ordinance 88-9, as adopted on November 14, 1988,

1. Each determination shall be based on preserving the environmental qualities of the Kissimmee River Flood Plain District.
2. No use, structure, or activity, including the filling of land to change the level of land shall be permitted in any floodway which adversely affects normal flood flows, increases flooding of lands above or below the property, increases erosion within or adjoining the floodway, causes diversion of flood waters in a manner more likely to create damage than does flow in a normal course, increases peak flows or velocities in a manner likely to lead to added property damage or hazards to life, or increases amounts of potentially damaging materials which might be carried downstream in floods.
3. Uses and structures permitted in the floodplain shall be limited to those less likely to be damaged by the kind and amount of flooding anticipated. No area known to be susceptible to frequent and dangerous flash floods shall be used as a place of assembly for substantial numbers of persons during periods when such floods are likely to occur. Any structures permitted in the Kissimmee Flood Plain District shall be so located, elevated on pilings and constructed as to minimize potential hazards and damage from probable flooding or resist flotation, offer minimum obstruction of flood flow and provide that the lowest floor elevation is at least one foot above the base flood elevation as established by the FEMA FIRM. No use shall be permitted which increases amounts of potentially damaging hazardous materials (including those likely to be injurious to health) which might be carried downstream in floods.
4. Uses and structures shall conserve water and maintain or improve present water quality in the floodplain, and will prevent damage which may be caused by degraded water quality and its consequential effect on the environmental resources of the area.

Objective 9 Policy (a)

Land Development Code shall contain at a minimum, the following provisions:

2. Protect environmentally sensitive lands, species and habitats: promote sustainable yield of commercially exploited regulation and wildlife and fisheries; and provide for urban open space, buffering, and opportunities for rural open space acquisition.
3. Regulate areas subject to seasonal and periodic flooding and provide for stormwater management. (Continued) all structures shall be required to be elevated so that the lowest

floor elevation is at least one foot above the base flood elevation as established by FEMA Flood Insurance Rate Maps.

8. Protect significant historical and archeological sites.

Housing Element

Objective 2 Policy (a) Encourage the maintenance of an effective housing code with realistic and humane minimum housing standards as well as an enforcement program.

Objective 4 To encourage environmentally responsible and energy-efficient residential development that will not adversely affect natural systems.

Objective 4 Policy (a) Encourage new residential developments to take every precaution necessary to alleviate possible negative environmental impacts to the air, water and adjacent land area.

Objective 4 Policy (d) Investigate the feasibility of incorporating regulation protecting environmentally sensitive areas into the County’s Land Development Code and or Regulations.

Objective 5 To the extent possible, protect the residents of Glades County from the effects of natural disasters.

Objective 5 Policy (a) Require that adequate precautions against storm damage be implemented in all residential developments.
 Action 1: The Board of County Commissioners shall maintain a current emergency management program providing adequate shelters, provisions, evacuation routes, emergency equipment, and personal to assist County residents in emergencies.
 Action 2: By year-end 2005, the Planning and Zoning Board shall adopt language in the LDC or Regulations requiring future mobile home parks to design support buildings such as laundry and recreational facilities to also function as windstorm shelters for park residents.
 Action 3: The Planning and Zoning Board shall require all residential development to comply with the standards of the National Flood Insurance Program.
 Action 4: The County Emergency Management Coordinator shall implement their responsibilities of the approved regional hurricane evacuation plan for Southwest Florida.

Sanitary Sewer, Solid Waste, Storm Water Management, Potable Water, and Natural Groundwater Aquifer Recharge Element

Goal (1) Ensure that the potable water, sanitary sewer, stormwater management, solid waste, and natural groundwater aquifer recharge needs of the residents of glades county are met economically and efficiently, while protecting the county’s natural resources and environmental quality.

Objective 3 Policy (d) Promote sound water conservation practices for all new development and assist the SFWMD in the implementation of water conservation plans.

- Objective 5 The County will continue to make provisions for adequate management of stormwater runoff to protect the public health, safety and welfare.
- Objective 5 Policy (a) The County will continue to manage stormwater and regulate stormwater management in a manner consistent with the public health and safety and in a manner consistent with the other elements of the Plan.
- Objective 5 Policy (b) Ensure that new development have adequate stormwater management systems.

Conservation Element

- Goal (1)** Provide for the management enhancement and protection of the natural resources of Glades County.
- Objective 1 Policy (b) Promote uses on agricultural lands, combining uses such as agricultural, fishing, recreation, and conservation.

Objective 4 Glades County shall ensure the protection of wetlands, naïve vegetative communities and habitats for the wildlife species by designating such areas as environmentally sensitive and regulating the development of such areas consistent the following policies.

- Objective 4 Policy (a) Development of wetlands shall be conducted as outlined in Objective 1, Policy (f) of the Future Land Use Element and as further defined in this policy.
- Objective 4 Policy (c) Encourage the preservation of native vegetation.
- Objective 4 Policy (e) Continue to support the SFWMD efforts in identifying and protecting by acquisition lands necessary for water management, water supply, and the conservation and protection of water resources.

Objective 5 The County will continue to identify, protect, and conserve the County’s Special Interest Areas and natural preservation areas.

- Objective 5 Policy (a) Encourage the public acquisition or formal protection of the County’s rare and unique areas and participate in protection plans for the protection of unique vegetative communities which are located within more than one jurisdiction.
- Objective 5 Policy (d) Preserve the County’s historic and archaeological sites.
- Objective 5 Policy (e) Promote and protect continued agricultural use of prime agricultural lands.

Recreation and Open Space Element

- Objective 1 Policy (e) Provide for the identification and preservation of the County's historic, archaeological, and other cultural resources.
- Objective 2 Policy (a) Pursue a systematic and integrated approach to acquiring adequate lands for long-range open space and recreational needs.
- Objective 2 Policy (c) Provide for the dedication of open space for recreational and leisure activities, for the betterment of the community and the enhancement of the environment.
- Objective 2 Policy (d) Require developers to donate land for the appropriate sized parks within their development.
- Objective 2 Policy (e) Encourage the use of cooperative acquisition, development, and maintenance agreements to protect areas with open space and recreation potential for public use.
- Objective 3 The Board of County Commissioners shall continue to promote funding sources for the acquisition, development, and maintenance of open space, recreation areas, and natural reservations and coordinate public and private resources to meet recreational demands.
- Objective 3 Policy (a) Establish a capital improvements program for open space and recreation needs.
- Objective 3 Policy (b) Utilize funds obtained from developers for open space and recreation needs.
- Objective 3 Policy (c) Broaden the funding base for recreation and open space, while also participating in Federal, State, or District Recreational Programs.

Capital Improvements Element

- Objective 3 Policy (c) Glades County's annual Capital Improvements Program shall continue to provide for parks and recreation facilities based on needs identified in the Comprehensive Plan and subject to financial feasibility