AGENDA

MONROE COUNTY BOARD OF COUNTY COMMISSIONERS

The purpose of the Workshop Meeting is for workshop discussion between the Board of County Commissioners, the County Administrator and staff for discussion and input regarding issues of concern impacting Monroe County, Florida. The Workshop Meeting will be conducted in workshop format without public speakers, except for those items marked on the agenda as an exception that may lead to legislation in the future. Any communications the public wishes to make to Commissioners on this subject should be made before the meeting. The public is invited to attend but the workshop format will not accommodate speakers from the general public, except as noted on the agenda.

ADA ASSISTANCE: If you are a person with a disability who needs special accommodations in order to participate in this proceeding, please contact the County Administrator's Office, by phoning (305) 292-4441, between the hours of 8:30 a.m. - 5:00 p.m., no later than five (5) calendar days prior to the scheduled meeting; if you are hearing or voice impaired, call "711".

Please note that all time approximate items are listed in bold.

Tuesday, January 26, 2016
Marathon Government Center
2798 Overseas Highway, MM 47.5 (Gulf)
Marathon, Florida 33050

TIME APPROXIMATE **WORKSHOP**

10:00 A.M. CALL TO ORDER
SALUTE TO FLAG

A. ADDITIONS,CORRECTIONS, DELETIONS

1. Approval Of Agenda.

B. DISCUSSION OF THE GREENKEYS! SUSTAINABILITY ACTION PLAN AND ISSUES RELATED TO SUSTAINABILITY AND SEA LEVEL RISE.

Documents: B.PDF

BOARD OF COUNTY COMMISSIONERS
AGENDA ITEM SUMMARY

Meeting Date: January 26, 2016 Department: Sustainability

Bulk Item: Yes ___ No X Staff Contact Person: Rhonda Haag, 453-8774

AGENDA ITEM WORDING: Discussion of the GreenKeys! Sustainability Action Plan and issues related to sustainability and sea level rise.

ITEM BACKGROUND: The County hired the services of Erin L. Deady, P.A. to develop a premier Sustainability Action Plan, using cutting edge technologies and policies vital to the future sustainable health of this County. A nationwide search for vendors was conducted by the project manager. Six (6) responses to the request for proposals (RFP) were received on August 26, 2013. A publicly noticed ranking meeting was held on September 10, 2013 to rank the responses. The top proposal included additional services for climate change modeling, to help the County and its residents determine the economic effects of climate change. The *Climate Change Advisory Committee* reviewed this option at its regular meeting held on September 13, 2013 and unanimously recommended that the BOCC consider approval of this option, in addition to the base Sustainability Action Plan.

The draft Sustainability Action Plan has been completed, posted for public review and comment, and will be presented for discussion. The entire Plan and its' appendices are available at www.GreenKeys.info. In addition, various issues facing the County in the future related to sea level rise will also be discussed.

Today's workshop will include an in depth discussion of the following:
1. GreenKeys! Sustainability Action Plan Executive Summary
2. GreenKeys! Sustainability Action Plan Recommendations Document
3. Five Year Projects Implementation Plan
4. Sea Level Rise Issue Chart

PREVIOUS RELEVANT BOCC ACTION:
7-17-13: Approval to advertise an RFP to develop a Sustainability Action Plan with Climate Change and Energy Savings Initiatives. The RFP included a request for the base Sustainability Plan plus any optional services that would help the County prepare for a fully sustainable future.
10-16-13: Approval to negotiate both the sustainability base contract and the additional climate modeling services.
11-20-13: Approval of the contract with climate change and energy savings elements.
03-19-14: Approval of Amendment No. 1 to modify task and deliverables schedule.
02-18-15: Approval of Amendment No. 2 to add outreach components for sea level rise workshops in the middle and lower Keys.
07-15-15: Approval of Amendment No. 3 which was a schedule revision with no additional cost.
09-16-15: Approval of Amendment No. 4 to add one (1) new modeling scenario for sea level rise.
10-21-15: Approval of Amendment No. 5 for a time extension to account for additional coordination needed on Plan recommendations and provide briefings to Commissioners on the Final Plan as well as adjust the schedule to account for the final workshop in January, 2016.
11-17-15: Approval of Amendment No. 6 for a pilot project on integrating design of stormwater, tidewater and road elements in two (2) communities for sea level rise adaptation and to extend the contract.

01-20-16: Approve a scrivener's error for Amendment No. 6 with Erin L. Deady, P.A. for a pilot project on integrating design of stormwater, tidewater and road elements in two (2) communities for sea level rise adaptation and to extend the contract.

CONTRACT/AGREEMENT CHANGES: Not applicable.

STAFF RECOMMENDATIONS: Approval.

TOTAL COST $N/A. INDIRECT COST: ___BUDGETED: Yes __No ___ N/A___

DIFFERENTIAL OF LOCAL PREFERENCE: N/A

COST TO COUNTY: **SOURCE OF FUNDS:** Not applicable

REVENUE PRODUCING: Yes ___ No _X_ **AMOUNT PER MONTH**____ **Year** ____

APPROVED BY: County Atty ___ OMB/Purchasing ___ Risk Management ____

DOCUMENTATION: Included __X__ Not Required____

DISPOSITION:_____ **AGENDA ITEM #**_____

GreenKeys! Sustainability Action Plan and Sea Level Rise Workshop Agenda
January 26, 2016

10:00 – 10:05 am **Introduction** – Monroe County among most vulnerable to climate change

10:05 – 10:15 am **GreenKeys! Planning Approach** – Summary of Plan approach, GHG summary

10:15 - 11:00 am **GreenKeys! Executive Summary** – Overview of Plan results and vulnerabilities

11:00 – 12:00 pm **Part 1: Sustainability Results and Projects**

a. STAR Assessment
b. Sustainability Recommendations
c. 5 Year Implementation Plan (with Projects and Costs)
d. When to Implement, Cross Department Budgeting, Strategic Planning
e. Sustainability as a Part of Ordinary Decision Making

12:00 – 1:30 pm **BREAK**

1:30 – 3:45 pm **Part 2: Sea Level Rise and Vulnerability Assessment Results**

a. "Big Picture Issues" from the GreenKeys! Plan Development – Issues for the BOCC's consideration to address vulnerabilities
    1. *Issue #1: Integrating Road, Stormwater, Tidewater Design*
    2. *Issue #2: Land Acquisition Priorities*
    3. *Issue 3: Where People Develop and How*
    4. *Issue 4: How Do We Collaborate, Plan For and Fund These Issues*
b. The Future of Monroe County and the Keys – Creative Adaptation, Smart Design, New Uses

3:45 – 4:00 pm **Wrap Up and Actions**

January 26, 2015 GreenKeys Workshop Issue Outline

Topic	Description of Item	Lead Staff
Introduction	Why we are doing this?	R. Haag
GreenKeys! Planning Approach	Brief summary about Plan approach harmonizing elements of sustainability and sea level rise (SLR). Describes data reviewed and sources of Plan recommendations: • Technical data and analysis • STAR Evaluation • Best practices research from other communities	E. Deady
Overview of Vulnerabilities	Very summarized version of previous presentations relating to habitat, water, wastewater, electric, buildings and facilities and roads exposure to 2030 and 2060 SLR scenarios: • Mention relationship to new Compact Projections • Data reviewed to complete analysis • Results of analyses • Results of Greenhouse Gas Inventory	Dr. Evans, Stetson
"Big Picture Issues" from GreenKeys! Plan Development	What we learned from the planning process and what the big policy issues are for the BOCC to consider	E. Deady
Part 1: Sustainability Discussion	Discussion of the results of the STAR Assessment, the recommendations and the 5 Year Plan	E. Deady
Break		
Part 2: Sea Level Rise Discussion	Discussion of SLR modeling and vulnerability assessment results to include: • Impacts we are facing • Discussion of major issues facing County to address vulnerabilities	E. Deady Dr. Evans, Stetson
Issue #1: Integrating Road, Stormwater, Tidewater	**Issue:** • Roads flooding now and will continue in future from tidal-based flooding • Typical rain-driven flooding on roads will become more unpredictable as rainfall patterns change due to climate change (e.g. higher volume events) • Variables will operate independently or dependently in future and road design will need to factor in: 1) additional tidewater impacts from extreme and more regular inundation, 2) reduced capacity	E. Deady

Design[1]		for drainage, 3) additional environmental constraints. • Use adopted LOS for varying infrastructure types to manage County financial responsibility and people's expectations in future as environment changes • People depend upon those LOS for their quality of life • May be necessary to move from incentivizing certain types of development or limiting it entirely consistent with those LOS	
	Current Approach:	• County currently maintains LOS as prescribed in various elements of the Comprehensive Plan • Road requirements in the Code: o CR905 shall have sufficient available capacity to operate at level of service D o US Highway 1 sufficient available capacity to operate at level of service C o All secondary roads to which traffic entering or leaving the development or use will have direct access shall have sufficient available capacity to operate at level of service D • Current approach does not consider impacts of climate change and SLR on LOS	E. Deady
	Solutions:	• County-wide roads vulnerability analysis conducted using FDOT's Sketch Tool to identify vulnerabilities and priorities for the timeline on exposure • GreenKeys! Plan recommends taking information and building upon it to investigate alternative designs based on varying future LOS • Based on new analysis, LOS needs to be adopted for future flood conditions • Potential Solutions: a. Environmentally Challenging Location: St. Johns County Ordinance (2012-35)[2] • Establishes design criteria/standards for roads in "environmentally challenging locations" and defines meaningful access for users • Applies to existing County owned and maintained roads • Design Exception to uniform standards/criteria in Ch. 14 of Greenbook[3] o Allowed designation of roads located in these locations (reso) o Changes the minimum standards of maintenance for roads, allowing: ▪ Unpaved surfaces composed of muck, sand, clay, organics	E. Deady, P. Morris (Leg.)

[1] ** May want to plug Tom Ruppert from UF SeaGrant in to Issue 1 or 3 below. Need to talk to Bob on that.

[2] http://www.clk.co.st-johns.fl.us/MinRec/OrdinanceBooks/2012/ORD2012-35.pdf

[3] State of Florida, Department of Transportation, Manual of Uniform Minimum Standards for Design, Construction and Maintenance for Streets and Highways (May 2011 edition) (a.k.a. "Florida Greenbook") provides uniform minimum standards and criteria for the design, construction, and maintenance of all public streets, roads, highways, bridges, sidewalks, curbs and curb ramps, crosswalks (where feasible), bicycle facilities, underpasses, and overpasses used by the public for vehicular and pedestrian traffic as directed by Sections 20.23(4)(a), 334.044(10)(a), 334.048(3) and 336.045, F.S. Standards established by the Greenbook are intended for use on all new and resurfacing construction projects off the state highway and federal aid systems.

        - Sub-standard lane widths, single lanes of varying widths
        - Vehicle type, size, weight limitations
        - Periods when road may be submerged, buried, covered, blocked
        - No assurance that emergency/service vehicles can use/access
        - Paved surfaces with intermittent pavement, potholes, cracks
        - Other conditions that cause road to be in substandard condition
    - Access to private property served by existing County roads may be limited by naturally occurring conditions, resulting in:
        - Road conditions that require 4 wheel drive vehicle for passage
        - Periods before road repair is done when access is not possible
        - Extended periods when access and the roadway are impassable
        - Instances where road repair cannot be done without permits
    - County no affirmative duty to construct, permit others to construct new roads or extend existing roads in these areas
    - County no affirmative duty to permit construction on property where County determines access is inadequate
    - County no obligation to improve any portion of a designated road located adjacent to property if purchased after designation or conditions visible

b. Minimum Maintenance Roads: ND[4] and many other states (CO, MN, NY)
    - County does not desire to close a road, but unable to spend time/resources to keep road on a full-time maintenance schedule
    - "Minimum maintenance" designations expressly established
    - County not liable for claim based on designation, repair, operation, maintenance of roads if procedural requirements followed when County designates road and maintained "to serve occasional and intermittent traffic"
    - Sample procedure for designating a minimum maintenance roads:
        - Designate road as minimum maintenance road
        - Determine road only used "occasionally or intermittently"
        - Identify beginning and end of road
        - Notify each adjoining political subdivision of designation made

c. Flood Protection Level of Service: South Florida Water Management District
    - Flood Protection LOS

[4] The procedures for minimum maintenance roads are set forth in sections 24-07-35, 24-07-36 and 24-07-37 of the North Dakota Century Code.

		o To identify and prioritize long-term SFWMD infrastructure needs o Provide process to establish flood protection thresholds for each basin. Thresholds established then initiate retrofit/other adaptation. Threshold is basin specific based on assessment, not uniform everywhere. o Adaptation coordinated with annual structure maintenance program • Conceptual Adaptive Resilience Model o Establish SLR where infrastructure no longer provides flood protection o Based on rebuild time, establish conditions to trigger replacement o Monitor conditions, initiate adaptive strategy once conditions realized d. <u>LOS in Traffic Context</u> • Typically based on how well traffic flows on a given street or highway • Relates to highway width, lane number, percentage of trucks, traffic volume, turning movements, lateral clearances, grades, sight distance, travel speed, etc.	
	<u>Next Steps:</u>	• Overview of current road design criteria and permitting considerations • Identify opportunities/constraints in areas that see future flood impacts near term • Develop alternative designs to address alternative LOS • Decide on LOS for various infrastructure County-wide • Adopt policy to manage expectations on future LOS	
Issue #2: Land Acquisition Priorities	**<u>Issue:</u>**	• County facing large commitments on future land acquisition as ROGO units diminish • Numerous factors influence land acquisition strategy such as location, environmental quality, value, future quality and maintenance responsibility • Factors will be impacted by SLR and climate change in the future	E. Deady
	<u>Current Approach:</u>	• County currently: o Has 2 dedicated sources of funding for purchasing land (1 cent tax, state park surcharge) o Incentivizes dedication of land o Has a discouragement policy to discourage increased density/intensity on private parcels o Commercial FLUM category created and redesignation encouraged o Revised ROGO to make simpler, encourage nonresidential development/redevelopment	
	<u>Solutions:</u>	• Harmonizing current land acquisition strategies and adding new factors, mapping and data completed in GreenKeys! process to determine if policy shifts are warranted • Investigate sources of funding support for acquisitions to address SLR/climate change • Potential Solutions: a. <u>July 18, 2013 BOCC Discussion</u> – current land acquisitions not adequate • 10 year ROGO allocations 3,550 County/cities; risk of 6,198 private vacant parcels at risk of	

not getting permits ($248 Million value); deficit could trigger takings claims

- Staff presented 16 strategies to the BOCC to address the issue, including:
  - Encouraging state and federal government to acquire properties in the County
  - Reduce rate of ROGO allocation to extend time remaining for available units
  - Further incentivize lot aggregation - expand to all tiers
  - Allow transfer of developing units - market rate to market expansion
  - Redesignate commercial to alleviate demand on residential ROGO
  - Eminent domain
  - Purchase tax certificates and deeds on delinquent properties
  - Various funding options, tourist impact tax, sales tax, special taxing authority
- July 25, 2014 - BOCC approved contract for TPL to identify options for purchasing land
  - TPL 2015 report identified 4 viable opportunities for financing acquisitions
    - General obligation bonds – issue bonds and levy property taxes to pay debt service on the bonds
    - Property tax – dedicated to park and open space purposes
    - Sales and use tax – dedicate more current revenue for acquisition
    - Special district – form one to levy ad valorem taxes or special assessments within unincorporated area

b. Criteria for Land Acquisition – Case Studies

- Coastal MD - Using SLAMM model results, selected additional criteria to prioritize areas for conservation, including criteria for maintaining areas in future: large continuous wetland areas, diversity of wetland types based on projected wetland rates of loss, new wetland areas, habitat type/size required by most wetland-dependent breeding birds.
- Oakwood Beach, NY: After Sandy, residents petitioned to be bought out of homes ($400M). Designated as an Enhanced Buyout area. Buyout critical to implementing large-scale mitigation project to reduce risk to surrounding area. Proposed network of natural infrastructure protections for post-buyout area including tidal wetlands, maritime forests, breakwater reefs, earthen levees, recreational overlays. If not acquired, NYC required to maintain roads for limited number of remaining at-risk residents. *Criteria for buyout*: 1) located in an eligible county; 2) located in 100 year floodplain; 3) damaged during qualified storm event; 4) matches defined eligible types and not otherwise ineligible; 5) in an Enhanced Buyout Area. *Criteria for acquisition:* located in an eligible county; 2) located in either 100 year and/or 500 year flood plain; 3) damaged during qualified storm event; 4) matches one of the defined eligible types and not otherwise ineligible; 5) property was

		Substantially Damaged • Sidney, NY - flooded during Irene/Lee; Camp Street neighborhood vulnerable. Led by state to acquire all properties in neighborhood, return to natural state, implement green infrastructure to create a recreational area to reduce risk of flooding, and relocate residents to new, affordable development in secure area. c. Land Acquisition for Conservation or Mitigation Purposes - Case Studies • NJ Coastal Blue Acres Program - authorizes $15 million in bond funding for grants/loans to municipalities to acquire lands in coastal areas for recreation/conservation. Priority lands are those damaged by storms, prone to storm damage, or buffer or protect other lands from storm damage. • CA Coastal Commission - coordinating with State Coastal Conservancy to facilitate acquisition of property in high-risk areas. • NY - incorporated SLR into Open Space Conservation Plan. Going to develop long-term program to prioritize high risk floodplain areas for conservation through acquisition/easement; facilitate tidal wetland migration.	
	Next Steps:	• Overview of future land acquisition needs and constraints • Summary of current factors driving land acquisition decisions • Determine what considerations are missing to address SLR and climate vulnerability • Adopt policy or direction to address more comprehensive criteria	
Issues #3: Where People Develop and How?	**Issue:**	• In future, SLR will impact infrastructure that serves neighborhoods • May be certain infrastructure unable to be maintained the way it is today • In more vulnerable areas, public health, safety and welfare may dictate that development or redevelopment may not be able to occur or be more regulated than it is today	E. Deady
	Current Approach:	• New Development limited by ROGO; current regulations include setbacks/buffer, require elevation • Redevelopment influenced by TDR program but not currently structured to include SLR; no current consideration of rolling easements	
	Solutions:	• Potential Solutions: a. Adaptation Action Areas Case Study – Satellite Beach, FL • Recognizing risks of SLR, produced topographic map, conducted vulnerability assessment, initiated planning process to mitigate impacts • Used elevation data to estimate when areas of community would flood • About 5% of town would experience annual flooding at 2' of SLR • Adaptation options –	E. Deady, ???

- dikes, levees, seawalls impractical for protection because barrier island's geology would allow water to flow under such structures
- relocation to higher ground complicated by 98% built-out; topography
- most likely response is accommodation through redevelopment at increased density on small amount of higher ground, with expectation of abandonment far enough in future to recoup redevelopment cost

- Adopted designation of Adaptation Action Area for protection of residents, prevention of property damage, reduction in flood insurance premiums
- Now in process of identifying Adaptation Action Areas

b. <u>Sea Level Rise Overlay Zones</u>

- Create SLR overlay zone: areas most vulnerable to impacts where special regulations could be imposed.
- Can prohibit/condition expansion of major renovations; prohibit/condition rebuilding of damaged structures; or require elevation
- Can create different zones:
  - Protection zones—areas with critical infrastructure and dense urban, permit coastal armoring, require soft-armoring if feasible
  - Accommodation zones— to allow new development but limit intensity and density, limit hard shoreline armoring, require structures be designed/retrofitted to be resilient to floods
  - Retreat zones—prohibit hard armoring, limit or prohibit rebuilding of damaged structures, require removal/relocation of inundated structures
- MD SLR Overlay Zone Ordinance (App. A, pg. 59) [5] contemplates 3 adaptation districts:
  - Conservation/retreat zone - designed to gradually relocate development out of vulnerable areas and protect natural resources
  - Accommodation zone - designed to allow for continued development while requiring that structures be more flood resilient
  - Protection zone - designed to permit hard shoreline armoring in areas with dense development and critical facilities
- Chesapeake Bay Critical Area law - uses overlay zones to protect/restore water quality and habitat[6]; regulate development based upon status of development in three areas:

[5] https://www.google.com/url?sa=t&rct=j&q=&esrc=s&source=web&cd=2&ved=0ahUKEwi8qOPE0ODJAhWJyyYKHUd6AkMQFggjMAE&url=http%3A%2F%2Fdnr2.maryland.gov%2Fccs%2FPublication%2FGCC_MD-SLROrdRpt_FINALv3_11-2011.pdf&usg=AFQjCNFPt0VSnmqRQMuvIFbNaaFDIkzCIw&sig2=FxqgBl4uHJ0m_JKnLgZSjQ&bvm=bv.110151844,d.eWE&cad=rja

- intensely developed areas—developed areas with little habitat that are preferred location for new development
- limited development areas—lightly developed areas where any new development must protect habitat
- resources conservation areas—predominantly wetlands where only limited residential development is permitted

c. Codes and Regulations

- Resilient Design/Construction Standards - FORTIFIED Home standards[7] added to Code to incentivize stringent building standards; add to ROGO.
  - AL, MS, NC - enforced mandatory insurance credits if home has one of these certifications at state level. Orange Beach, AL, decided to put recommendations into code. Moore, OK put in place measures to strengthen properties against tornadoes that reflect recommendations in FORTIFIED program.
  - FORTIFIED Home™ is set of engineering/building standards designed to help strengthen new/existing homes through system-specific building upgrades to minimum building code requirements that will reduce damage from specific natural hazards. Three levels of designation:
    - Bronze - addresses improving roof system, attic ventilation system
    - Silver - addresses improving exterior opening protection
    - Gold - addresses design/installation of continuous load path
- Setbacks and buffer zones –
  - Setbacks - building restrictions that establish distance from a boundary line where land owners are prohibited from building structures
  - Buffers (or buffer zones) - require landowners to leave undeveloped portions of property that provide important natural processes.
  - Both established through zoning, subdivision, or floodplain ordinances.
  - Several different mechanisms for establishing setbacks and buffers:
    - Fixed mandatory setbacks - require all structures be set back a specific distance from a predetermined point
    - Erosion-based setbacks - determined by projected shoreline position that assumes specific increase in SLR/erosion over time
    - Tiered setbacks - require a lesser setback or buffer for smaller structures and a

[6] Md. Code Ann., Nat. Res. § 8-1802 (2015).
[7] https://disastersafety.org/fortified/fortified-home/

greater setback for larger structures

- To incorporate consideration of SLR, County could require coastal setbacks/buffers be established based upon a projected shoreline position that assumes specific increases in sea level or erosion rates over life of structure. County could also require new development along dynamic coastal shorelines evaluate potential impacts from a specific rate of SLR. County could also limit development where it cannot include sufficient setbacks to mitigate SLR impacts.
- Case Studies:
  - Chesapeake Bay Preservation Act - allows local jurisdictions to require development adjacent to Bay include a 100-foot buffer measured inland from edge of wetlands, shores, or streams
  - ME Sand Dune Rules - require structures >2,500 sq. ft. be set back a distance calculated based upon future shoreline position considering 2' SLR over 100 years
  - NC - allows tiered setback based upon size/type of structure; determined by vegetative line and annual average rate of erosion. Smaller structures (< 5,000 sq. ft.) set back 30x erosion rate; larger structures set back 60-90x erosion rate

- Rolling Easements-
  - Established to prevent development from impeding inland migration of coastal resources
  - Can be created by three mechanisms: 1) state-level statutes ("rolling coastal management statutes"), 2) "rolling" conservation easements, and 3) conditions imposed in development permits
  - For each, land-use restrictions imposed by reference to tide line or other natural feature (e.g., vegetative line). Restrictions "roll" because reference feature fluctuates with natural coastal processes.
  - Case Studies: Rolling Easement Statutes
    - ME Sand Dune Rules - combine limits on upland development, prohibitions against sea walls to create rolling coastal management statute. Projects not permitted is expected to be eroded or damaged by 2' SLR within 100 years. To obtain a development permit, applicants must provide data to show how project will be impacted by 2' of SLR.
    - SC Beachfront Management Act - "40-year retreat policy," establishes state's preference for preserving coastline by requiring gradual relocation of development away from coast. Requires erosion-based setback, prohibits new

coastal armoring.

- Transfer development credits/rights (TDC/TDR)–
  - Market incentives to shift development to areas where preferred
  - Through zoning ordinances, designate areas where discourage development ("sending areas"), allows owners to sever development credits, sell to areas where encouraging development ("receiving areas").
  - County's TDR program could be redesigned to address SLR. Could amend to: (1) restrict development in vulnerable areas, designate as "sending areas"; (2) designate inland "receiving areas" where development is appropriate, increased density is desirable; and (3) establish development credit market to give affected owners incentive to transfer development rights rather build threatened sites.
  - Case Studies:
    - Ocean City, MD - innovative TDR program to compensate owners for private property taken to construct dunes north of boardwalk and seawall. Allowed landowners to sell development rights to developers/owners in a receiving district; used comprehensive plan to determine receiving zones, created using an overlay district.

d. <u>Relocation Case Study – Longboat Key, FL</u>

- Defense against coastal erosion and SLR is beach renourishment and relocation inward, demolish susceptible/destroyed ones and replace with inland, elevated homes
- Property value is in land not structures, so moving homes is economically unfeasible.
- Owners choose to demolish rather than purchase new land to move shoreward.
- Example of difficulty of relocation as response to SLR, no government action taken
- What can be learned from Longboat Key:
  - relocation can be a feasible response to shifting coastlines
  - buildings that are realistic to move and availability of space to which to move are minimum requisites for relocation to work
  - when value of property resides almost exclusively in land and very little on structure on land, little likelihood of structures being moved.
- Lessons may still apply where possibility of living in areas for a while but moving as hazards threaten or in areas slated for redevelopment after storm. Implementing policies that recognize these lessons could include:
  - Require building design/construction that makes relocation feasible
  - Ensure availability of a viable parcel for relocation

	Next Steps:	• Determining what developable areas in County will be impacted the greatest • Determine what County's responsibilities are for maintaining infrastructure supporting those areas • Make level of service determinations on what is feasible in those areas in future • Modify land development regulations and land uses accordingly	
Issue 4: How do we Collaborate, Plan for and Fund these Issues?	**Issue:**	• Issues related to this type of future planning are complex • In government, silos form where cross-departmental coordination is not clear • Several areas where this type of collaboration could occur are infrastructure design, facilities retrofits, land development regulations, legislative goals, capital planning and budgetary process and legal input	E. Deady
	Current Approach:	• County has numerous places where this collaboration occurs at a high level, but it needs to occur at a more detailed level on a more consistent basis. • Collaboration is preliminarily beginning for current projects and can be expanded for projects in the CIP (through 2020) and all future capital projects beyond that.	
	Solutions	• Mechanisms such as "development review", Director's Meetings, and budget development exist, but there needs to be a specific discussion about how SLR and climate issues are being factored or considered in that decision making. • Legislatively, collaboration on funding opportunities, appropriations and new programs, laws and regulations should be coordinated with the project development and land acquisition factors and criteria developed to plan for change. • Potential Solutions: a. Collaboration - Case Studies • MD Working Group - recommends planning efforts for new/modified capital projects, transportation planning, stormwater management, and infrastructure siting assess SLR and storm surge vulnerability. Recommends that design of future public projects, including roads, bridges, tunnels, landfills, water, and wastewater treatment plants, etc., should consider effects of climate change and SLR. • NC Ocean Policy Steering Committee - recommends development of a 'worst-case scenario' planning document to establish general policies for identifying areas/infrastructure that may no longer be supported through public funds. Would apply if SLR progresses at rate that would make it unwise/uneconomical to continue to maintain certain areas/infrastructure on threatened barrier-islands. • WA Working Group - recommends state include best available data on SLR in design of new coastal facilities and major repairs and consider SLR when funding. b. Capital Improvement Program (CIP)	

		• Consider future sea-level rise when developing CIPs c. <u>Strategy Example: Grant Funding</u> • Several grants available for SLR and coastal resilience planning: o FEMA's Pre-Disaster Mitigation Grant Program; Hazard Mitigation Grant Program; Flood Mitigation Assistance Program o FDEP Coastal Partnership Initiative o NOAA's Coastal and Marine Habitat Restoration Grant Program d. <u>Assessments</u> • Case Study: City of Miami Beach Stormwater Utility Assessment o Combatting SLR with new pump stations; 60-80 pumps installed by 2020; placed where water from high tide spills onto streets to pump 14,000 gpm back into sea o $300 million project, fund with three $100 million bonds o Also, new Stormwater Utility Fee collected from all homeowners, businesses and hotels to help fund project o Passed 09/14 (Ord. 2014-3894), utility service charge for all customers increased from $9.06 to $16.67/mo. o Increase will provide financial coverage to issue first bonds	
	<u>Next Steps:</u>	• Policy direction to make collaboration a leading principle in service delivery • Specific coordination to manage implementation of Plan recommendations • Collaboration on project design to address future flood risk • Assuring project design or County equipment/asset acquisitions factor in most energy efficient alternatives to reduce cost and GHG emissions • Coordinate on budget development/review to assure climate/SLR issues addressed • Coordination between emergency management (LMS process), floodplain management, land development process to address future flood risk from SLR • Aligning legislative opportunities with new climate/SLR priorities • Legal issues – LOS, takings, etc.	
Wrap Up and Actions		• Not every issue above may result in specific action as an outcome of this Workshop • Consensus/direction from BOCC will be sought for staff to bring back specific proposals integrating GreenKeys! recommendations into policies and procedures • Annual Report Card of the GreenKeys! Plan can be used to track/measure progress • 5 Year Plan to initiate process of becoming more sustainable and resilient	R. Haag

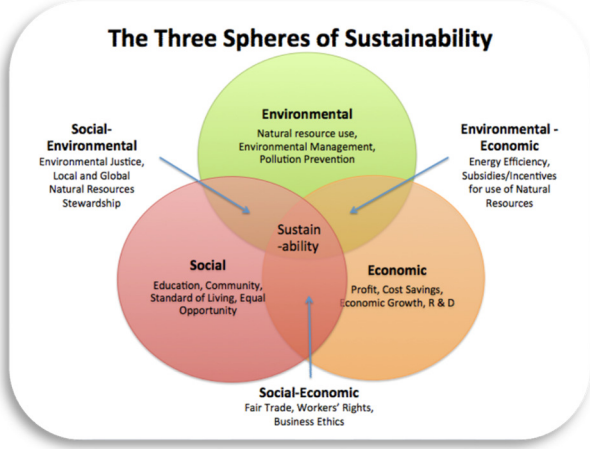
1. Executive Summary

Monroe County (the "County"), like many other Florida counties, stands at a crossroads faced with uncertainty not only over what the true impacts of climate change and sea level rise will be, but also how soon they will be felt. This GreenKeys! Sustainability Action Plan ("GreenKeys! SAP" or "SAP") is a planning document that identifies and addresses challenges Monroe County will face in the coming years from climate change and sea level rise. This SAP also evaluates efforts the County can consider to increase its overall level of sustainability in an attempt to help mitigate the impacts of climate change and sea level rise on County residents, infrastructure and habitat. The GreenKeys! SAP process is the first step in helping the County become better prepared and ultimately more resilient over the long term.

Boca Chica Key, FL
Photo Source: GreenKeys! Project Team

The SAP provides a summary of the activities conducted with public participation and as part of the overall GreenKeys! sustainability and climate planning project to create a more sustainable Florida Keys. It includes results of the County's vulnerability assessment, sea level rise modeling efforts, as well as an evaluation of the County's current level of sustainability using the Sustainability Tools for Assessing and Rating Communities ("STAR") community rating system. More importantly, this document provides a comprehensive set of recommendations designed to put the County on a proactive path towards increased sustainability and overall resilience to face climate change impacts and sea level rise.

A key outcome of the GreenKeys! SAP planning process is integrating decision making across multiple government disciplines. Such integration incorporates climate change and sea level rise adaptation and response into the County's policies and procedures. Integrated climate change and sea level rise adaptation and response requires harmonizing issues related to transportation, shoreline and buffer management, land use, building codes, infrastructure readiness and design, natural resource management and emergency preparedness.



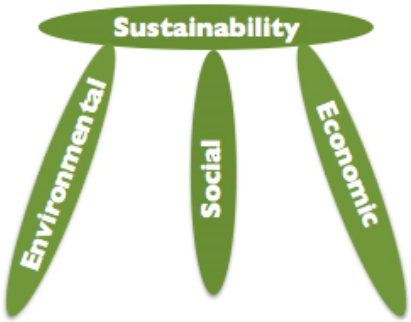
Sustainability Spheres
Photo Source: *www.newsustainabilityinc.com*

Sustainability Planning

Since 2007, Monroe County has devoted resources to sustainability planning initiatives. Sustainability is a holistic concept focused on meeting current community needs without compromising the ability of future generations to meet their needs. Sustainability is broad, including not only the environmental needs but also the economic and social needs of a community. For local governments, sustainability is achieved when "the three e's" - environment, economic and equity (social) - are balanced. Environmental sustainability includes ecosystem restoration and habitat preservation (terrestrial and aquatic), water

conservation, and greenhouse gas ("GHG") emissions reductions. Social sustainability focuses on optimizing the quality of life for community residents and includes social equity, livability, community health and safety, affordable housing, and cultural diversity. Finally, economic sustainability includes workforce development, economic opportunity, and sustainable business practices.

Sustainability is in essence about efficiency, prioritizing ways to efficiently use resources, enhance quality of life and promote economic viability for future generations. Often analogized as a three-legged stool, sustainability cannot be achieved without careful consideration of each "leg" of the stool. When one leg of the stool is eliminated or underachieved, the balance of the stool – or sustainability – is lost.



Sustainability Stool
Photo Source:
https://bridgebrighton.wordpress.com/2012/11/20/defining-sustainable/

Sustainability planning encompasses a wide range of issues, including:

- ✓ Identifying ways to make homes and businesses more energy efficient;
- ✓ Encouraging renewable energy use and deployment to reduce dependence on fossil fuels;
- ✓ Conserving and protecting natural resources (both terrestrial and aquatic);
- ✓ Reducing waste generated throughout a community; and
- ✓ Growing a sustainably-focused, green economy.

Responsibility and accountability are essential to making the County as a whole more sustainable. Everyone, including individuals, families, communities, businesses, and government, has the responsibility for achieving a sustainable Monroe County. Each of these groups must recognize that the decisions they make affect the sustainability of Monroe County. For the overall sustainability level of the County to increase, several things need to occur. County staff will need to implement these GreenKeys! SAP strategies and recommendations as part of their regular and annual work plans. The Mayor and Board of County Commissioners should have a standing agenda item to discuss sustainability planning and adaptation as sea level rise modeling is updated and as response technologies advance. County staff will need to continue educational outreach on these issues while continuing to seek public input to further the best exchange of progressive ideas in managing future growth. Finally, the County should continue to work with other Florida counties creating and streamlining an appropriate governance structure related to sustainability in the region.

Key Largo Flooding
Photo Source: GreenKeys! Project Team

Sea Level Rise Planning

As the earth gets warmers, sea levels rise because: (1) as ocean water warms, it expands and causes the average level of the ocean to increase, and (2) as glaciers and ice-caps melt, water empties into the oceans and causes the average level of the ocean to increase. These global events ultimately

result in a local rate of sea level rise in Monroe County. While no one is certain the extent to which this will occur in the future, there is consensus among the scientific community that these processes are accelerating and thus we will see higher sea levels in years to come. Knowing this, the GreenKeys! SAP focuses on addressing the impacts from climate change and sea level rise which can include: (1) planning and implementing adaptation measures and (2) building adaptive capacity based on knowledge gained from a vulnerability assessment. Both are needed for successful adaptation planning.

- ✓ Adaptation measures are actions that can be taken by the County and residents to prepare for climate change and sea level rise in a particular location. These actions can include restoring environmental areas, raising buildings above flood elevations and retrofitting infrastructure, some of which are described in more detail in Section 6(g) of this GreenKeys! SAP. In general, these adaptation measures will ultimately be planned and implemented by landowners, business owners and the County to address projected impacts.

- ✓ Building adaptive capacity means developing the data and ability to assess the potential impacts of climate change and sea level rise and to select and implement appropriate adaptation measures. Capacity can mean a combination of elements, including: collecting data and information to identify adaptation measures, technical review of that data to make informed choices, funding to implement adaptation measures, assuring laws and regulations do not create obstacles for implementing adaptation measures, information about the economic benefits of adaptation, and the ability to gain public support for implementation.

Sea level rise is just one of many challenges to living in an island community. Coupled with hurricanes, extreme storm events and flooding, residents and stakeholders throughout Monroe County and the Florida Keys, including the real estate community, need to become educated about the impacts of climate change and sea level rise in order to make informed decisions about how to best adapt in their communities.

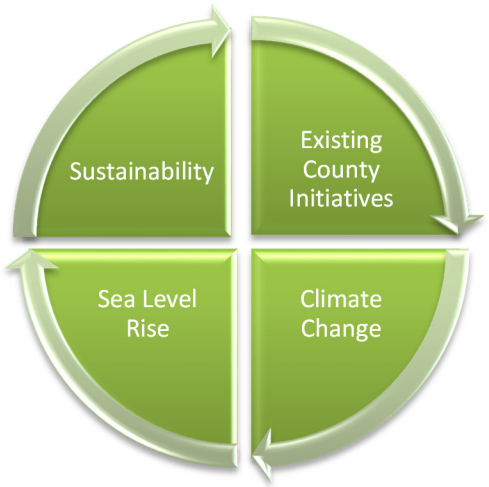
Nuisance Flooding, Monroe County, FL
Photo Source: Greg Corning

Inherent in this type of planning is some level of uncertainty due to the predictive nature of changing conditions related to sea level rise. While it is quite conclusive that sea levels are rising (based upon National Oceanic and Atmospheric Administration ("NOAA") tide gauge data), the rate at which that change takes place is planned for based over a range of scenarios. Those ranges support the adaptation responses proposed in this planning effort. As more data becomes available, those ranges may narrow or new assumptions may be better to rely upon to make decisions in response. Revisiting the best data on sea level rise assumptions should be tied to a specific period of time, like every (3) three years, or when an entity like the Southeast Florida Regional Climate Change Compact ("SFRCCC") updates their projections. The continual development of better data from which to make decisions is

a constant theme in this GreenKeys! SAP. This planning effort itself has resulted in improved datasets for use in future mapping and decision making, but there will continue to be some level of uncertainty associated with sea level rise planning that must be proactively managed.

GreenKeys! Guiding Principles

This planning effort is based on best available data, existing sustainability and planning initiatives, and current strategic County goals and objectives. As a result, the following "Guiding Principles" have driven this planning effort:



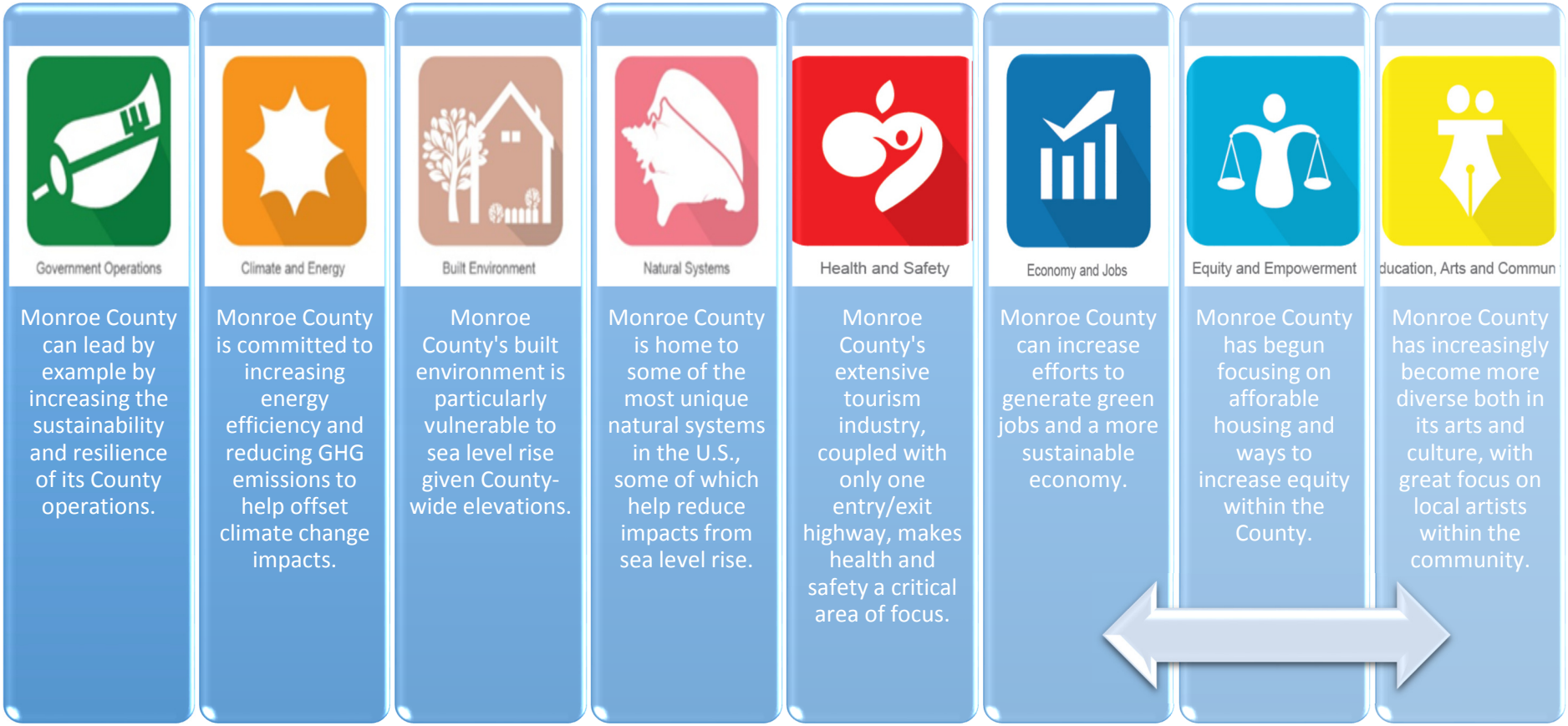
- The time is now to begin sustainability and adaptation planning and implementation, we can adjust and make improvements into the future as more information becomes available;
- Incorporate sustainability, climate change and sea level rise adaptation into existing County programs and initiatives including procurement, design of capital improvements, land acquisition/management, and planning decisions;
- Engage the public in sustainability, climate change and sea level rise adaptation decisions;
- Educate County stakeholders, including the public and business communities, as better science and County-specific data become available;
- Use the best available science to guide future decision-making;
- Balance the protection of homes and businesses, infrastructure and the conservation and preservation of natural resources;
- Strive for equity in the selection of adaptation measures benefitting as many people as possible; and
- Pursue user-related funding options, as appropriate.

GreenKeys! SAP Purpose, Structure and Contents

Monroe County's GreenKeys! SAP is intended to provide guidance for current and future decision makers, County employees, Board of County Commissioners, and County residents and business owners. The strategies and recommendations provided in this GreenKeys! SAP are meant to help guide the County in becoming more sustainable. The SAP seeks to engage the community and build resilience in the face of challenges, including climate change, sea level rise, and even economic crises. This document should be used and modified as necessary as new data, technologies and practices are developed that impact the County. This GreenKeys! SAP is broken down into the following sections:

1 • Executive Summary
2 • Introduction and Background
3 • History of Sustainability and Climate Change-Related Efforts to Date
4 • Policy and Regulatory Overview of Sustainability and Climate Planning
5 • Greenhouse Gas Inventory Update
6 • Overview of Other Data for Development of the Plan
7 • Use of Sustainability Tools for Assessing and Rating Communities
8 • GreenKeys! Focus Area Prioritization
9 • Projects and Initiatives
10 • Public Involvement
11 • Implementation Strategy
12 • Conclusion
13 • Appendices

The GreenKeys! SAP contains six (6) main Focus Areas with specific relevance to Monroe County as depicted in the graphic below. Because of their similarities, Economy & Jobs, Equity & Empowerment and Education, Arts & Community have been combined into a single Focus Area for discussion purposes throughout the remainder of this document. These Focus Areas were identified as important to the County because of its unique natural environment and population and they align well with County priorities for future planning and project implementation. Each Focus Area contains a number of goals and recommendations with key timeframes, funding sources and implementation options provided for each recommendation. Time frames are listed as short-term (1-3 years), medium-term (3-5 years) and long-term (greater than 5 years). Some of the goals and recommendations provided are very specific and ambitious, while others are more generally or broadly stated.



What's Ahead?

Monroe County will experience many impacts from sea level rise in the coming years, including nuisance flooding, fluctuations in storm severity and changes in ecosystem and species composition. Climate change will also likely have impacts on County residents and visitors, including changes in average daily temperatures, annual precipitation rates and volume, and even human health impacts. The County can however, with proactive planning and informed decision making, minimize these impacts to ensure its environmental and economic viability for decades to come. Proactive planning is proven to be more effective than reacting after particular impacts occur. In the case of hazard mitigation expenses, returns on

investments are very positive. For example, the National Institute of Building Sciences found that for every dollar spent by the Federal Emergency Management Agency ("FEMA") on natural hazard mitigation, the result was $4 in future benefits.[1]

- Nuisance Flooding. Sea level rise is expected to cause an increase in the frequency of minor flooding events, or "nuisance floods." Nuisance flooding events are typically associated with little or no permanent damage to human assets and recede quickly with the outgoing tide. Two (2) typical consequences of nuisance flooding include temporarily slowed or stopped traffic flow through low-lying roads and damage to saltwater intolerant landscaping plants in low-lying yards. However, it is well-known that nuisance tidal flood events can also lead to temporary, but sometimes significant, loss of stormwater drainage potential. Assessment of the Vaca Key tide gauge from 2010-2014 indicates that the 1.08 feet above mean higher high water ("MHHW") threshold is currently being exceeded approximately four (4) times per year which is the threshold for that type of flooding at that location. In terms of increased flood inundation, we can particularly expect to see greater impacts during the Spring and Fall high tides (King Tides) which are the highest over the course of the year.

Nuisance Flooding, 11th Street Boat Ramp, Monroe County, FL
Photo Source: GreenKeys! Project Team

- Storms, Erosion and Precipitation. Rainfall levels are also expected to fluctuate, though exact increases or reductions are much more difficult to predict given the number of factors at play. Monroe County has already begun to see stronger storms with increased storm surge and wave heights during hurricanes. This will be magnified as coastal water depths increase with sea level rise, amplifying the damage potential of these hurricanes. In lower lying areas, stormwater drainage will be increasingly problematic with heavy rainfall during hurricanes and severe storms. More frequent floods, hurricanes and tropical storms will likely have tangible impacts for County residents. There is also a correlation between long-term erosion and sea level rise rates. Therefore, areas already exhibiting signs of erosion will likely continue to do so at an accelerated rate as sea level rise accelerates.[2]

- Exotic Species. As annual temperature and rainfall patterns change and vegetative ecosystems migrate due to higher sea level and increased salinity, new and more prevalent invasive, exotic pests and plant/animal species will likely become established throughout the Keys. Invasive and exotic species of plants and animals are threats to the native ecosystem because they have no known predators and can therefore become the pervasive species. It will be increasingly critical to further efforts to control the movement and overall distribution of both exotic plant and animal species to protect the health of existing ecosystems and people in Monroe County.

- Health Impacts. Within the County, several human health impacts could occur including heat impacts, vector borne diseases, extreme weather events, air quality, and waterborne diseases. As the global climate changes, average annual temperatures are expected to rise in South Florida. Extreme heat, more days with temperatures over 95° F, and a longer summer season will have impacts on the County's residents, businesses and visitors. These impacts will range from human health impacts, increased incidence of heat-related illnesses, to increased demands for electricity and fresh water. Heat stress affects human health in several ways, most frequently exacerbating chronic conditions like respiratory and cardiovascular disease. Increased temperatures will also lead to higher electricity consumption rates and resulting GHG emissions. These impacts may also affect the health care system. Additional vector borne diseases may be able to prevail in new environments as the natural barriers of inhospitable environments to the vectors of such diseases are diminished in a warming climate. Air quality impacts may result in heightened levels of allergies and respiratory disease. Additionally, pathogens and pollutants from runoff and flooding have the potential to enter water supplies, while increased temperatures can support pathogen growth, and concentration of these agents under drought conditions can increase the threat of waterborne diseases.

Expected Impacts in Each Focus Area and Summary of GreenKeys! SAP Recommendations

Climate change and sea level rise will affect each of the following six (6) Focus Areas addressed in this GreenKeys! SAP. To address these affects, the Team identified important goals for the County within each of the Focus Areas and developed a comprehensive set of recommendations under each identified goal to ultimately help the County transition into a more sustainable, more resilient community. There are a total of 162 recommendations provided within this GreenKeys! SAP. Each of the recommendations in this SAP are prioritized as either short-, medium- or long-term with regard to the recommended timeline for implementation. A brief summary of the goals and in some instances specific recommendations to achieve those goals are provided for each of the Focus Areas as follows:

Government Operations. County buildings and facilities will become increasingly vulnerable as sea level continues to rise in the Florida Keys. At the high sea level rise scenario, or up to two (2) feet higher of mean sea level by 2060, several Monroe County structures show potential exposure that would be similar to Hurricane Wilma flood event. Of most immediate concern due to the social vulnerability of facility residents is the Bay Manor assisted-living retirement home. Also of high to moderate concern are two (2) Monroe County Sheriff's Office structures; the Freeman substation on Cudjoe Key with likely priority for flood mitigation and emergency preparedness and the Marathon substation which could potentially be vulnerable to an extreme event storm surge under a high sea level rise scenario.

Murray Nelson Government Center, Key Largo, FL
Photo Source: *www.smartgrowthpartnership.org*

Of moderate future concern are the Roth Building and two (2) nearby structures (Radio Transmission Shop and County Offices)

that are owned by Monroe County on Plantation Key within the Village of Islamorada. Other structures that show risk of current or future flooding from a Wilma-sized flood event are two (2) recreation structures at Clarence Higgs Beach, including a vendor and public restroom structure, and the historic East Martello Tower Museum.

In addition to the facilities of most immediate concern, many other County-owned facilities show vulnerability. Under the low sea level rise scenario (3-7 inches), by 2030 eleven (11) County-owned facilities are below the Possible Nuisance threshold and three (3) facilities are below the Likely Nuisance threshold. By 2060 (low scenario), twenty-seven (27) facilities are under the Possible Nuisance threshold. Under the high sea level rise scenario (9-24 inches), by 2030 seven (7) facilities are below the Likely Nuisance threshold, seventeen (17) facilities are below the Possible Nuisance threshold, and one (1) facility is under the Possible Inundation threshold. By 2060 (high scenario), thirty-four (34) structures are under the Likely Nuisance threshold, forty-four (44) facilities are below the Possible Nuisance threshold, and twenty-nine (29) facilities are under the Possible Inundation threshold.

Several goals were identified for the County's Government Operations, including:

1. Develop better data and monitoring to increase the resilience of County infrastructure to sea level rise
2. Develop specific adaptation strategies and increase resilience for County facilities with risk to sea level rise
3. Increase energy efficiency in County operations
4. Reduce GHG emissions and expand alternative energy usage County-wide
5. Expand efforts to reduce GHG impacts from County fleet
6. Strengthen water conservation efforts in County operations
7. Continue planning for and implementing solid waste reduction efforts in County operations
8. Increase efforts to promote sustainability in County operations

Select recommendations made under these goals include conducting detailed site level assessments of the most vulnerable County facilities, performing energy audits on County facilities to develop retrofit priorities, creating incentives to encourage the construction of energy efficient and water conserving structures, continued GHG inventory updates and emissions reductions, increased rates of waste diversion, and improving employee sustainability practices.

Climate and Energy

Climate & Energy. With increasing global temperatures, energy demands will increase which in turn leads to more carbon loading into the atmosphere and higher consumption of remaining available fresh water. However, as the impacts of climate change and sea level rise become increasingly visible, changes in perception and behavior will ultimately result. In an effort to help offset the impacts from climate change and sea level rise, changes in energy consumption, technology and daily behavior and operations are expected to occur. These changes will likely come in the form of more stringent industrial emissions regulations, stricter water conservation laws, increasing and perhaps mandatory GHG emissions reduction targets, expansion of renewable energy use, and the continued development of newer, cleaner, more-efficient technologies.

Electric Vehicle Charging Stations, Marathon Airport
Photo Source: GreenKeys! Project Team

Several Climate & Energy goals were identified for the County, including:

1. Continually develop better data to best plan for climate change and sea level rise
2. Mitigate impacts from inundation and nuisance flooding to County roads and support efforts by FDOT to mitigate impacts on FDOT-managed roads within the County
3. Increase efforts to educate residents about energy efficiency and climate resiliency
4. Develop incentives to incentivize energy efficiency, water conservation, climate resiliency and waste reduction efforts
5. Promote employee training and reporting on sustainability initiatives
6. Support efforts to diversify the energy supply within the County
7. Increase resource efficiency and reduce waste generated in the County

Recommendations made under these goals include creating a database of nuisance flood events, ensuring that nuisance flood data informs future road decisions, creation of improved Light Detection and Ranging ("LIDAR") data County-wide, development of a ranking process to identify most vulnerable neighborhoods first, continue discussing sea level rise vulnerability with residents, creating energy and water efficiency incentives within the County's Rate of Growth Ordinance ("ROGO"), conducting a feasibility analysis for renewable energy County-wide, and adopting a plan to improve the resource efficiency of community businesses.

Natural Systems. Though highly protected in Monroe County, various aspects of climate change pose a significant long-term danger to the future health and sustainability of many natural ecosystems within the County. Monroe County's marine and terrestrial habitats are among the most vulnerable in the United States to climate change impacts. The long-term disappearance of upland ecosystems and associated species is expected as these ecosystems become increasingly inundated by rising seas. Large-scale changes in the composition and productivity of marine ecosystems are expected as a result of ocean acidification, increased ocean temperatures, and rapid sea level rise. Diversity of intertidal mangrove wetland communities are also expected to be impacted by sea level rise, changes in regional sedimentation patterns, and human engineering interventions within the intertidal zone. Threats to natural systems in Monroe County are important, as natural infrastructure including marshes, reefs, and beaches provide strengthened coastal resilience to storms, flooding, erosion and other threats. Living shorelines, when combined with natural habitat and built infrastructure, also provide increased coastal resilience.

The following goals were identified for the County's Natural Systems:

1. •Continue cooperative efforts that support natural systems restoration and conservation
2. •Build a better database of the most vulnerable natural systems within the County
3. •Strengthen protection of natural systems within the County
4. •Improve and increase incentives for residents to conserve and preserve natural systems
5. •Establish a framework for evaluating adaptation strategies
6. •Continue County efforts to control invasive species

Recommendations under these goals include continued cooperation with federal, state and private partners in support of coral reef restoration, completion of a County-wide tree inventory, identification and mapping of natural inundation buffers, maintaining natural habitat corridors, identifying and protecting "core areas" within the County with the best chance of persistence during sea level rise, incentivizing the protection of natural resources on sites, promoting living shorelines and mangrove restoration, and continuing invasive exotic species management throughout the County.

Built Environment. Monroe County's built environment, including roads, buildings (non-County owned), stormwater, water, wastewater and power supply, will be tested as the impacts of climate change and sea level rise continue to be felt. As climate change and sea level rise stressors increase, the systems within Monroe County that were once adequate to provide the levels

of service needed for the County will become inadequate. This will necessitate renovation, elevation, and even relocation of the most vulnerable infrastructure in the short term while intensifying the need to incorporate predicted impacts to all infrastructure improvements and planning in the long term. Planning activities will increasingly need to focus on adapting to sea level rise impacts through the avoidance, accommodation and protection adaptation strategies. As sea level rise impacts become more visible, "managed retreat" or planning for projected increases in sea levels by relocating vulnerable buildings, infrastructure and public facilities before significant inundation occurs may also need to occur.

For the Built Environment Focus Area, the following goals were identified for the County:

1. •Increase the resilience of structures and buildings within the County
2. •Continue making improvements to promote alternate modes of transportation within the County
3. •Strengthen regulation of noise and light pollution within the County
4. •Promote urban agriculture within the County

Recommendations made under these goals include maintaining and strengthening setback policies, imposing use restrictions in areas most vulnerable to flooding, adopting a natural forces' ordinance, incentivizing resiliency construction standards, establishing types of adaptation actions, increasing the mileage of bicycle lanes and shared use paths in the County, identifying strategies to provide better public transportation options, adoption of a complete streets policy that considers all users, incorporating Dark Skies practices into land development regulations, and adopting zoning and development regulations that allow farmers markets, community gardens and urban agriculture.

Health & Safety. In addition to impacts to emergency response and evacuation routes/times, climate change and sea level rise will also impact the health of Monroe County residents. Climate change is expected to contribute increased heat impacts, more widespread vector borne diseases, more frequent and extreme weather events, potentially decreased air quality, and more prevalent waterborne diseases as water temperatures rise. Florida Keys residents may experience exacerbated respiratory and cardiovascular issues as daily average temperatures rise. Labor productivity may also decline, particularly in "high-risk" industries involving outdoor work (which is prevalent in the Keys), as annual temperatures increase during summer months. Stronger storms, more frequent floods, hurricanes, and tropical storms may have physical and emotional health impacts, including injury, drowning, death from structural collapses, infectious and chronic disease, displacement, and socioeconomic disruption. It is critical that the wide range of health and safety impacts on County residents be considered in all future planning and decision-making efforts.

Several goals were identified for the County's Health & Safety, including:

1. Ensure that sea level rise and climate change is being considered in health and safety and emergency preparedness and response planning
2. Increase efforts to consume local food, including seafood
3. Incorporate active living into County planning and capital improvement projects
4. Promote wellness and healthy living among residents throughout the County
5. Continue efforts to reduce the use and impacts of toxic chemicals throughout the County

Recommendations under these goals include incorporating future sea level rise impacts into emergency management plans, supporting school district participation in Florida's Farm to School program, encouraging the sale of locally-caught fish by charter boat captains, including active living or active transportation in the Comprehensive Plan or transportation plan, creating guidelines to encourage the incorporation of active building design in new buildings, adopting a health in all policies statement, encouraging workplace wellness programs, identifying resources to provide disposal of toxic materials, and developing informational resources on how to properly dispose of unused medicine.

Economy & Jobs; Equity & Empowerment; Education, Arts & Community. An increased focus will likely be placed on improving sustainability within the County to help offset conditions contributing to climate change and sea level rise. This could present economic opportunities for sustainably-focused businesses and a shift toward a "greener" economy. As tourism and coastal recreation patterns change with the climate and sea level, the County's economy will need to adapt. It will be increasingly important to ensure equity among residents as adaptation strategies are put into place to ensure that the quality of life among residents remains unchanged. The community will need to come together to ensure that County planning efforts and infrastructure decisions are adequately informed and in the best interest for the greatest number of residents and business owners.

For Economy & Jobs; Equity & Empowerment; and Education, Arts & Community, the following goals were identified for the County:

1. •Incorporate sustainability into ongoing education and arts programs in the County
2. •Encourage a balanced local economy that is protective of all sectors of the County's population
3. •Promote sustainability in all sectors of the County's economy

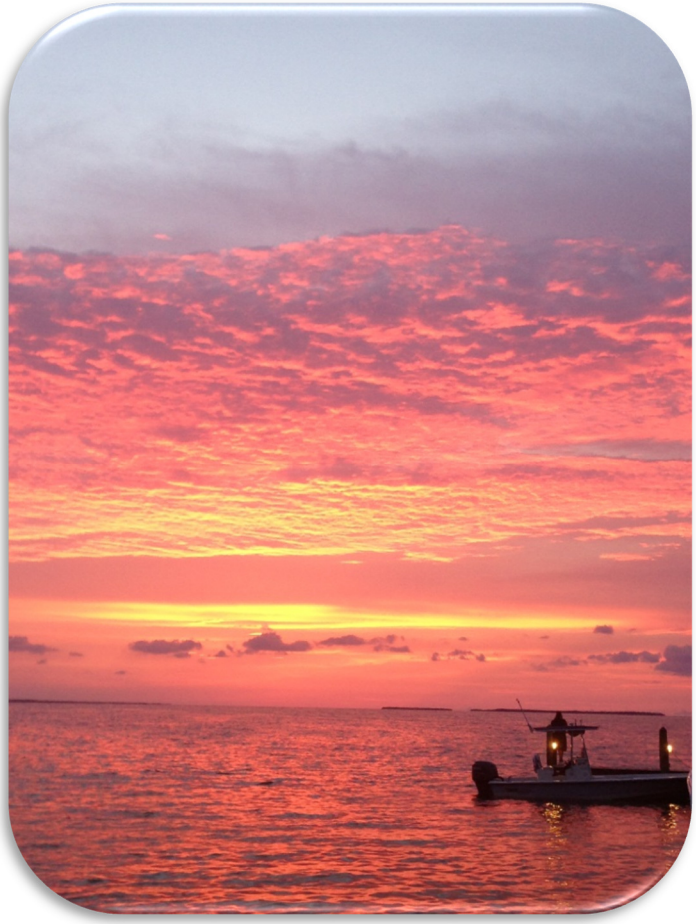
Recommendations under these goals include development of an "arts, culture and innovation" policy or plan, building on the County's success in its commitment to public art to create opportunities along prominent streets, encouraging sustainable practices in Monroe County's Art in Public Places Program, encouraging diverse community involvement in County government, adopting policies or regulations to increase market demand for green building and associated materials, developing and maintaining a Sustainability Handbook for business owners, encouraging sustainable business practices, and creating or supporting promotional campaigns to bank locally, buy locally, or buy from small independent businesses.

Outreach, Education and Next Steps

Education of residents, business owners and County staff will continue to be critical to ensuring that the County becomes more sustainable and resilient to climate change and sea level rise. Results of the GreenKeys! planning project should continue to be highlighted in future outreach activities hosted by the County to keep residents and business owners informed about changing conditions and engaged in the process of adapting to predicted impacts. Pilot projects can further be used to demonstrate or to study the effectiveness of particular recommendations in this GreenKeys! SAP. There are many pilot project examples, including a pilot project on the feasibility of floodproofing or elevating structures within the County to inform the prioritization of future adaptation strategies implemented in the County.

GreenKeys! Community Workshop
Photo Source: GreenKeys! Project Team

To further build upon the success of the GreenKeys! planning project, Monroe County (along with the Village of Islamorada) will also be involved in a NOAA grant entitled: *Advancing Understanding of Risk: Increasing Accuracy of Hazard Damage Assessment Tools by Improving Base Data and Analyzing Opportunities and Barriers for Use in Adaptation Planning* to be implemented in 2016-2018. This is a collaborative project involving four (4) communities across four (4) states in the Southeast, including Monroe County and Islamorada, Village of Islands, Florida; McIntosh County, Georgia; City of Beaufort, South Carolina; and Town of Nags Head, North Carolina. This project will consist of several components, including: 1) collection of stakeholder input to determine local resilience priorities, 2) creation of digital data to improve local planning capacity related to the priorities identified, 3) performance of legal and policy research to improve the implementation of adaptation measures identified by the communities, and 4) pre- and post-project knowledge assessments to evaluate the success of this method in communicating hazard vulnerability and resilience information on a regional scale. Both Monroe County and the Village of Islamorada will directly benefit from this project through continued community outreach on adaptation and resilience, creation of better base data, more accurate hazard damage assessments, and improved knowledge of local vulnerabilities and resilience.



Monroe County, FL
Photo Source: GreenKeys! Project Team

Endnotes

[1]Multihazard Mitigation Council, Natural Hazard Mitigation Saves: An Independent Study to Assess the Future Savings from Mitigation Activities (2005), available at: https://www.nibs.org/resource/resmgr/MMC/hms_vol1.pdf.

[2]Florida Ocean's Council, Climate Change and Sea Level Rise In Florida 2010, available at: http://www.dep.state.fl.us/oceanscouncil/reports/climate_change_and_sea_level_rise.pdf.

Government Operations

Recommendation		STAR Identifier	Corresponding MCAP Recommendation
Goal 1: Develop better data and monitoring to increase the resilience of County infrastructure to sea level rise.			
GO 1.1	Develop site level assessments that characterize resistance of above ground structures and associated electrical components to damage from extreme event flooding.		
GO 1.2	Develop and maintain recording protocols and, as necessary, engineering assessments to assess resilience of below-grade pipes and pump infrastructure to increased saltwater incursion associated with sea level rise (coordination with FKAA).		M-3.1
GO 1.3	Consider utilizing other systems related to infrastructure project analysis including Envision, Infrastructure Voluntary Evaluation Sustainability Tool ("INVEST") or other design-related systems that consider sustainability and resiliency factors.		
GO 1.4	Create detailed site investigations to better resolve the extreme event flood risks of all critical infrastructure within defined special flood hazard areas, with near-term prioritization of such investigations recommended for all critical infrastructure with LIDAR elevation estimates below 6.89' above MHHW (i.e., threshold for Possible Extreme event flood risk under 7" of sea level rise, or maximum sea level rise expected by 2030).		
GO 1.5	Enhance monitoring of County buildings and create a database for flood risk to detect potential access and structural issues associated with increased tidal flooding exposure.		M-3.1
GO 1.6	Develop site-specific elevation data for finished floors for buildings County-wide.		M-2.1
GO 1.7	Coordinate with utilities to complete large-scale digitization of Elevation Certificates that contain specific information about the siting and elevation of equipment to develop comprehensive information about the scale of the risk, and to inform development of appropriate policy options for preventing and mitigating future risks.		M-2.1, M-2.2
GO 1.8	Develop and implement a public education campaign to inform County residents about future flood risk, potential for environmental change, and relevant policies being implemented by the County for government operations.		E-1.1, E-1.2

* Short-term (1-3 yrs.) recommendations in light blue, medium-term (3-5 yrs.) recommendations in light yellow, and long-term (>5 yrs.) recommendations in light pink.
** For long-term recommendations, the County is not required to wait on implementation if the opportunity for earlier implementation presents itself.

Goal 2: Develop specific adaptation strategies and increase resilience for County facilities with risk to sea level rise.			
GO 2.1	Consultation with the Pigeon Key Foundation (which manages the Pigeon Key site under long-term lease from the County) and utilization of FEMA's National Flood Insurance Program Floodplain Management Bulletin for Historic structures to determine appropriate sea level rise adaptation and flooding resilience strategies on Pigeon Key.		
GO 2.2	For the West Martello Tower, which shows potential exposure to first floor nuisance flooding by 2060, consultation with historic preservation specialists in Monroe County and FEMA guidelines for retrofit of historic structures.		
GO 2.3	For the Monroe County Animal Shelter in Key West, which shows access concerns and first floor flooding under the 2060 scenario, consider potential relocation to a more elevated site as part of any future plans to renovate the Animal Shelter facilities.		
GO 2.4	For the Bay Manor assisted living retirement home, which shows potential exposure to an extreme flood event, develop procedures for rapid evacuation in the case of an approaching storm surge event (procedures above and beyond what is contemplated in the Monroe County Local Mitigation Strategy 2015 Update which relates only to evacuations for threatening Category 3 hurricanes). Perform further analysis with improved elevation data related to increased inundation and nuisance flooding and develop adaptation or relocation strategies as necessary.		
GO 2.5	Work with the Florida Keys Aqueduct Authority to ensure that siting and design of any new wastewater facilities include resilience to future sea level rise as a primary engineering consideration.		W-2.1
GO 2.6	Require that significant maintenance, upgrade, or expansion of any existing wastewater facilities, including Bay Point Wastewater Treatment Plant, consider stressors from sea level rise within life-cycle design.		W-2.1
GO 2.7	Conduct site-specific analyses of particularly vulnerable wastewater infrastructure that include survey quality elevation data of sensitive components and engineering assessments of potential floodwaters to determine the present and future vulnerability to extreme flood events.		
GO 2.8	For the Marathon electric substation, which shows vulnerability to an extreme storm surge by 2060 under a high sea level rise scenario, coordinate with Florida Keys Electric Cooperative Association to determine true risk exposure and alternatives to reduce that risk.		
GO 2.9	For the Roth Building (50 High Point Road), Radio Transmission Shop (88770 U.S. Highway 1) and County Offices (MM 88.5, U.S. Highway 1), which show potential risk to an extreme flooding event by 2060, take into account both the rate of sea level rise over the next two decades and the overall lifecycle of the buildings in making flood adaptation decisions to reduce risk.		
GO 2.10	For Clarence Higgs Beach, which shows risk of current or future flooding from a Wilma-sized event, incorporate appropriate hazard mitigation design features into any retrofits or upgrade projects.		
GO 2.11	For East Martello Tower, which shows risk of current or future flooding from a Wilma-sized event, consider flood adaptation measures (more mid to long-term because of fort construction and historic nature).		

* Short-term (1-3 yrs.) recommendations in light blue, medium-term (3-5 yrs.) recommendations in light yellow, and long-term (>5 yrs.) recommendations in light pink.
** For long-term recommendations, the County is not required to wait on implementation if the opportunity for earlier implementation presents itself.

GO 2.12	For Monroe County Sheriff's Office Freeman substation structure on Cudjoe Key, which shows moderate risk concern, develop adaptation strategies as a likely priority for flood mitigation and emergency preparedness.		
Goal 3: Increase energy efficiency in County operations.			
GO 3.1	Link energy efficiency upgrades to capital asset improvements, renovations, or additions.		E-2.3, B-3.1
GO 3.2	Establish criteria and specifications that require energy efficiency in all new construction, facility improvements, renovations or additions. Such criteria and specifications should go into bid and contract documents with designers, contractors, and engineers. These should include requirements for high efficiency HVAC equipment, efficient lighting, EnergyStar or similarly certified appliances, thermal resistance values (R-value and U-value) for insulation and windows, motor efficiency, controls and settings, and others.		
GO 3.3	Enhance tracking of utility data through FacilityDude program to target and further reduce energy inefficiencies.		
GO 3.4	Develop and implement an employee training program for ensuring energy efficiency in operations and maintenance of fleet and facilities which also includes control settings for appropriate facilities.	CE-5(7)	E-2.1, E-2.2
GO 3.5	Publish/post County utility bills, or include in Annual update, for public review and promote usage reductions.		
GO 3.6	Analyze opportunities to increase lighting efficiency on County maintained and controlled roads.		
GO 3.7	Create incentives (expedited permitting, decreased permit fees, rebates, etc.) to encourage construction of energy efficient buildings.	CE-5(8)	W-1.2, W-1.3, W-1.4, B-3.1
GO 3.8	Complete Level I/Level II energy audits on County facilities that have not already been audited and for next level of priority facilities develop retrofit priorities to include in capital improvement and budget processes. • Convert all faucets/toilets in municipal buildings to low flow or high efficiency over next 10 years. • Assure that new County construction complies with the highest rating achievable pursuant to Section 255.2575, F.S. requiring all county, municipal, school district, water management district, state university, community college, and state court buildings (after July 1, 2008) be built to comply with a sustainable building rating system or a national model green building code. • Reduce the total energy use of all buildings built before 2010 by 25% through retrofit, targeting largest inefficiencies first.	CE-5(10)	B-3.1
Goal 4: Reduce GHG emissions and expand alternative energy usage County-wide.			
GO 4.1	Use more complete baseline GHG emissions data moving forward for forecasting energy emissions reductions and for setting additional reduction targets.		
GO 4.2	Establish an interim target for 2030, consistent with the timeframe of the County's latest Comprehensive Plan, for a 40 percent reduction by 2030 as compared to the 2012 baseline.		

* Short-term (1-3 yrs.) recommendations in light blue, medium-term (3-5 yrs.) recommendations in light yellow, and long-term (>5 yrs.) recommendations in light pink.
** For long-term recommendations, the County is not required to wait on implementation if the opportunity for earlier implementation presents itself.

GO 4.3	Adopt a target for energy use from renewable sources for County buildings and facilities such as 10% by 2025 and explore financing alternatives such as leasing. Conduct feasibility studies for alternative energy at County facilities. Partner with electric utilities for creative ways to deploy more solar. To monitor progress, develop a baseline for current renewable energy use.		
GO 4.4	Implement policies and programs to enhance electric vehicle infrastructure and make the Florida Keys "EV Ready." This could include providing electric vehicle charging stations at community parking lots and/or working with vehicle manufacturers to install publicly accessible electric vehicle charging stations.	CE-2(8)	B-4.3, B-4.4
GO 4.5	Engage public works and infrastructure managers in voluntary GHG reporting. This could include making materials available online to assist managers in this reporting or creation of a one page fact sheet for inclusion in the Monroe County Personnel Policies and Procedures Manual (dated November 18, 2014).	CE-6(5)	
GO 4.6	Inventory GHG emissions for County and Community-wide sectors every three (3) years beginning in 2016.		
GO 4.7	Upgrade to solar lighting at County parks and beaches consistent with GO 4.3. Expand the use of solar panels in County parking lots to further reduce energy use in County operations.	CE-5(10)	E-2.3
GO 4.8	Create a green business challenge for local businesses and recognize resource reduction.	EJ-2(9)	S-1.4, E-2.3
Goal 5: Expand efforts to reduce GHG impacts from County fleet.			
GO 5.1	Complete a "right size" fleet analysis to develop a policy and process for reducing vehicle miles traveled and fuel cost for the County's fleet. Evaluate current fleet and expand the County's electric, hybrid, or alternative fuel fleet. Perform analysis of fleet through various tools such as Alternative Fuel Life-Cycle Environmental and Economic Transportation. Develop a baseline of County vehicle miles travel and set a vehicle miles traveled reduction goal for the fleet based on the analysis (10% reduction in 10 years). Also consider: • Ensure that the average age of the County's fleet is less than 10 years old. • Develop County fleet strategy that incorporates carbon emission reductions, electric vehicle and low-carbon transportation fuel goals. • Monitor and track County vehicle use, fuel efficiency and trends.		B-4.3
GO 5.2	The County should work closely with the State Sheriffs Association and perhaps other municipalities that are pursuing increased purchase of EVs to advocate for incorporation of EVs on the state-approved list.		B-4.3
Goal 6: Strengthen water conservation efforts in County operations.			
GO 6.1	Install low-flow water conserving fixtures throughout County facilities. Water-conserving fixtures may include faucet aerators, low-flow showerheads, waterless urinals, low/dual flush toilets, and irrigation equipment.	BE-2(8)	W-1.3
GO 6.2	Develop and implement educational materials and a program for employees to ensure water efficiency in operations and maintenance of fleet and facilities. Partner with FKAA to target reductions in the largest water use applications.		E-2.1, E-2.2
GO 6.3	Partner with FKAA to promote water conservation through rebate and public education programs.		

* Short-term (1-3 yrs.) recommendations in light blue, medium-term (3-5 yrs.) recommendations in light yellow, and long-term (>5 yrs.) recommendations in light pink.
** For long-term recommendations, the County is not required to wait on implementation if the opportunity for earlier implementation presents itself.

GO 6.4	Create incentives to encourage construction of water efficient buildings.	CE-5(8)	W-1.2, W-1.3, W-1.4, B-3.1
Goal 7: Continue planning for and implementing solid waste reduction efforts in County operations.			
GO 7.1	Improve County waste management policy with tangible goals and baseline to track accomplishments. Track County recycling rates separately from other recycling programs and establish goal for increases. Adopt policy that the County will also achieve a 75 percent diversion rate of its own solid waste stream by January 4, 2020.		S-1.2
GO 7.2	Create a policy and goal to increase material salvage for County-owned full and partial building demolitions. Develop procurement specifications for materials reuse, reduced packaging, materials with recycled content, and other waste management strategies.		S-1.2
Goal 8: Increase efforts to promote sustainability in County operations.			
GO 8.1	Adopt or modify procurement policies in the Monroe County Purchasing Policy (as revised March 18, 2015) to incentivize vendors whose buildings, equipment, products/services meet achievable sustainability targets.		
GO 8.2	Provide annual progress reports on the implementation of the GreenKeys! Sustainability Action Plan.		
GO 8.3	Reduce pesticide and herbicide use in County operations.		
GO 8.4	Update or modify goals and recommendations in the GreenKeys! Sustainability Action Plan every 3-5 years.		
GO 8.5	Create an environmentally preferable purchasing program for local government procurement of safe, healthy, and environmentally responsible products.	EJ-2(7)	S-3.2
GO 8.6	Improve employee sustainability practices: • Conduct an internal employee survey to determine most effective and underutilized sustainability practices and modify policies to increase sustainable practices. • Create a “top ten list” of energy, water and waste management efficient practices for County employees and include in the Monroe County Personnel Policies and Procedures document. • Create a monthly email blast to employees on successes and case studies for sustainable practices.		
* Short-term (1-3 yrs.) recommendations in light blue, medium-term (3-5 yrs.) recommendations in light yellow, and long-term (>5 yrs.) recommendations in light pink. ** For long-term recommendations, the County is not required to wait on implementation if the opportunity for earlier implementation presents itself.			

Climate and Energy

Climate & Energy

Recommendation		STAR Identifier	Corresponding MCAP Recommendation
Goal 1: Continually develop better data to best plan for climate change and sea level rise.			
CE 1.1	Develop a geographic database for Monroe County employees (and interested residents) to document time and location of nuisance flooding events that affect parking lots, access roads, neighborhoods and landscapes.		M-3.1
CE 1.2	Ensure that future flood vulnerability assessments in Monroe County build upon the work in the GreenKeys! project and continue efforts to develop a more complete digital record of Elevation Certificates for homes, buildings and facilities. Use, integrate, and improve the Elevation Certificate record to promote higher confidence in flood risk assessments.		M-2.2
Goal 2: Mitigate impacts from inundation and nuisance flooding to County roads and support efforts by FDOT to mitigate impacts on FDOT-managed roads within the County.			
CE 2.1	Ensure that all new nuisance flooding data informs future road decisions, starting now. These data will also need to be considered for future road decisions. Will require FDOT coordination for impacts to State Roads.		M-2.2
CE 2.2	Create better elevation data County-wide to improve decision-making and inform future decisions, develop improved LIDAR County-wide.		M-2.1
CE 2.3	Conduct a Comprehensive Feasibility Study for Enhanced Stormwater Criteria (prioritizing areas) for near-term areas subject to inundation risk, including nuisance flooding.		
CE 2.4	Develop a ranking process to identify the most vulnerable neighborhoods first. Develop criteria to establish levels of service each road gets subjected to based upon a tolerable level of nuisance flooding (saltwater-based flooding on a road for some amount of time).		M-3.3
CE 2.5	Along areas of the U.S. Highway 1 corridor susceptible to nuisance flooding during King Tides, like at MM 74, establish mitigation as a priority in the near term including engineering interventions to keep tidal water from entering onto the road surface while maintaining stormwater drainage. Work with FDOT to develop site surveys of road bed elevation and, as appropriate, suggest engineering designs to raise portions of U.S. Highway 1 that currently show vulnerability to nuisance tidal flooding.		
CE 2.6	Utilize the tidal flood vulnerability maps for roads as a guide for a public outreach campaign to develop a photographic record that documents the date, time, and severity of nuisance tidal flooding events.		M-2.2, M-3.1, E-1.1

* Short-term (1-3 yrs.) recommendations in light blue, medium-term (3-5 yrs.) recommendations in light yellow, and long-term (>5 yrs.) recommendations in light pink.
** For long-term recommendations, the County is not required to wait on implementation if the opportunity for earlier implementation presents itself.

Goal 3: Increase efforts to educate residents about energy efficiency and climate resiliency.			
CE 3.1	Consistently highlight available and pending incentives for residents desiring to perform energy retrofits or renewable energy projects on homes or businesses.		
CE 3.2	Continue discussing sea level rise vulnerability with residents and stakeholders, along with the importance of having a method to weigh different adaptation actions against one another to ensure the most beneficial strategies are implemented. Hold at least three (3) community workshops per year with different stakeholders including realtors and Chambers.		E-1.1
CE 3.3	Develop a framework for using new knowledge to engage with residents so that consensus on an eventual adaptation action is both data and stakeholder driven (such as the Vulnerability, Consequences, and Adaptation Planning Scenarios ("VCAPS") process). Expand communications on sea level rise and align them with future efforts within the CRS program, where applicable, to provide information about areas predicted to experience more flooding impacts in the future due to sea level rise (for example CRS Credit 322.c).		
CE 3.4	Develop a "best practices" tool kit to educate residents on energy saving and resiliency techniques.		E-1.1
Goal 4: Develop incentives to incentivize energy efficiency, water conservation, climate resiliency and waste reduction efforts.			
CE 4.1	Enforce regulations (i.e. limiting development or redevelopment in particularly vulnerable areas) or offer incentives (i.e. points or permit fee reductions for elevating or floodproofing structures) to encourage residents/businesses to shift behavior to prepare for future climate change impacts.	CE-1(7)	P-1.3, B-3.1
CE 4.2	Create incentives to encourage construction of energy and water efficient buildings through the Rate of Growth Ordinance ("ROGO") or other means.	CE-5(8)	E-2.3, E-2.4, B-3.1
CE 4.3	Implement incentives or enforce regulations ensuring that residents/businesses are working toward community waste reduction targets.	CE-7(5)	S-1.2, S-2.2
Goal 5: Promote employee training and reporting on sustainability initiatives.			
CE 5.1	Develop training programs for County buildings and facilities operators on energy and water efficiency techniques and train inspectors to enforce water/energy efficiency standards in adopted building codes.	CE-5(7) CE-6(6)	E-2.1
Goal 6: Support efforts to diversify the energy supply within the County.			
CE 6.1	Conduct a renewable energy feasibility analysis County-wide. Evaluate the feasibility of new solar technologies such as those that may be imbedded in roadways or shade canopies that provide electric vehicle charging.		R-1.5
Goal 7: Increase resource efficiency and reduce waste generated in the County.			
CE 7.1	Adopt a plan designed to improve the resource efficiency of the community's businesses including manufacturing, automotive and marine repair.	CE-4(1)	
CE 7.2	Create or update policies for incentives reducing the generation of fats, oils, and grease and their beneficial reuse.		
CE 7.3	Create financial incentives or industry-focused challenges to encourage companies to reduce the intensity of their resource consumption. One example is the Nebraska Energy Office's Dollar & Energy Savings Loan, an external revolving loan fund that provides low-interest loans of up to $750,000 for energy efficiency projects.	CE-4(8)	E-2.3, E-2.4

* Short-term (1-3 yrs.) recommendations in light blue, medium-term (3-5 yrs.) recommendations in light yellow, and long-term (>5 yrs.) recommendations in light pink.
** For long-term recommendations, the County is not required to wait on implementation if the opportunity for earlier implementation presents itself.

CE 7.4	Adopt specific product bans to significantly advance progress toward waste reduction goals. Note that during the 2016 legislative session, the Florida Legislature will likely be considering bills to allow small communities in coastal areas to enact temporary plastic bag bans as part of a 2.5 year pilot program.	CE-7(2)	S-3.1
* Short-term (1-3 yrs.) recommendations in light blue, medium-term (3-5 yrs.) recommendations in light yellow, and long-term (>5 yrs.) recommendations in light pink. ** For long-term recommendations, the County is not required to wait on implementation if the opportunity for earlier implementation presents itself.			

Natural Systems

Natural Systems

Recommendation		STAR Identifier	Corresponding MCAP Recommendation
Goal 1: Continue cooperative efforts that support natural systems restoration and conservation.			
NS 1.1	Continue cooperation with federal, state, and private partners in support of coral reef restoration initiatives to support the implementation of strategies that may promote long-term recovery and resilience of the Florida Keys coral barrier reef system in the face of future climate change.		N-1.1
NS 1.2	Continue cooperation with federal, state, private efforts to research, implement, improve seagrass replanting.		N-1.1
NS 1.3	Cooperate with the U.S. Fish and Wildlife Service, FWC, and conservation organizations to monitor populations of endangered species, track habitat trends, and, as necessary, implement relocation experiments under conditions of drastic habitat loss for endangered species due to sea level rise.		N-1.1
NS 1.4	Support bringing improved fire management in the Lower Keys pine rocklands to the forefront of the U.S. Fish and Wildlife Service's habitat management agenda. Monitor indicators used to determine when fire is no longer an effective habitat management tool for select forest or wetland blocks due to sea level rise. When necessary, cease using fire as a habitat management tool in those areas and accept that succession to hammock or wetland conditions is inevitable.		N-1.1, N-1.2
Goal 2: Build a better database of the most vulnerable natural systems within the County.			
NS 2.1	Complete a County-wide tree inventory and establish a tree canopy goal considering: • Low-canopy neighborhoods and those with populations at higher risk of urban heat island effects. • Exploring options for public and private partnerships to help reduce or share the cost of tree planting and maintenance. • Taking into consideration goals for carbon sequestration, resiliency to climate change impacts, and equitable distribution of tree-related benefits across the County. • Addressing tree age, species diversity, tree distribution, while expanding overall canopy coverage. • Engage nonprofits, corporations, individuals, institutions, and community organizations, to plant trees County-wide and set a target, such as a certain number of trees per year. • Create incentives/awards to encourage individuals and businesses to plant trees on private property.		

* Short-term (1-3 yrs.) recommendations in light blue, medium-term (3-5 yrs.) recommendations in light yellow, and long-term (>5 yrs.) recommendations in light pink.
** For long-term recommendations, the County is not required to wait on implementation if the opportunity for earlier implementation presents itself.

NS 2.2	Calibrate the SLAMM model with historic land cover change and field observations to provide helpful guidance for further updates and revisions of the modeling input parameters to better fit the specific ecological nuances of the Florida Keys.		
NS 2.3	Identify and map natural inundation buffers which could also provide sea level rise adaptation benefits.		
NS 2.4	Update requirements for ecological buffers and provide guidance on how to establish or adjust these buffers to accommodate sea level rise. Buffers should be designed, where site applicable, to provide "habitat migration corridors" that allow sensitive habitats and species to migrate inland or upland as sea level rises. To accommodate sea level rise, the amount of buffer required between development and coastal habitats may need to be increased.		
Goal 3: Strengthen protection of natural systems within the County.			
NS 3.1	Continue implementation of traditional coral reef management actions as strategies for supporting the maintenance of functional coral reef systems under rapid climate change. Such actions should clearly include decreasing loads of nutrients and sediments, continued restoration of apex predator populations, and creation of physical reef structures that may enhance recruitment of hard coral species.		N-3.3
NS 3.2	Maintain and enhance programs, like canal restoration, to improve water quality nearshore and offshore to reduce environmental stressors exacerbated by sea level rise and increasing ocean temperatures.		
NS 3.3	Increase the percentage of funding invested in green infrastructure.	NS-1(7)	N-3.1, N-3.2
NS 3.4	Include marine ecosystem mitigation under accelerated sea level rise as a possible overlay component in future land buying and conservation zoning within the County.		
NS 3.5	Maintain natural habitat corridors in low-lying areas that allow for up-gradient colonization of tidal wetlands to promote future coverage of mangroves and other tidal wetland ecosystems.		
NS 3.6	Identify and protect "core areas" within the County with the best chances of persistence during sea level rise and perform intensive management of these areas and ex-situ conservation strategies which may include species relocation. Specific areas should focus on hammocks, beach areas and shorelines that may be stabilized, considering impacts to listed species.		
Goal 4: Improve and increase incentives for residents to conserve and preserve natural systems.			
NS 4.1	Review land development regulations to better incentivize protecting natural resources on sites.		
NS 4.2	Provide incentives to residents and developers to protect critical watershed protection areas.		N-1.2
NS 4.3	Create or enhance programs aimed at increasing tree canopy through active planting.		
NS 4.4	Pursue "blue carbon" payments for conserved and restored seagrass areas through international carbon mitigation markets that may begin emerging over the next decade. Such payments could serve as a possible revenue source for adaptive management and, as necessary, assisted migration/colonization of seagrass communities under accelerated climate change scenarios.		

* Short-term (1-3 yrs.) recommendations in light blue, medium-term (3-5 yrs.) recommendations in light yellow, and long-term (>5 yrs.) recommendations in light pink.
** For long-term recommendations, the County is not required to wait on implementation if the opportunity for earlier implementation presents itself.

NS 4.5	Pursue future revenue opportunities from "blue carbon" payments associated with conservation and assisted migration of local mangrove habitats. This revenue source could be used for adaptive management and, as necessary, assisted migration of local mangrove habitats.		
Goal 5: Establish a framework for evaluating adaptation strategies.			
NS 5.1	Identify intact corridors for future tidal wetland migration corridors as a potential criterion for future land purchase and flood mitigation initiatives within Monroe County.		N-1.2, N-3.1
NS 5.2	Promote living shorelines and mangrove restoration as an alternative to traditional bulkheads for near-term stabilization of eroding coastal areas, while also allowing for long-term marine ecosystem migration.		
NS 5.3	Identify the local areas where living shorelines are most appropriate and develop guidance for implementation, monitoring, and evaluation. Require living shorelines where feasible. Require any living shorelines to take into account sea level rise and storm events.		N-3.1
NS 5.4	Specify priority areas where shoreline protection structures should be removed, including areas where structures threaten the survival of wetlands and other habitat, or beaches, trails, and other recreational areas. This might be accomplished by offering incentives for removal to property owners and by incorporating removal of public structures into Capital Improvement Plans or requiring removal of shoreline protection structures after certain thresholds are passed related to impact.		
NS 5.5	Continue discouraging the use of hard protection unless no other feasible alternative is available. Develop design standards for the more frequently used hard protection measures and require designs that address or can be adapted to changing sea level. Require that hard protection be monitored for damage from sea level rise hazards, that permits be re-opened after some time period to assess effectiveness in light of sea level rise, and that removal options be incorporated into the design, in the event the structure may no longer be useful or appropriate in the future.		N-2.1
NS 5.6	Require detailed evaluation of soft options in an alternatives analysis and require the use of soft protection where feasible. Sea level rise and storms should be incorporated into the siting and design of any soft protection projects.		
Goal 6: Continue County efforts to control invasive species.			
NS 6.1	Continue invasive exotic species management and pursue funding options throughout the County to ensure that natural areas maintain high habitat values.		
NS 6.2	Identify areas for habitat maintenance where the removal of exotics could improve the quality of that area to serve as a natural or soft protection option. Establish a maintenance schedule that factors in the benefits of managing habitats as a natural defense strategy against sea level rise impacts.		
NS 6.3	Establish and enforce regulations to control the use and sale of invasive species. This would expand the County's existing regulations limiting invasive species in site restoration and landscaping.	NS-2(7)	B-1.1

* Short-term (1-3 yrs.) recommendations in light blue, medium-term (3-5 yrs.) recommendations in light yellow, and long-term (>5 yrs.) recommendations in light pink.
** For long-term recommendations, the County is not required to wait on implementation if the opportunity for earlier implementation presents itself.

Built Environment

Recommendation		STAR Identifier	Corresponding MCAP Recommendation
Goal 1: Increase the resilience of structures and buildings within the County.			
BE 1.1	Maintain and strengthen setback policies to account for sea level rise impacts.		B-2.1
BE 1.2	Consider imposing use restrictions on development in areas most vulnerable to flooding.		B-2.1
BE 1.3	Establish triggers for retrofit of a structure impacted by changing site conditions such as when erosion is within a certain distance of the foundation; when monthly high tides are within a certain distance of the finished floor elevation; or when a setback decreases to a certain width. Consider the following concepts in development and redevelopment principles: • Address sea level rise in “non-conforming” structure policies. • Address sea level rise in redevelopment or replacement of existing structures. • Use rolling easements in property development and redevelopment strategy. • Enhance Transfer of Development Rights program parameters to account for sea level rise impacts by directing growth to land outside of potentially vulnerable areas.		B-2.1
BE 1.4	Adopt an ordinance to address natural forces’ degradation and damage to public roads, streets, highways, bridges, sidewalks, curbs and curb ramps, crosswalks, bicycle ways, hiking and walking paths and trails, underpasses, overpasses, and other improved public rights-of-way used for travel and recreation or other appropriate infrastructure. (See Model Ordinance in Appendix H)		
BE 1.5	Incentivize new “resiliency” construction standards such as Resilience STAR™, the Institute for Business and Home Safety’s FORTIFIED Home™, FORTIFIED Commercial, FORTIFIED Safer Business, FORTIFIED for Safer Living®, RELi or other appropriate standard rating systems.		

* Short-term (1-3 yrs.) recommendations in light blue, medium-term (3-5 yrs.) recommendations in light yellow, and long-term (>5 yrs.) recommendations in light pink.
** For long-term recommendations, the County is not required to wait on implementation if the opportunity for earlier implementation presents itself.

BE 1.6	Conduct additional study of a freeboard initiative to elevate and floodproof buildings within Monroe County including insurance benefits and funding sources. Identify additional barriers to elevating strategies such as height restrictions that may curtail the ability of someone to construct to higher elevations.		
BE 1.7	Highlight "demonstration" projects to provide examples of benefits to residents and business owners. Distribute information about GreenKeys! planning efforts at County events.		
BE 1.8	Ensure resiliency and energy efficiency design considerations are included in affordable housing projects.		
BE 1.9	Identify funding sources to finance energy-efficiency and resiliency upgrades in residences and businesses.		
BE 1.10	Establish types of adaptation action areas that may include focus on living shorelines, development in high risk areas, habitat migration corridors, levels of service for infrastructure or other sea level rise mitigation projects.		P-2.4
BE 1.11	Enhance coordination with the development and real estate communities to provide information about projected sea level rise impacts and solutions from the GreenKeys! planning process. Schedule annual briefings with the predominant industry associations to increase communication.		
BE 1.12	Develop incentive program for developers and property owners who relocate structures landward, develop in less vulnerable tiers, conserve more open space along the shoreline, and/or preserve or restore natural flood buffers.		
Goal 2: Continue making improvements to promote alternate modes of transportation within the County.			
BE 2.1	Conduct an analysis of the pedestrian network and identify areas of low connectivity and route choice. Identify impediments to street and sidewalk connections and identify constraints and projects to rectify the deficiencies. Formulate capital improvements to address deficiencies.		B-4.2
BE 2.2	Continue increasing the total mileage of bicycle lanes and shared use paths throughout the County. Develop baseline data of total miles and areas appropriate for additional bike lanes and facilities through a comprehensive bicycle master plan to set goals and monitor trends.	BE-7(7)	B-4.2
BE 2.3	Amend the land development regulations to require one out of three following elements for new parking lots over a certain threshold in the number of spaces: (a) 50 percent of the parking lot to be shaded by tree canopy, (b) solar photovoltaic panels, (c) or the use of cooling pavements or pavement coatings with albedos greater than 40 percent if trees and solar panels are impractical due to site considerations. Incorporate sustainable parking practices and design into land development regulations such as increasing stormwater infiltration where applicable, including bike parking, reducing heat island effects, and other strategies to reduce environmental impacts.		

* Short-term (1-3 yrs.) recommendations in light blue, medium-term (3-5 yrs.) recommendations in light yellow, and long-term (>5 yrs.) recommendations in light pink.
** For long-term recommendations, the County is not required to wait on implementation if the opportunity for earlier implementation presents itself.

BE 2.4	Create vibrant neighborhoods where a certain percentage of residents can easily walk or bicycle to meet all basic daily, non-work needs and have safe pedestrian or bicycle access to transit. Establish a target to reduce per capita vehicle miles travelled.		
BE 2.5	Develop a feasibility analysis for a public bike share program in more urbanized areas.	BE-7(9)	B-4.1, B-4.2
BE 2.6	Achieve recognition as a Bicycle Friendly Community or Walk Friendly Community.		
BE 2.7	Identify strategies to provide better public transportation options through improved connectivity, extended routes, expanded hours, increased reliability and more education of available services.		
BE 2.8	Include transit linkages as a consideration in affordable housing projects.		
BE 2.9	Develop a ride sharing social networking website or app for the Florida Keys to help residents identify potential carpool candidates.		
BE 2.10	Adopt a complete streets policy to address all users on County maintained and controlled roads. Complete Streets improvements support safe, efficient, and convenient mobility for all roadway users (pedestrians, bicyclists, transit riders, and motorists) regardless of age or ability. Coordinate with efforts in Recommendation CE 2.4 to enhance resiliency criteria in road paving projects.	BE-7(2)	
BE 2.11	Implement two focused enforcement programs to improve pedestrian and bicycle safety. The types of enforcement programs could include targeted speed and red light enforcement using radars or cameras in areas where frequent violations or collisions have occurred; targeted crosswalk right-of-way enforcement; targeted bicycle traffic law obedience enforcement; bicycle lane encroachment enforcement; or school zone and bus-arm enforcement.	BE-7(5)	B-4.2
Goal 3: Strengthen regulation of noise and light pollution within the County.			
BE 3.1	Incorporate Dark Skies best practices into land development regulations to reduce light pollution and minimize bird strike hazards. This could include incorporation of Dark Sky Friendly Lighting into County infrastructure to further reduce light pollution within the County. Establish programs that eliminate existing sources of light pollution coming from County-owned entities.		
BE 3.2	Review code enforcement procedures to specifically track noise and light violations so that trends can be monitored to reduce these types of issues.	BE-1(6)	
Goal 4: Promote urban agriculture within the County.			
BE 4.1	Review land development regulations and zoning requirements to encourage acceptable forms and uses related to urban agriculture such as use of raised beds or any landscape constraints.		
BE 4.2	Adopt zoning and development regulations that allow farmers markets, community gardens, and urban agriculture in appropriate land uses.		B-1.2

* Short-term (1-3 yrs.) recommendations in light blue, medium-term (3-5 yrs.) recommendations in light yellow, and long-term (>5 yrs.) recommendations in light pink.
** For long-term recommendations, the County is not required to wait on implementation if the opportunity for earlier implementation presents itself.

Health and Safety

Health & Safety

Recommendation		STAR Identifier	Corresponding MCAP Recommendation
Goal 1: Ensure that sea level rise and climate change is being considered in health and safety and emergency preparedness and response planning.			
HS 1.1	Incorporate future sea level rise impacts into emergency management plans including but not limited to the Local Mitigation Strategy and its projects.		
HS 1.2	Promote discussion of emergency prevention and response, including nuisance flooding and sea level rise, at the neighborhood and family level.		
HS 1.3	Minimize health issues caused by extreme heat days and associated poor air quality, especially for populations most vulnerable to these impacts by improving the preparation for and response to heat by health, community service, public safety and emergency response staff and services.		
HS 1.4	Partner with Mosquito control agencies to develop better elevation data and identify risk areas from vector populations by managing habitat and by working with the community to reduce health risks.		
Goal 2: Increase efforts to consume local food, including seafood.			
HS 2.1	Support school district participation in Florida's Farm to School program that connects in-state growers with local schools.		
HS 2.2	Identify appropriate spaces in County Parks and partner with School District to provide opportunities for community gardens.	HS-4(2)	B-1.2
HS 2.3	Model programs throughout the County after the Dock-to-Dish program implemented by the City of Key West that connects fishermen with local consumers.		
HS 2.4	Encourage the sale of locally-caught fish by charter boat captains and allow sale of locally-caught fish at the docks and/or to local restaurants.		

* Short-term (1-3 yrs.) recommendations in light blue, medium-term (3-5 yrs.) recommendations in light yellow, and long-term (>5 yrs.) recommendations in light pink.
** For long-term recommendations, the County is not required to wait on implementation if the opportunity for earlier implementation presents itself.

Goal 3: Incorporate active living into County planning and capital improvement projects.			
HS 3.1	Include a chapter on active living or active transportation in the comprehensive plan or transportation plan. Active living encourages physical activity for adults and kids through community design improvements and activities that promote walking, bicycling, and other forms of recreation.	HS-1(1)	P-2.2
HS 3.2	Improve infrastructure for increased physical activity and design routes that are integrated into the regional park system. Design parks to maximize space for physical activity.		
HS 3.3	Create guidelines to encourage incorporation of active building design in new buildings. Active building design is a process of consciously incorporating building design features that encourage physical activity. Examples include bicycle storage, highly visible stairways, and showers and locker rooms.	HS-1(3)	P-2.2
HS 3.4	Adopt a health in all policies statement or policy commitment for local decision-making. A health in all policies statement or policy expresses the County's clear commitment to consider community health impacts of local decisions and take policy action to improve public health. This commitment can extend to land use, design, transportation, and other aspects of the built environment that impact the ability for residents to walk or bicycle to destinations.	HS-3(10) HS-2(3)	
Goal 4: Promote wellness and healthy living among residents throughout the County.			
HS 4.1	Encourage worksite wellness programs that provide physical activity and weight loss programs at work.		
Goal 5: Continue efforts to reduce the use and impacts of toxic chemicals throughout the County.			
HS 5.1	Identify resources to provide disposal options for toxic materials, such as household hazardous waste.		
HS 5.2	Develop informational resources on how to properly dispose of unused medicine. Coordinate with health care facilities to offer and promote collection sites or services for unused medicines.		
HS 5.3	Create a healthy hazardous product initiative that includes: • Educating residents about proper use and disposal of hazardous products, and making information about more sustainable household products available. • Hosting green cleaning workshops and awareness programs.		

* Short-term (1-3 yrs.) recommendations in light blue, medium-term (3-5 yrs.) recommendations in light yellow, and long-term (>5 yrs.) recommendations in light pink.
** For long-term recommendations, the County is not required to wait on implementation if the opportunity for earlier implementation presents itself.

Education, Arts & Community
Economy & Jobs
Equity & Empowerment

	Recommendation	STAR Identifier	Corresponding MCAP Recommendation
Goal 1: Incorporate sustainability into ongoing education and arts programs in the County.			
M 1.1	Develop an "arts, culture, and innovation" policy or plan clearly defining the County's role based on: • A survey of the location of arts amenities throughout the County. • Ensure the Plan aligns with the County's economic and community development approach including the economic, environmental, and social impact of the arts, design, and cultural industry in the County. • Highlighting the community's existing cultural assets by increasing their presence on the street and in highly visible public forums. • Establishing priorities for public art and design projects, events, and locations for the next fifteen years. • Encouraging streetscape and public spaces that promote cultural/and arts projects throughout the County.		
M 1.2	Work with the Tourist Development Council on opportunities to: • Increase the County's marketing effort to promote arts, cultural, entertainment, and historic preservation amenities to residents and local, national and international audiences. • Create a County-wide "art and design week" that coordinates with existing arts events to promote local arts and culture and attract artists and innovators from art, design, architecture, fashion, related fields.		
M 1.3	Build on the County's success in its commitment to public art to create opportunities along prominent streets and in public spaces. Take residents' preferences into account and use local artists where possible to build neighborhood pride as well as identity to reinforce their uniqueness, image, and branding, and attract visitors.		
M 1.4	Encourage sustainable practices in Monroe County's Art in Public Places Program.		
M 1.5	Use County libraries as a platform to promote environmental and social engagement.		
M 1.6	Encourage and partner with municipalities to expand "arts districts" and events to promote them.		

* Short-term (1-3 yrs.) recommendations in light blue, medium-term (3-5 yrs.) recommendations in light yellow, and long-term (>5 yrs.) recommendations in light pink.
** For long-term recommendations, the County is not required to wait on implementation if the opportunity for earlier implementation presents itself.

M 1.7	Continue to attract and sponsor major arts, design, music and cultural events as a way of bringing tourists and activists into the County.		
M 1.8	Target artists and the creative industries to bring economic and community development to neighborhoods and districts by increasing the connections between the arts and cultural sector and other sectors of the economy and providing information about locally available resources and assets.		
M 1.9	Require art, cultural, and educational organizations to establish recommended sustainability policies and practices as a condition for the receipt of public funds or services.		
M 1.10	Develop a special "Arts Pass" and/or "Event Pass" that residents and visitors can purchase for a reduced rate for certain County-wide events to supplement existing special ticket price initiatives.		
Goal 2: Encourage a balanced local economy that is protective of all sectors of the County's population.			
M 2.1	Encourage diverse community involvement in County government. Post vacancies and announcements regarding governmental boards in public locations.	EAC-5(3)	
M 2.2	Adopt policies or regulations that increase overall market demand for green buildings and associated materials, renewable energy products or infrastructure, and recyclable products.	EJ-2(2)	S-2.5
M 2.3	Increase initiatives and outreach designed to increase green and resilient construction practices in conjunction with the development community for retrofits to harmonize sustainable business practices with new economic opportunities.		E-2.4
M 2.4	Address impacts of climate change and sea level rise on disadvantaged social groups, values and symbolic places.		
Goal 3: Promote sustainability in all sectors of the County's economy.			
M 3.1	Develop and maintain a Sustainability Handbook for business owners on the County's GreenKeys! website.		E-2.3, E-2.4
M 3.2	Target an annual community workshop aimed at underserved and underrepresented populations on sea level rise and community resilience.		
M 3.3	Encourage sustainable business practices such as recycling and use of local and sustainably-grown products. Hold at least one annual briefing with the predominant Chambers of Commerce to discuss opportunities for enhancing sustainability-related incentives and initiatives.		E-2.3, E-2.4
M 3.4	Create a web-based clearinghouse for best management practices, local data, tools, and tracking for the business community.		E-2.4
M 3.5	Create or support promotional campaigns to bank locally, buy locally, or buy from small and independent businesses and retailers.	EJ-3(4)	
M 3.6	Work with Florida Keys Community College to expand or create a green jobs program for new opportunities in green industries and trades such as green buildings and energy management.	EJ-6(9)	E-2.1

* Short-term (1-3 yrs.) recommendations in light blue, medium-term (3-5 yrs.) recommendations in light yellow, and long-term (>5 yrs.) recommendations in light pink.
** For long-term recommendations, the County is not required to wait on implementation if the opportunity for earlier implementation presents itself.

Five Year Implementation Plan

	Recommended Projects	Implementation Year	Plan Recommendation(s) Implemented	Projected Cost/Level of Effort[1]	Grant Available[2]	Responsible Department
Year 1 Projects (2016)						
1	Conduct next phase of energy auditing on County facilities and link upgrades to capital asset improvements. Install low-flow water conserving fixtures throughout County facilities.	1 (ongoing)	GO 3.1; GO 3.3; GO 3.8; GO 6.1	Audits - range per square foot from $0.04/sq. ft. (system specific) to $0.20/ sq. ft. (entire building) Toilets - $100-325 each uninstalled Urinals - $275-375 each uninstalled Showerheads - $10-50 each uninstalled Faucets - $45-100 each uninstalled Staff time – 150 hours	Y	Public Works
2	Expand County's use of renewable energy (and vehicle charging stations) through a Solar Feasibility Study.	1	GO 4.4; GO 4.7; CE 6.1	Feasibility analysis - $50,000-75,000 Public electric vehicle charging stations - estimated at $6,000-$10,000 per unit Solar street lights/poles - $4,500 per unit installed Staff time – 200 hours	Y	Sustainability in cooperation with FKEC and Keys Energy
	Recommended Projects	**Implementation Year**	**Plan Recommendation(s)**	**Projected Cost/Level of Effort**	**Grant Available**	**Responsible Department**

[1] Projected costs are based on the following assumption - hours assume the availability of two (2) full time equivalent staff members which may be pulled from existing staff or a combination of existing or new staff. Examples of other staffing efforts include the City of West Palm Beach, Palm Beach County, Miami-Dade County and Broward County.
[2] See the Implementation Matrix in Appendix G of the GreenKeys! Sustainability Action Plan for more detail on available grants.

			Implemented			
3	Develop better elevation data (LIDAR) County-wide.	1	CE 2.2	Countywide - $400,000 - $425,000 Key Largo - $160,000 - $175,000 Key West/Stock Island - $130,000 - $140,000 Staff Time - 120 hours	N	Sustainability
4	Develop adaptation alternatives for vulnerable County facilities and infrastructure based on 2030 sea level rise scenarios.	1	GO 1.4; GO 2.3; GO 2.8 – 2.12	Alternatives Analysis to Determine Cost Per Facility	Y	Outside Consultant
5	Pilot project to conduct a Comprehensive Feasibility Study for Enhanced Stormwater and Tidewater Criteria (prioritizing areas) for near-term areas subject to inundation risk, including nuisance flooding (in two locations).	1	CE 2.3; NS 3.3	$98,000 Staff time – 100 hours	N	Sustainability
6	Perform further analysis with improved elevation data for the Bay Manor assisted living retirement home.	1	GO 2.4	Alternatives Analysis to Determine Cost for Facility	Application pending for DEP grant	Sustainability
7	Develop a geographic database to document nuisance flooding events.	1	CE 1.1; GO 1.5	Staff time - 30 hours	Y	IT Sustainability
8	Hold three (3) community workshops to discuss sea level rise with stakeholders.	1	CE 3.2; BE 1.7; BE 1.11; HS 1.2	Staff time – 90 hours	N	Sustainability
Recommended Projects		**Implementation Year**	**Plan Recommendation(s) Implemented**	**Projected Cost/Level of Effort**	**Grant Available**	**Responsible Department**
9	Develop a Sustainability	1	M 3.1	Staff time –120 hours	N	IFAS

	Handbook for business owners on the County's GreenKeys! website.					
10	Continue invasive exotic species management.[3]	1	NS 6.1	Staff time – 50 hours annually	N	Land Authority
11	Develop an analysis of useful infrastructure energy and sustainability rating systems to optimize planning for infrastructure, facilities and assets.	1	GO 1.3, GO 3.1, GO 3.2, GO 3.6	Staff time – 100 hours	N	Public Works
Year 2 Projects (2017)						
1	Develop an employee training program on energy efficiency and water conservation.	2	GO 3.4; GO 4.5; GO 6.2; GO 8.6; CE 5.1	Staff time – 100 hours	Y	IFAS
2	Conduct a County-wide roads analysis to identify near-term roads subject to inundation risk, including nuisance flooding. This will include researching where additional green infrastructure would be appropriate.	2	NS 3.3; CE 2.1; CE 2.3	Estimated at $300,000-500,000 Staff time – 200 hours	N	Sustainability Engineering
Recommended Projects		**Implementation Year**	**Plan Recommendation(s) Implemented**	**Projected Cost/Level of Effort**	**Grant Available**	**Responsible Department**
3	Build local government capacity to better understand local coastal	2	GO 1.6; GO 2.7; CE 1.2; CE 3.3	$30,000 County match funds	Y	Outside Consultant

[3] Need Michael Roberts' input.

	hazard risks, and analyze the legal and policy factors that impact adaptation responses. (NOAA grant) End products will include: • A participatory VCAPS[4] assessment for Monroe County; • HAZUS5 damage valuations and visualizations for Monroe County; • Law and policy analysis of issues directly affecting local adaptation capabilities; and • Regional analysis comparing how the state and local regulatory environment impacts resilience planning and adaptation.			Staff time – 50 hours		Sustainability
4	Create a list of incentives to encourage construction of energy and water efficient buildings, including but not limited to linkages to ROGO.	2	GO 3.7; GO 6.4; CE 3.1; CE 4.1; CE 4.2; BE 1.8; M 2.3	Staff time – 50 hours	N	IFAS Public Works
Recommended Projects		**Implementation Year**	**Plan Recommendation(s) Implemented**	**Projected Cost/Level of Effort**	**Grant Available**	**Responsible Department**
5	Create a list of funding sources to finance energy-efficiency and resiliency upgrades in residences and businesses.	2	BE 1.9	Staff time – 50 hours	N	IFAS

[4] Vulnerability, Consequences, and Adaptation Planning Scenarios (VCAPS) builds on concepts of hazard management and vulnerability and uses participatory modeling techniques to organize and document dialogue and learning.

[5] Hazus uses Geographic Information Systems (GIS) technology to estimate physical, economic and social impacts of disasters. It graphically illustrates the limits of identified high-risk locations.

6	Update vulnerability assessments on Monroe County buildings upon the work in the GreenKeys! project.	2	CE 1.2; CE 2.4; CE 2.5	Staff time – 100 hours	Y	Sustainability
7	Conduct additional study of a freeboard initiative to elevate and floodproof buildings within Monroe County.	2	BE 1.6	Staff time – 100 hours	N	Growth Management
8	Conduct a tree inventory and establish tree canopy goals County-wide.	2	NS 2.1; NS 4.3	Staff time – 200 hours or Consulting Services	Y	TBD
9	Complete a "right size/right type" fleet analysis.	2	GO 5.1; GO 5.2	Staff time – 200 hours	N	Fleet Management IFAS Sustainability
10	Develop a public education campaign to inform residents about energy and water efficiency and future flood risk and potential environmental change.	2	GO 1.8; GO 3.5; GO 6.3; CE 2.6; CE 3.1; CE 3.4; HS 1.2; HS 1.3	Staff time – 100 hours	N	PIO Sustainability IFAS
Recommended Projects		**Implementation Year**	**Plan Recommendation(s) Implemented**	**Projected Cost/Level of Effort**	**Grant Available**	**Responsible Department**
11	Adopt specific product bans to significantly advance progress toward waste reduction goals.	2	CE 7.4	Staff time – 50 hours	N	TBD

	Note that during the 2016 legislative session, the Florida Legislature will likely be considering bills to allow small communities in coastal areas to enact temporary plastic bag bans as part of a 2.5 year pilot program.					
12	Hold three (3) community workshops to discuss sea level rise with stakeholders.	2	CE 3.2; BE 1.7; BE 1.11; HS 1.2	Staff time – 90 hours	N	Sustainability
Year 3 Projects (2018)						
1	Conduct an analysis of where maintaining living shorelines would be beneficial. Identify and map natural inundation buffers which could also provide sea level rise adaptation benefits.	3	NS 5.1; NS 5.2; NS 5.3; NS 2.3	Staff time – 150 hours or Consulting Services	Y	Growth Management
2	Create a database of all elevation data for County and utility facilities and assets.	3	GO 1.7	Staff time – 100 hours	N	IT IFAS Sustainability
3	Identify areas for habitat maintenance where the removal of exotics could serve as a natural or soft protection option and inundation buffering opportunities.	3	NS 2.3; NS 5.6; NS 6.2	Staff time – 30 hours	N	Land Authority Growth Management
Recommended Projects		**Implementation Year**	**Plan Recommendation(s) Implemented**	**Projected Cost/Level of Effort**	**Grant Available**	**Responsible Department**
4	Calibrate the SLAMM model results with historic land cover change and field observations	3	NS 2.2	$30,000	N	TBD

	and coordinate with land acquisition.					
5	Conduct feasibility studies for alternative energy at County facilities. Partner with electric utilities for creative ways to deploy more solar. To monitor progress, develop a baseline for current renewable energy use.	3	GO 4.3; GO 4.7; CE 6.1	$60,000 Staff time – 50 hours	N	Outside Consultant
6	Enhance public information campaign on waste reduction targets and available recycling programs. This should include reduced generation of fats, oils and grease and their beneficial reuse.	3	CE 4.3; CE 7.1; CE 7.2	Staff time – 50 hours	N	Solid Waste
7	Analyze pedestrian network to improve safety and continue increasing total mileage of bicycle lanes and shared use paths.	3	BE 2.1 ; BE 2.2; BE 2.5; BE 2.6; BE 2.11	Staff time – 80 hours	Y	Growth Management Engineering Sustainability
8	Inventory GHG emissions for County and Community-wide sectors every three (3) years.	3	GO 4.1; GO 4.6	Estimated at $20,000 per inventory	N	IFAS
9	Analyze current EV charging infrastructure in partnership with private companies to look for opportunities to expand charging infrastructure.	3	GO 4.4	Staff time – 100 hours	N	Sustainability Utilities
Recommended Projects		**Implementation Year**	**Plan Recommendation(s) Implemented**	**Projected Cost/Level of Effort**	**Grant Available**	**Responsible Department**
10	Adopt or modify procurement policies in the Monroe County Purchasing Policy to incentivize	3	GO 8.1	Staff time – 250 hours	N	Budget Legal Sustainability

	vendors whose buildings, equipment, products and services meet achievable sustainability targets.					
11	Develop a policy to reduce pesticide and herbicide use in County operations.	3	GO 8.3	Staff time – 75 hours	N	IFAS
12	Increase efforts to protect and maintain natural habitats, especially "core areas" with best chance of persistence during sea level rise, including marine ecosystem mitigation as possible overlay component and offering incentives for protection natural resources. This will facilitate development of a land acquisition strategy based on sea level rise impacts.	3	NS 3.4; NS 3.5; NS 3.6; NS 4.1	Staff time – 100 hours	N	Growth Management Land Authority Sustainability
13	Specify priority areas where shoreline protection structures should be removed and continue discouraging the use of hard protection unless no other feasible alternative is available.	3	NS 5.4; NS 5.5	Staff time – 100 hours	N	TBD
14	Hold three (3) community workshops to discuss sea level rise with stakeholders.	3	CE 3.2; BE 1.7; BE 1.11; HS 1.2	Staff time – 90 hours	N	Sustainability
Recommended Projects		**Implementation Year**	**Plan Recommendation(s) Implemented**	**Projected Cost/Level of Effort**	**Grant Available**	**Responsible Department**
15	Establish and enforce regulations to control the use and sale of invasive species. This would	3	NS 6.3	Staff time – 50 hours	N	Land Authority

	expand the County's existing regulations limiting invasive species in site restoration and landscaping.					
Year 4 Projects (2019)						
1	Develop adaptation alternatives for vulnerable County facilities based on low and high 2060 sea level rise scenario.	4	GO 2.1 – 2.3; GO 2.8 – 2.12	Alternatives Analysis to Determine Cost Per Facility; Staff time or Consulting Services	Y	Sustainability Growth Management Public Works
2	Create an environmentally preferable purchasing program.	4	GO 8.5; GO 8.6	Staff time – 75 hours	N	IFAS
3	Update or modify goals and recommendations in the GreenKeys! Sustainability Action Plan every 3-5 years.	4 (ongoing)	GO 8.4	Staff time – 100 hours per update	N	Sustainability
4	Update requirements for ecological buffers and provide guidance on how to establish or adjust buffers to accommodate sea level rise. Buffers should be designed to provide "habitat migration corridors" that allow sensitive habitats and species to migrate inland or upland as seas rises. To accommodate, buffer amount may need to be increased.	4	NS 2.4	Staff time – 150 hours	N	Growth Management
Recommended Projects		**Implementation Year**	**Plan Recommendation(s) Implemented**	**Projected Cost/Level of Effort**	**Grant Available**	**Responsible Department**
5	Create a timeline for revising land development regulations and future Comprehensive Plan	4	BE 1.1 - 1.4; BE 1.10	Staff time – 50 hours	N	Growth Management

	updates to more comprehensively plan for sea level rise and climate change. Revisions to consider should include setbacks, adaptation action areas, use restrictions, retrofit triggers, and adoption of a natural forces' ordinance.					
6	Analyze available "resiliency" construction standards (including Resilience STAR™, the Institute for Business and Home Safety's FORTIFIED Home™, FORTIFIED Commercial, FORTIFIED Safer Business, FORTIFIED for Safer Living®, RELi or others) to determine which will be most appropriate to incorporate into County regulations.	4	BE 1.5	Staff time – 50 hours	N	Growth Management Public Works
7	Develop incentive program for developers and property owners who relocate structures landward, develop in less vulnerable tiers, conserve more open space along the shoreline, and/or preserve or restore natural flood buffers.	4	BE 1.12	Staff time – 150 hours	N	Growth Management
Recommended Projects		**Implementation Year**	**Plan Recommendation(s) Implemented**	**Projected Cost/Level of Effort**	**Grant Available**	**Responsible Department**
8	Address impacts of climate change and sea level rise on disadvantaged social groups, values and symbolic places.	4	M 2.4; M 3.2	Staff time – 250 hours	N	Social Services

	Target an annual community workshop aimed at underserved and underrepresented populations on sea level rise and community resilience.					
9	Work with Florida Keys Community College to expand or create a green jobs program for new opportunities in green industries and trades such as green buildings and energy management.	4	M 3.6	Staff time – 50 hours	N	IFAS Sustainability
10	Hold three (3) community workshops to discuss sea level rise with stakeholders.	4	CE 3.2; BE 1.7; BE 1.11; HS 1.2	Staff time – 90 hours	N	Sustainability
Year 5 Projects (2020)						
1	Develop a "best practices" tool kit to educate residents on energy saving and resiliency techniques.	5	CE 3.4	Staff time – 80 hours	N	IFAS Sustainability
Recommended Projects		**Implementation Year**	**Plan Recommendation(s) Implemented**	**Projected Cost/Level of Effort**	**Grant Available**	**Responsible Department**
2	Research the feasibility of pursuing "blue carbon" payments for conserved and restored seagrass areas as well as pursuing future revenue opportunities	5	NS 4.4; NS 4.5	Staff time – 50 hours	N	IFAS

	from "blue carbon" payments associated with conservation and assisted migration of local mangrove habitats (Partner with the Florida Keys National Marine Sanctuary Advisory Council).					
3	Identify strategies to provide better public transportation options through improved connectivity, extended routes, expanded hours, increased reliability and more education of available services.	5	BE 2.4; BE 2.7; BE 2.8; BE 2.10	Staff time – 50 hours	N	Growth Management IFAS
4	Analyze land development regulations and zoning requirements to determine how to more effectively promote sustainable food system including urban agriculture, farmers markets, community gardens, Farm to School programs, dock to dish programs, etc.	5	BE 4.1; BE 4.2; HS 2.1; HS 2.2; HS 2.3; HS 2.4; M 3.5	Staff time – 50 hours	N	Growth Management
5	Incorporate future sea level rise impacts into the 2020 Local Mitigation Strategy Update.	5	HS 1.1	Staff time – 20 hours	N	Emergency Management
Recommended Projects		**Implementation Year**	**Plan Recommendation(s) Implemented**	**Projected Cost/Level of Effort**	**Grant Available**	**Responsible Department**
6	Evaluate current policies and regulations to identify appropriate places to include wellness, active living and active building design concepts.	5	HS 3.1; HS 3.2; HS 3.3; HS 3.4; HS 4.1	Staff time – 50 hours	N	Growth Management
7	Develop an "arts, culture, and	5	M 1.1; M 1.2; M 1.3	Staff time – 100 hours	N	Growth

	innovation" policy or plan clearly defining County's role based on: • Survey of the location of arts amenities in the County. • Ensure Plan aligns with County's economic and community development approach including the economic, environmental, and social impact of arts, design, and cultural industry in County. • Highlighting the community's existing cultural assets by increasing their presence on the street and in highly visible public forums. • Establishing priorities for public art and design projects, events, and locations for the next fifteen years. • Encouraging streetscape and public spaces that promote cultural and arts projects throughout the County.					Management IFAS
Recommended Projects		**Implementation Year**	**Plan Recommendation(s) Implemented**	**Projected Cost/Level of Effort**	**Grant Available**	**Responsible Department**
8	Create a healthy hazardous product initiative that includes: • Educating residents about proper use and disposal of hazardous products, and	5	HS 5.1; HS 5.2; HS 5.3	Staff time – 100 hours	N	IFAS

	making information about more sustainable household products available. • Hosting green cleaning workshops and awareness programs.					
9	Develop a special "Arts Pass" and/or "Event Pass" that residents and visitors can purchase for a reduced rate for certain County-wide events to supplement existing special ticket price initiatives.	5	M 1.10	Staff time – 50 hours	N	TBD
10	Hold three (3) community workshops to discuss sea level rise with different stakeholders including realtors and Chambers.	5	CE 3.2; BE 1.7; BE 1.11; HS 1.2	Staff time – 90 hours	N	Sustainability