Flood and Stormwater Management

Initiative Summary Statement:

Improve the capacity of stormwater infrastructure to reduce the impact of flooding and improve environmental outcomes on a regional scale.

Initiative Description:

Objective: **The objective of this Initiative is to improve the capacity of stormwater infrastructure using nature-based solutions that improve environmental outcomes, mitigate risk of water intrusion in homes, and reduce the risk of flooding across the region.** Stormwater infrastructure includes open green spaces, waterscapes, swales, flow ways, culverts, and canals that contribute to the capacity of the system to effectively convey water off the land and into waterways. Effective stormwater conveyance includes traditional gray infrastructure such as pipes, culverts, or other concrete design features as well as green infrastructure techniques that mimic nature and involve the use of soils for percolation and vegetation for infiltration, evapotranspiration, and/or recycling of stormwater runoff.[24] When these nature-based solutions are incorporated into the built environment, it is referred to as a "living with water" approach. Managing water is an inherently regional, watershed-based process. A watershed (also called a drainage basin and catchment) is a land area that directs water flow that consists of all forms of precipitation to smaller bodies of water, such as creeks, streams, and rivers that outflow to a common, larger body of water; in the County, water outflows to the Caloosahatchee River, Charlotte Harbor Estuary, Imperial River, Estero Bay, and the Gulf of Mexico.[25]

Need: **Stormwater management at a regional level is necessary to mitigate flood risk from heavy rain events, king tides, sea level rise, and major tropical activity, in an increasingly urbanized, developed area.** The County has relatively flat topography and high amounts of rainfall, which are typical of Southwest Florida. In 2017, two storms, Invest 92L and Hurricane Irma, precipitated 15" - 30" of rain in the County within 20 days. These two significant rainfall events caused major downstream flooding and became the impetus for

[24] NRDC. (2022, July 25). Green Infrastructure: How to manage water in a sustainable way. https://www.nrdc.org/stories/green-infrastructure-how-manage-water-sustainable-way#whatis
[25] National Ocean Service. (n.d). National Oceanic and Atmospheric Administration (NOAA). What is a Watershed?. https://oceanservice.noaa.gov/facts/watershed.html

the commission of a study that became known as the Southern Lee County Flood Mitigation Plan (SLCFMP).

When stormwater systems are unable to effectively flow, surface water is unable to drain properly and can flood low-lying areas. Flooding can threaten safety as well as damage infrastructure and the natural environment. Land use changes in the County because of development may impact the hydrology of the region by decreasing the available ground surface over which water can infiltrate and by decreasing the time it takes for water to reach the discharge point in a watershed. Impervious surfaces such as roads do not allow water to infiltrate and create additional drainage challenges in developed areas.

The region has an extensive and complex system of canals that provides residents waterfront property and access to natural resources; the City of Cape Coral, for example, has over 400 miles of canals, and Lehigh Acres has a network of over 300 miles. These canals are also a system for water control. The maintenance of flow ways and canals considers the effective flow of water, removing obstructions such as vegetative debris or sediment that restricts flow. A well-developed maintenance plan will increase the longevity of the drainage facilities and will allow for maximum conveyance during storm events.

This Initiative stands to reduce the loss of life, property, and environmental impacts in respect to the strong forces of nature. Focusing on mitigating overall impacts in plans, developments, and direct improvement actions throughout the region is critical to strengthening resilience.

Regional Approach: The flow of water does not consider jurisdictional boundaries; a regional approach to reducing flood risk through improved stormwater management requires coordinated implementation of infrastructure maintenance, planning, and construction. Watershed issues in one jurisdiction can have downstream effects on others. A key strategy to reduce flood risk is for each jurisdiction to maintain individual flow ways by adhering to a regional standard of maintenance and clearing vegetative debris where necessary to maintain adequate flow of water. Direct actions should also consider floods of all types. The causes of flooding are not limited to tropical systems and may include traditional rain/weather, sea level rise, and tidal flooding.

Stormwater projects must be completed in a strategic order so as not to inadvertently cause new issues in another area of the watershed. A prerequisite of some of the upstream projects is that downstream improvements (such as maintaining flow ways) must occur first so that flooding problems are not transferred from one area to another.

Regional planning would also support the incorporation of other considerations, such as prioritizing improvements along evacuation and collector routes to maintain safe transit.

Similarly, the planning and design of stormwater criteria is informed using complex regional models. The SLCFMP analyzed four regional watersheds and developed conceptual projects to mitigate flooding challenges in the South Lee County area, which includes Unincorporated Lee County, the Village of Estero, the City of Bonita Springs, and portions of the City of Fort Myers. Note that Cape Coral was not included in this modeling and may need a watershed analysis for a complete picture of the region. These projects could increase the effectiveness of stormwater infrastructure through bypass, structure replacement, increased storage, and improved conveyance. Projects with a lower construction cost were prioritized and already implemented; the implementation of these direct actions provides the region with a strategic model for how to mitigate flood risk.

It is important for local leaders to plan and collaborate with the South Florida Water Management District for flood control levels of service in the County to increase overall resilience. Coordination between the South Florida Water Management District, Lee County, municipalities, and water control districts could allow jurisdictions to jointly pursue funding to complete the larger, more expensive projects. The BRIC, FMA, and some EPA, USDA, and state water programs are just some of the funding sources that consider regionalism and/or partnerships in the selection process.

Impact: The region can improve stormwater capacity and reduce the impacts of flooding through a standard of maintenance for flow ways, coordinated direct actions to increase conveyance, and strategic planning and resourcing. Resilient stormwater infrastructure reduces the negative impacts from flooding on the built environment, as well as the secondary results of flooding (e.g., loss of economic activity).

Key Considerations:

- Consider implementation of the 38 conceptual projects from the Southern Lee County Flood Mitigation Plan, especially those with the greatest potential impact. Projects were evaluated individually and as a system for flood mitigation benefits to the region. Note that Cape Coral was not included in initial analysis and should be considered for full analysis of regional watershed. Perhaps Cape Coral can identify projects based on the same criteria. The following criteria was considered for the prioritization of projects:
  - Cost and Flood Mitigation Benefit - Lower cost projects with higher flood mitigation benefits were ranked higher.
  - Existing Drainage Level of Service - Represents current drainage and areas that have historically shown significant flooding.
  - Multiple Benefits - Projects often have more than one flood mitigation benefit.

    - Land Availability - Land acquisition costs were considered, and projects on lands that were already owned by Lee County were given a higher priority where appropriate.
    - Permittability - Projects that require extensive state and federal permitting were ranked lower.
- Municipalities should consider innovative jurisdictional projects to address the specific needs of their communities.
- Incorporate green infrastructure techniques and nature-based solutions into future project plans.
- Acquire lands through Conservation 20/20 program or other methods to preserve open spaces for improved water management.
- Cooperation between jurisdictions for restoration of historic flow ways.
- Localities are continually making new investments in advanced modeling to increase community resilience. Reviewing and partnering with other municipalities can showcase best practices and guide successful implementation of this Initiative.

Co-Sponsoring Branches:

Natural Resources, Infrastructure

Stakeholders:

- United States Army Corps of Engineers
- South Florida Water Management District
- Florida Department of Environmental Protection
- Lee County departmental experts on natural resources, parks, and transportation.
- Municipal departmental experts on natural resources, parks, and transportation
- University Partnerships

Potential Funding Sources:

- Federal Emergency Management Agency
- United States Environmental Protection Agency
- United States Department of Transportation
- United States Army Corps of Engineers
- National Oceanic and Atmospheric Administration
- Florida Division of Emergency Management
- Florida Department of Environmental Protection
- Florida Department of Transportation

Resources:

- SOUTHERN LEE COUNTY FLOOD MITIGATION PLAN.pdf (leegov.com)