

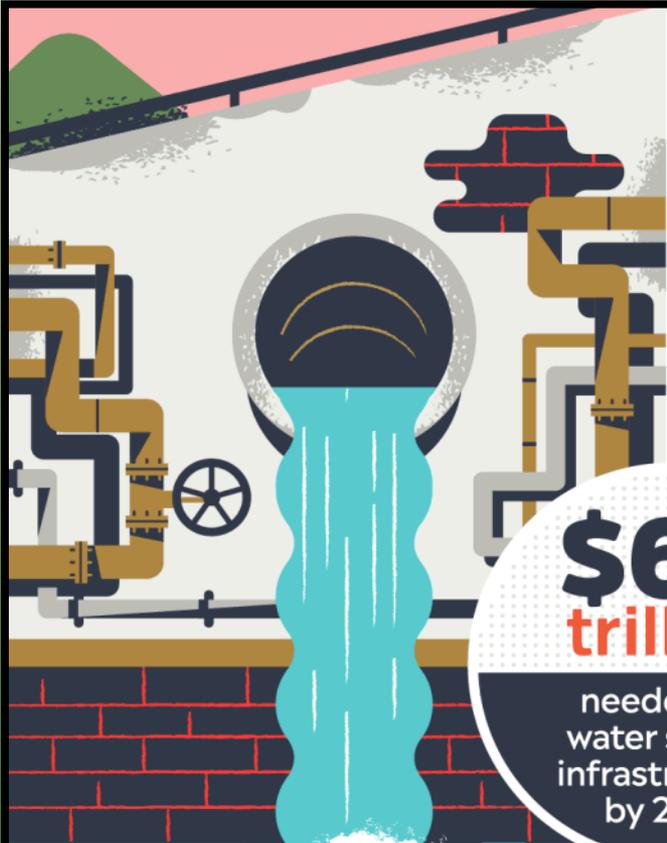


Introduction to Green Infrastructure & Greenways Planning

STATUS QUO

Grey infrastructure refers to *TRADITIONAL* stormwater management systems that quickly dispose of stormwater, such as pipes, pumps and lined ditches, or Retention/detention ponds.



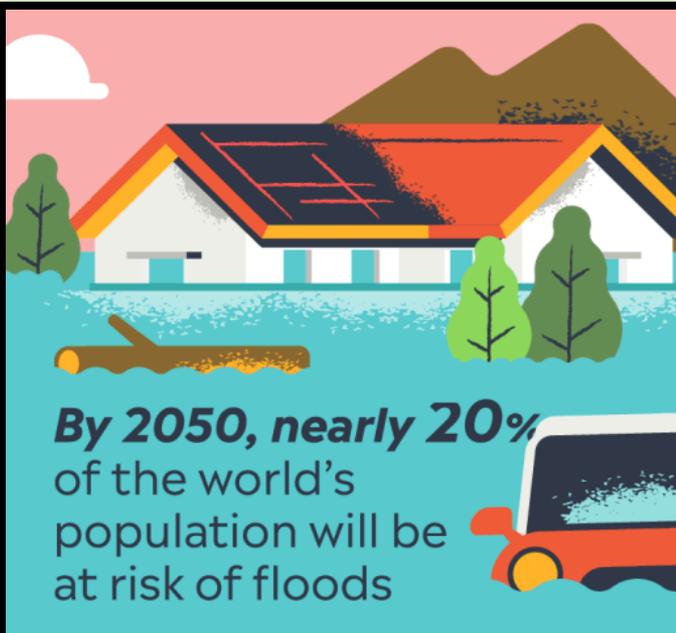


Natural systems may contribute to clean, reliable water supply and protect against floods and drought.

\$6.7
trillion

needed for
water supply
infrastructure
by 2030

Traditional “gray infrastructure” alone may no longer provide the climate resilience and level of services required in today’s world.



By 2050, nearly 20%
of the world's
population will be
at risk of floods



Up to **5.7**
billion people
will live in
water-scarce areas.



A new wave of infrastructure projects is
needed for water security and development

IMPERVIOUS CREEP!

Building the Case for Low Impact Design – Impervious Creep



Cocoa Beach 1956



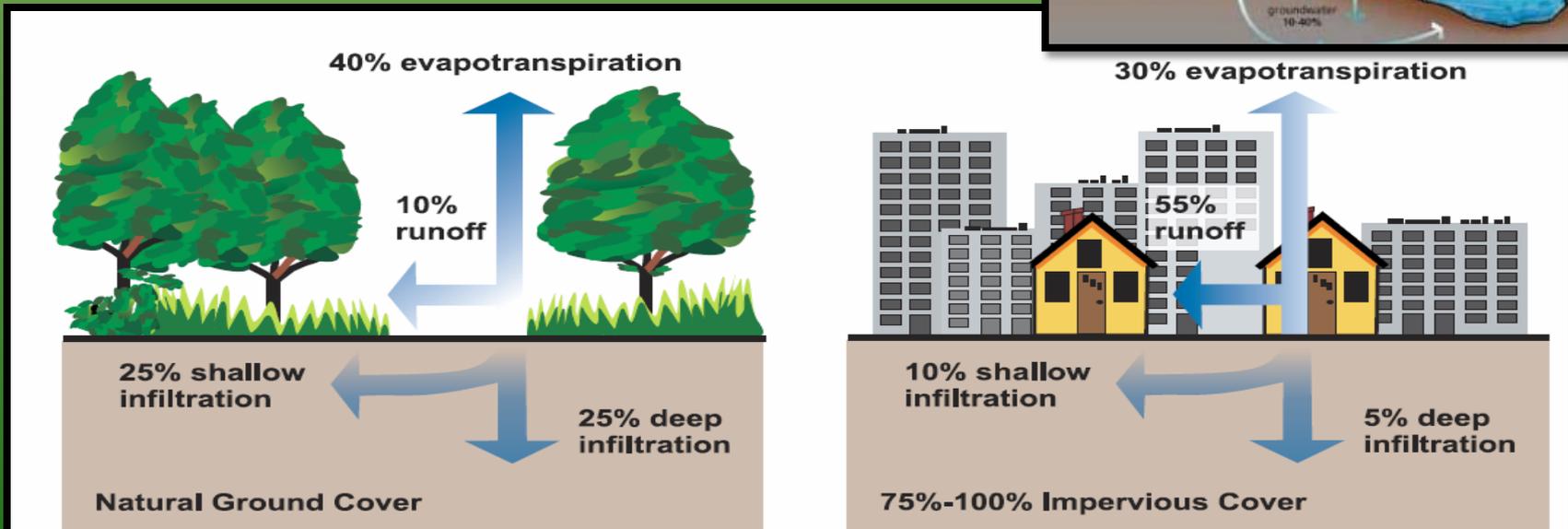
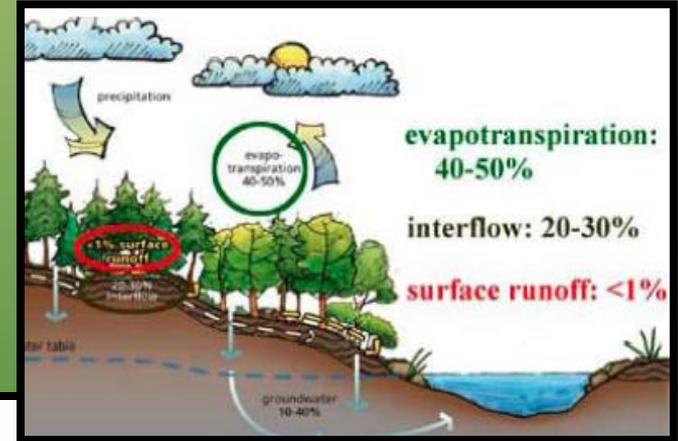
Cocoa Beach Today



Urbanization Infrastructure . . . Impervious Creep . . . green turns gray

INCREASING NON POINT POLLUTION

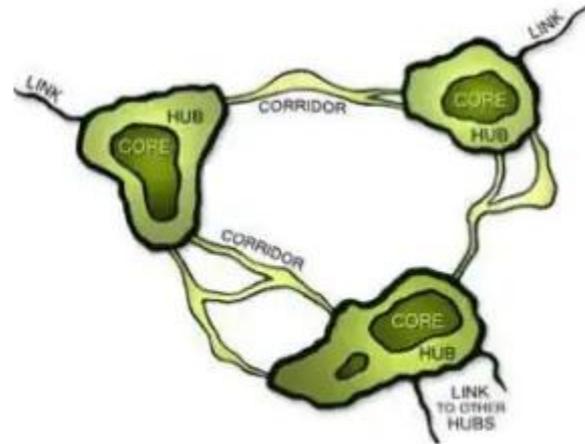
Did you know that because of impervious surfaces like pavement and rooftops, a typical city block generates more than 5 times more runoff than a woodland area of the same size?



Relationship between impervious cover and surface runoff. Impervious cover in a watershed results in increased surface runoff. As little as 10 percent impervious cover in a watershed can result in stream degradation.

WHAT IS GREEN INFRASTRUCTURE (GI) ?

- **Hubs** act as “anchor” for a variety of ecological processes, e.g., providing source and destination areas for species.
- **Links** are the connections tying the system together, facilitating the flow of ecological processes; links may include, green corridors, green belts, stepping stones.



Green infrastructure (GI) is defined as PRESERVING and UTILIZING the natural and man-made landscapes and features that can be used to manage runoff. Examples of natural green infrastructure include forests, meadows and floodplains. Examples of man-made green infrastructure include green roofs, rain gardens and rainwater cisterns. GI is also the network of open space nodes and corridor that provide habitat for wildlife.

WHAT IS LOW IMPACT DEVELOPMENT (LID) ?

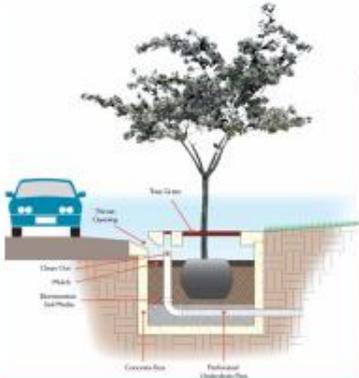
Low impact development (LID) is an approach to development and redevelopment intended to reduce impacts on water resources through the use of INCREMENTAL stormwater management

practices and TREATMENT TRAINS that treat, infiltrate, evapotranspire, or reuse stormwater runoff on the site where it falls.

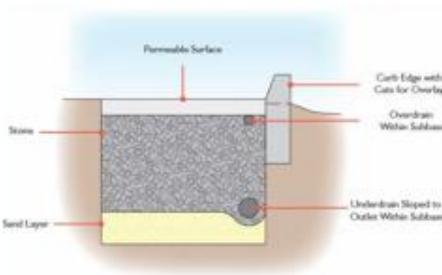


LID PROJECT EXAMPLES

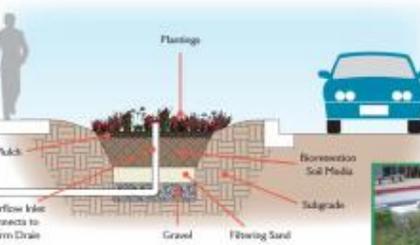
Tree Box



Pervious Sidewalk



Curb Extension



Bioretention



Rain Garden



GI and LID Provides Many Environmental and Economic Benefits

- Improved Water Quality.
- Reduced Number of Costly Flooding Events.
- Restored Aquatic Habitat.
- Improved Groundwater Recharge.
- Enhanced Neighborhood Beauty.
- Mitigate the urban heat island effect
- Mitigate climate change
- Save energy
- Reduce air pollution
- Increase property values
- Increase groundwater recharge



Parking lot runoff is allowed to infiltrate through a vegetated bioretention area



WHY GI & LID?

- Reduces Stormwater **VOLUME** to waterways
- Reduces Stormwater **POLLUTANTS** to waterways
- Reduces Stormwater **INTENSITY** at Storm Outfall
- Recharges Local **AQUIFER**
- Nourishes **SOIL BIOTA/MICROBES** – increases holding capacity
- Soil Biota/Microbes **REDUCE TN/TP** to **GROUNDWATER**
- Protects against **SALTWATER INTRUSION**
- Reduces **DOWNSTREAM FLOODING/KING TIDES**
- Promotes **GREEN SPACE & NATURAL RESOURCES**



HOW TO IMPLEMENT GI & LID

LID/Green Infrastructure Principles/BMPs

- Minimize Impervious Footprint
- Preserve Site Trees/Natural Areas
- Plant Tree Canopy
- All Green Areas recessed
- Pervious Pavement walkways and driveways
- Elevated Structures for buildings, decks and patios
- Underground Rain Storage/Rainwater Harvesting/Cisterns
- Explore Innovative BMPs – Green Roofs/Walls



FOR MORE INFORMATION

There are many great resources out there!



United States Environmental Protection Agency August 2016 EPA 832-R-16-004

Green Infrastructure and Climate Change Collaborating to Improve Community Resiliency

A collage of four photographs illustrating green infrastructure: a residential street with a rain garden, a group of people standing in front of a building, a paved path next to a green roof, and a stone-lined stream with large boulders.

U.S. Environmental Protection Agency, Office of Wastewater Management

RESOURCE GUIDE FOR PLANNING, DESIGNING AND IMPLEMENTING GREEN INFRASTRUCTURE IN PARKS

A photograph of a park featuring a paved path, lush green trees, and a modern building with a glass facade in the background. Two people are riding bicycles on the path.

NRPA National Recreation and Park Association
Because everyone deserves a great.

MRC

The logo for the Marine Resources Council (MRC) features the letters "MRC" in large, bold, blue font. Below the letters is a silhouette of a whale breaching the water, surrounded by a school of fish and reeds.

Marine Resources Council

JOIN CITY STAFF AND THE NATURAL RESOURCES BOARD FOR A

**LOW IMPACT
DEVELOPMENT
COMMUNITY WORKSHOP**

TUESDAY, DECEMBER 7TH

6PM

CITY COUNCIL CHAMBERS