

Low Impact Development (LID)

Grade Level: 6th through 12th

Subject: Science

Duration: 90 Minutes

Materials: Water Quality Kits, Sample buckets,
Water Quality data sheets, LID worksheet



Overview: Students will map the flow of water from sample site to the Gulf of Mexico. Students will analyze water quality of the site. Follow-up: Students will create a model LID program for home or school.

Objectives: Students will understand the concept of watershed. Students will understand that non-point source pollution can be mitigated by the principals of Low Impact Development. Students will document and understand the distinction between native, non-native, and non-native invasive plants.

NGSSS:

SC.6.E.6.2 Recognize that there are a variety of different landforms on Earth's surface such as coastlines, dunes, rivers, mountains, glaciers, deltas, and lakes and relate these landforms as they apply to Florida.

SC.7.E.6.6 Identify the impact that humans have had on Earth, such as deforestation, urbanization, desertification, erosion, air & water quality, changing the flow of water.

SC.8.N.1.5 Analyze the methods used to develop a scientific explanation as seen in different fields of science.

SC.8.N.3.1 Select models useful in relating the results of their own investigations.

SC.912.E.6.2 Connect surface features to surface processes that are responsible for their formation

SC.912.E.6.4 Analyze how specific geologic processes and features are expressed in Florida and elsewhere

SC.912.L.17.7 Characterize the biotic and abiotic components that define freshwater systems, marine systems and terrestrial systems.

SC.912.L.17.18 Describe how human population size and resource use relate to environmental quality

SC.912.L.17.12 Discuss the political, social, and environmental consequences of sustainable use of land

SC.912.L.17.13 Discuss the need for adequate monitoring of environmental parameters when making policy decisions.

SC.912.L.17.17 Assess the effectiveness of innovative methods of protecting the environment.

LID Field Study (continued)

SC.912.L.17.16 Discuss the large-scale environmental impacts resulting from human activity, relating to runoff, surface and groundwater pollution.

SC.912.L.17.20 Predict the impact of individuals on environmental systems and examine how human lifestyles affect sustainability.

SC.912.L.17.15 Discuss the effects of technology on environmental quality

Extension: Students will use the knowledge they are acquired to contact local community leaders to inform them of the benefits of LID to the community. Students will use various forms of communication that could include: letters to the community leaders, podcasts, letters to the editor of a local newspaper, brochures etc.

SC.8.N.4.1 Explain that science is one of the processes that can be used to inform decision making at the community, state, national, and international levels.

SC.8.N.4.2 Explain how political, social, and economic concerns can affect science, and vice versa.

Background: Low Impact Development (LID) is an innovative stormwater management approach with a basic principle that is modeled after nature. It is a hydrologically functional landscape that generates less surface runoff, less pollution, less erosion, and less overall damage to our wetlands, lakes, streams and coastal waters.

LID techniques are being applied successfully in many areas of the United States and internationally. The USEPA is encouraging the application of LID techniques, and the technology is being transferred through the Low Impact Development Center, Inc.

<http://www.lowimpactdevelopment.org/>

The LID approach is a method of getting the rainfall into the ground as close as possible to the point where it landed. It has been explained as a basic principle to model nature. The basic premise is storm water should be managed on site instead of piping storm water directly to Sarasota Bay. LID techniques include landscaping features typically located on site with the purpose of getting the water back into the ground. The principles that may be appropriate include bioretention, green roofs, permeable pavements, the use of rain barrels and cisterns, soil amendments and tree box filters. The use of LID techniques is not without controversy among planners and developers. However, it is another tool available to assist in storm water management, and its application should be considered.

LID Field Study (continued)

LID techniques include (but are not limited to):

- Rain Barrels and Cisterns
- Rain Gardens
- Tree Box Filters
- Soil amendments - and stockpiling topsoil
- Permeable pavers on driveways and walkways
- Green roofs
- Bio-retention

The quality of water can change as it flows over the land. These changes in water quality may be due to natural factors or human activities. When water is degraded to a point that affects its use for a particular purpose, it has become polluted. Water pollution originates from two very different sources: point sources and non-point sources. Point source pollution comes from a discrete source such as a pipe, ditch or wastewater treatment plant. Non-point source means that the pollution comes from a broad area, such as a large field or lawn that has been covered with fertilizer or pesticides. Excessive application of fertilizer or pesticides on lawns and gardens (such as various "chem.-lawn" companies promote) can create non-point sources. People who use fertilizers and pesticides must read labels to ensure that they are applying the materials properly. The use of LID techniques can help to minimize the effects of these non-point source pollutants.

Suggested Procedure:

1. Lead a guided walk at field trip site - water samples will be taken and analyzed using LaMotte test kits. Record data on data sheet for later comparison.
2. Along the walk identify native plants and discuss the various habitats that are present. Identify any exotics that may be present and introduce the concept of invasive exotics.
3. Follow-up: students will complete the LID worksheet to create their own version of natural stormwater retention using LID principles.
4. Encourage the students to discuss their observations and share how they created each LID system.