San Nicolas Wetland Rethinking Urban Runoff

Problem: Water quality, function and aesthetics of the Campus Lagoon and wetlands across the nation are impacted by excessive nutrient-rich runoff.

Solution: A multifaceted treatment process improves water quality, enhances aesthetics and supports diverse habitats.

Students Assess Lagoon Water Quality
Since 2005, the Coastal Center for Biodiversity and Ecological Restoration (CCBER) has been researching lagoon water quality. Students collected stormwater for nutrient and heavy metal studies; monitored dissolved oxygen, temperature, and salinity; measured algae cover and collected soil cores from the bottom of the lagoon to assess carbon content and benthic invertebrate diversity.

What did they find?

Students found high nutrient levels in both the dry season (from irrigation runoff) and during storm events. They found consistently low dissolved oxygen levels in the dry season, especially at the bottom of the lagoon, which creates a challenging environment for fish and bottom dwelling (benthic) organisms. Soil cores showed that the bottom is covered with a deep muck of half-decomposed organic matter and a low diversity of benthic organisms. Together, these studies have demonstrated that the campus lagoon is suffering from eutrophication, indicating the need to treat runoff before it reaches the lagoon.

Eutrophication

Eutrophic or unhealthy system: Unconstrained, nutrient-rich runoff (high in nitrates ‘N’ and phosphates ‘P’) from irrigation and storm events supports dense algal blooms. This algal layer blocks sunlight and eventually dies and sinks to the bottom. Low-oxygen conditions are created at the bottom by the oxygen-demanding activity of decomposers working to break down the annual additions of dead algae. Because the lagoon doesn’t experience tidal flushing, these low-oxygen conditions effectively reduce the diversity of organisms that can survive.

Healthy system: Wetlands without excessive nutrient rich inputs have a healthy balance of algae and phytoplankton. This allows the sun’s light and energy to reach the bottom of the wetland and support a diversity of organisms and nutrient natural cycling.

Working Toward a Solution

Transforming a site: This site was dominated by invasive, non-native plants such as ivy, castor bean, kikuyu grass and pampas grass. Student research on the site’s hydrology demonstrated the presence of a near-surface water table. Their findings led to a vision for wetland restoration. A 2010 campus-funded project to upgrade the storm drain system provided the opportunity to translate the research and planning into a multi-faceted project designed to address lagoon water quality issues. The Coastal Fund, The Wetlands Recovery Project, and Housing and Residential Services provided additional funding that made the full restoration possible.

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Students monitor wetland and algae cover.

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