

## ***The Regional Report***

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### **Water conservation goes high tech with satellite imagery**

**LC Region conducts irrigated vegetation assessment of San Diego urban environments**

Satellite technology, applied and implemented by **Ron Simms**, Regional Geographical Information System (GIS) coordinator, and **Ray Ahlbrandt**, a GIS specialist in the Resource Management Office, will soon play an integral part of water conservation efforts in San Diego.



This is the result of an innovative new project funded by Reclamation through the [Southern California Area Office's \(SCAO\) Water Conservation Field Services Program](#) in partnership with the City of San Diego Water Department.

Satellite photo of San Diego. Mission Bay is on the left. NASA image

"The satellite project is a first for Reclamation," said **Meena Westford**, Water Resources manager at SCAO. "We are very excited because this project is a prime example of making science applicable to the real world. Water is a precious resource and using modern technology to help us save it is a win-win for both mother nature and science." An estimated \$135,000 is being provided by Reclamation for the current project.

The project, a proposal developed by the City of San Diego, is designed to effectively manage the City's limited water supply for irrigated urban landscapes by using satellite imagery to create a city-wide map designed to determine accurate water budgets for all

landscaped areas. In addition to being more cost-effective, the use of satellite images, versus aerial photographs, will provide the city with more expansive land use data.

Like many other cities in southern California, San Diego is challenged with limited rainfall and imports much of its water from northern California and the Colorado River.

To help reduce demand on imported water, the City's Water Conservation Program supplements indoor water conservation programs with services focused on landscape water conservation, since San Diegans use 50% or more of their water to maintain landscapes. The satellite project is an extension of the program's continued effort to secure significant savings via landscape water conservation.

### **Creating a Benchmark**

Simms and Ahlbrandt will use state-of-the-art multi-spectral satellite imagery and GIS to accurately identify and quantify urban landscaping for the City of San Diego. From the acquired information and the data on the volume of water consumed, a benchmark can be determined indicating the actual quantity of water needed.

“We’re very excited about this project, because we are using very high resolution satellite imagery and GIS in a way that will be beneficial to San Diego’s water budgeting process,” Simms said.

“Water has always been critical to southern California, particularly now in a drought situation, so we feel that we are using the appropriate technology to help the City of San Diego make informed decisions on their water use. We received the DigitalGlobe imagery last week, and it looks terrific. The folks we’ve met at the City are eager to get started, and so are we,” he added.

“Given that water use throughout the region is being scrutinized as never before, we feel this project is very timely. It is our hope that the project will serve as a model for other municipalities wanting to implement the latest technology to help manage and conserve water resources,” Ahlbrandt said.

“It is estimated that if San Diegans properly watered their existing landscapes, the overall water use in the City could be reduced by at least 10 percent,” states Dan Carney, Water Department Landscape Architect who initiated this effort.

“Information gained from this map could save consumers millions of dollars each year.”

### **Landscape Oriented Pixels**

AgriCast, Inc., the technical consultant for the project, will turn satellite imagery provided by Reclamation and the National Aeronautics and Space Administration (NASA) from multi-spectral color images into a functioning GIS map.

The satellite image map will consist of various color pixels, each representing a 2-meter by 2-meter (6 ft. x 6 ft.) area of land. The color pixels in the image are matched to what is on land to show all irrigated landscape plants, such as trees, shrubs or groundcover, by

assigning each individual landscape type to a specific pixel color. Accurate areas designated for each landscape type can then be calculated.

When all irrigated landscape areas are accurately accounted for, the City can easily create water budgets based on the needs for each individual plant type per square meter. Comparisons can then be made between data from past water meter readings for irrigation purposes and how much water is actually needed to maintain healthy landscapes.

The differing amount between what is needed and what is being used becomes the water that is available for conservation. On average, water budgets show a potential water savings of 20% or more.

### **Pilot Study**

Prior to the launch of the satellite project in June, San Diego State University (SDSU) conducted a pilot study in collaboration with NASA and AgriCast that established the appropriate procedures for the project. In 2000, Dr. Doug Stow with SDSU's Geography Department began the pilot study aimed at developing commercial uses for satellite images.

After much research and development, a final report on the study was published in April of 2003 and as a result of the study's success, Reclamation agreed to fund a citywide project.

The project will be completed in one year, and when the digital map is produced, it will serve as both a policy-making and engineering measurement tool for the City. After a dollar value is given to the amount of water that could be saved, policy-makers will have a solid basis for allocating resources to assist Water Department customers, both residential and commercial, via the free programs and services offered through the Water Conservation Program.

In addition to assisting with water conservation efforts, the map can be used by the city for other possible research projects. These include: measuring urban water runoff for stormwater studies; mapping blighted areas for crime related studies; measuring energy use via heat islands and the cooling effects of trees and landscapes; analyzing property values related to landscape density; and measuring urban/wildlife boundaries for habitat and fire prevention studies.

For more information on the City of San Diego Water Department's Satellite Project, please contact Dan Carney at (619) 533-7548 or email [Dcarney@SanDiego.gov](mailto:Dcarney@SanDiego.gov) and for more information about the Water Conservation Program, visit [www.sandiego.gov/water/conservation](http://www.sandiego.gov/water/conservation).

*Editor's Note: Luis Generoso, Water Resources manager for the City of San Diego Water Department, contributed to this article.*