



## Using GIS to help Monitor Coral Reef Health in Mexico

### Purpose

In the spring of 2006, Juniper GIS worked with Global Vision International (GVI) to help establish GIS as a tool for monitoring the health of coral reefs in the Yucatan at the Costa Maya Station in Mahahual, Mexico. This is part of a larger project to monitor the health of fish and coral along the Mesoamerican barrier reef, which runs along the Caribbean from the Yucatan to Honduras and is the second largest coral reef system in the world.

GVI was formed in 1998 to provide support and services to international charities, non-profits and governmental agencies, with the goal of promoting the advancement of sustainable development through the creation of partnerships, promotion of local and global education opportunities, and direct financial support. The expedition based in Mahahual continues to support and assist the work of local non-profits including Amigos de Sian Ka'an (ASK), the local state University of Quintana Roo (UQRoo), and the National Commission for the Conservation of Natural Protected Areas (CONANP), as well as international NGO's and universities on the Mesoamerican Barrier Reef Survey.



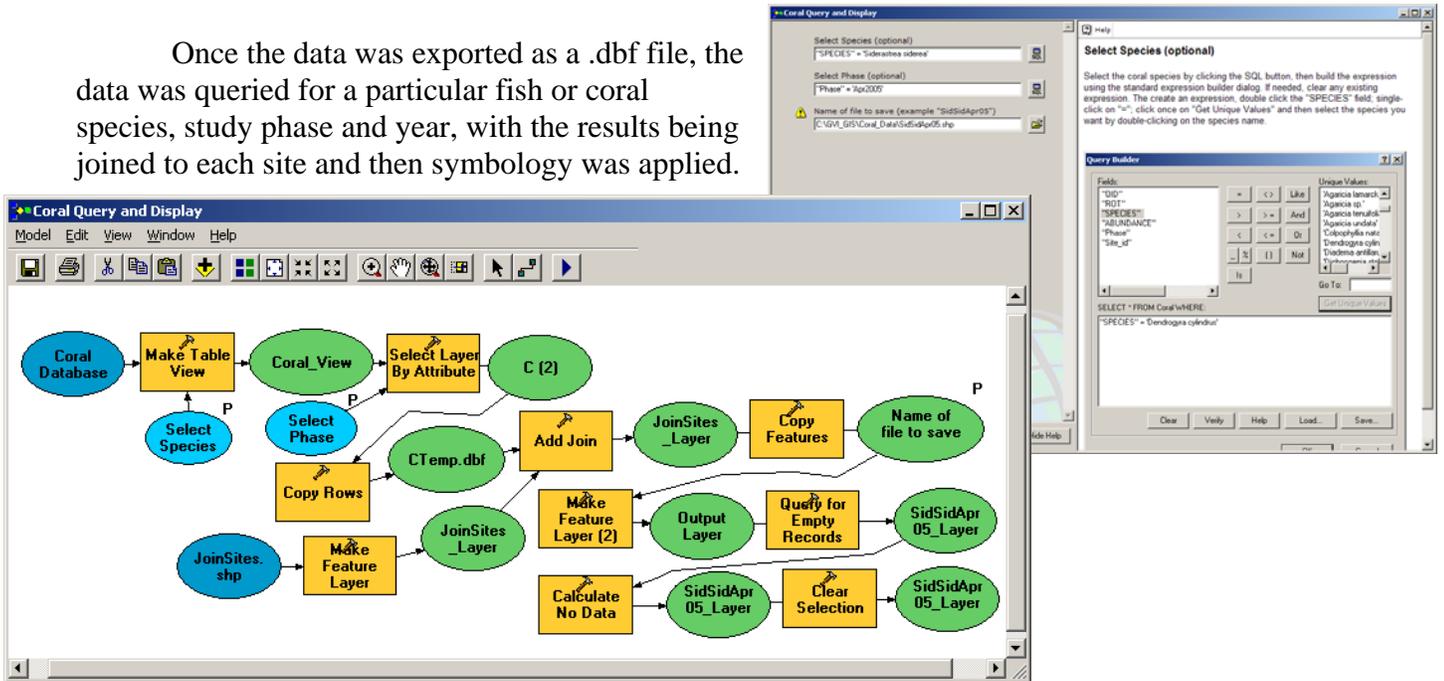
Our aim in working with GVI was to display the results of the dive surveys, primarily the abundance levels of various coral and fish species in GIS, in a format that was easy to use for non-GIS people, and that would show the relation of the study sites to the neighboring land use and land-based activities. In order for GVI staff to continue to use this after we left, Juniper GIS donated a laptop and arranged with ESRI to donate a copy of ArcGIS.

### Methods

The first task was to create a base map showing the dive sites used in the studies and the surrounding environment. We were able to obtain shapefiles from Amigos de Sian Ka'an that had originally come from the University of Quintana Roo showing rivers, roads, cenotes, land use and geology. The location of the dive sites was taken from GPS and converted into a projection to match the data from Amigos de Sian Ka'an. After working there awhile, a lieutenant from the Mexican Navy stopped to ask what we were doing and then shared a number of charts that allowed us to add some details, such as the location of piers.

The next task was to export the survey data stored in Access, which was the result of multiple dives at each site 2-4 times per year to count fish and coral, into a format useable in ArcGIS. The goal was to examine abundance levels for different species at the different sites, and fortunately most of the data had been summarized and the determination for abundance was done in Access. Where abundance levels were not determined in Access, we are developing some routines that will take the raw data for multiple surveys and summarize that in ArcGIS, as well as calculate indices of biodiversity.

Once the data was exported as a .dbf file, the data was queried for a particular fish or coral species, study phase and year, with the results being joined to each site and then symbology was applied.



Because this would take several steps for even an experienced GIS user, we created a tool in ModelBuilder that did this with a few clicks so non-GIS people could easily create maps.

## Results

GVI now has a tool that lets them quickly display abundance levels for species at each site and see how this varies by site, or season, and start to see if there are any correlations to what is happening onshore that might be impacting abundance levels. Juniper GIS continues to work with GVI on developing GIS and travels to Mahahual on a regular basis to work directly with GVI staff.

