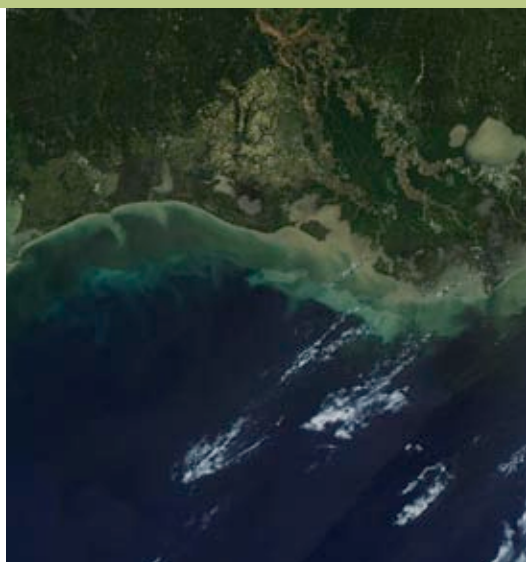
CRS: Citizens Awaken

FLORIDA KEYS ENVIRONMENTAL PROTECTION

EARTH SCOPE

The April 20, 2010 oil disaster in the Gulf of Mexico ***(Figure 1)***, the result of an unprecedented cluster of human errors and mechanical failures, has led ultimately to a hopeful result. The disaster and the resulting national and international press coverage, including a real-time underwater camera for 24/7 monitoring of the oil gushing from the extraction pipes and catastrophic projections for the damage inflicted, has sparked much-needed activity by citizens, NGOs, businesses, educators, and government agencies.



Both accurate news and serious misinformation flowed consistently from the media, and this combination of responsible and irresponsible reporting resulted in alarming the public while muddying the waters regarding the consequences of the disaster. Early victims of poor communications included the fishing and tourism industries along the gulf states, who suffered significant economic and psychological losses. On a positive note, the gulf oil disaster sparked activity across a spectrum of locations and interest groups, creating actions and collective interest by citizens concerned with the health and well being of the ecosystems around them. One interesting story is that of the citizens living in the Florida Keys and their concerted actions to address the immediate and residual impacts from the oil damage.

Alarmed last spring by the ensuing reality of the oil gushing into the Gulf of Mexico and dissatisfied by the lack of clear information regarding the fate of the oil and oil-dispersants heading towards the Keys, citizens and groups began a dialog. Leading environmental groups like Reef Relief, a respected organization with over two decades of reef monitoring experience (***Figure 2***), were early leaders in asking critical questions of BP representatives and the federal government: How do we best measure the health of the ecosystems and assess any impacts from the oil disaster? How can we take charge of our environment so that we know what is really going on?

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EDITOR'S NOTE: The ESRI VGI is an excellent example of a corporate-led Community Remote Sensing (CRS) project, bringing citizens into an important role contributing datasets that would be otherwise missing in monitoring the oil spill.

Reef Relief (www.reefrelief.org), working with other groups, formed the Florida Keys Environmental Coalition (www.fkec.org), which includes business and academic leaders. This coalition formed a Science and Technical (S&T) Task Force under the leadership of Dr. Patrick Rice, Dean of Marine Sciences at the Florida Keys Community College, to seek an approach for citizen-led environmental monitoring and assessment. The S&T recognized early on that satellites and social network tools would be needed to meet the demands for environmental stewardship for the Florida Keys.

Early on, the S&T discovered the early involvement of ESRI (Redlands, Calif.) in mitigation of the disaster. The GIS firm had created web site workspaces for volunteer geographic information (VGI) to enable web-mapping of oil-response activities and incident reports that could be viewed in near-real-time (***Figure 3***). Dr. Rice's Task Force believed that the VGI approach might work well with their goal of harnessing citizens' passion to contribute.

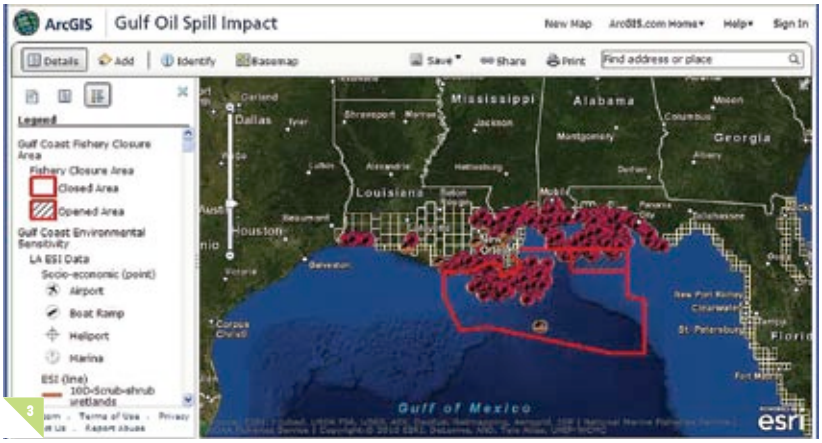
As part of their background, the S&T team was provided copies of the Imaging Notes article by Natalie Cutsforth (Summer 2010, Vol. 25, No. 3), which emphasized a similar technology approach for coral reef mapping and studying marine environments. Thousands of Florida Keys citizens had signed up as volunteers for beach and mangrove oil clean up and for monitoring activities and were waiting for leadership instructions. A series of meetings and workshops in Key West was scheduled to define the technical and managerial foundations for a long-term monitoring and assessment strategy. This strategy will incorporate citizen-scientists as the keystone component of the VGI approaches to environmental protection and monitoring in the wake of the gulf oil event.

Because the coalition leadership developed consensus that an Earth-observation perspective was the best approach to build

FIGURE 1. *NASA's Aqua satellite captured this image of the Gulf of Mexico on April 25, 2010 using its Moderate Resolution Imaging Spectroradiometer (MODIS) instrument.*

FIGURE 2. *Reef Relief volunteers monitoring coral reefs in the Florida Keys.*

FIGURE 3. *ESRI ArcGIS volunteer geographic information (VGI) application for the Gulf oil disaster.*



a monitoring and assessment program, web-supported tools and web-based data collection methods have been the preferred mode for creating citizen-friendly technologies. The VGI methods will focus on mobile data collection devices, primarily using market leading phones and GPS units. Commercially available technology represents a robust set of proven solutions for citizens and scientists.

K-14 education institutions along the Florida Keys will also be included in the final design components to help ensure that students can integrate their field data collection activities into their educational agenda. Data collection protocols will be reviewed not only by the scientific members of the S&T but with city, county, state, and federal environmental representatives. Inclusiveness of all these environmental protection and management professionals is essential to the long-term success of the VGI proposed strategy.

Critical questions will drive the final design of this grass-roots monitoring program. Raised by citizens as the alarm and uncertainty of the oil disaster loomed on the horizon, these questions have alerted the S&T team to selecting a prudent design that will serve the citizens, scientists, and government decision-makers in the coming decades in light of both natural threats and human disasters:

- **How do we measure the health of the Florida Keys ecosystems?**
- **What should we measure and how do we measure it?**
- **How can we take charge and maintain charge of our environment?**
- **How will our data collection efforts provide for legally valid applications of data?**
- **How can a community best sustain the needed long-term monitoring regimes?**
- **Can multiple generations and the education system be fully incorporated into this new digital democracy for environmental stewardship?**

Positive outcomes from disasters are always a welcome relief. A new chapter in environmental democracy will be discovered, should the citizens of the Florida Keys manifest their concerns for their ecosystems using the VGI approach based on satellite data and web-based spatial tools.