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Application Note

# YSI EcoNet™ Goes the Distance in Mecklenburg County NC

With more than 500 square miles to cover – including a network of streams flowing through a handful of towns and dozens of active construction sites – the Land Use and Environmental Services Agency in Mecklenburg County, NC, wanted to get a handle on water quality within its borders. County officials know that booming development has sometimes led to water quality problems downstream of construction, so they wanted an early-warning system to notify regulators if a pollution event was in progress.

Perhaps most important, they wanted a system that streams data to their computer network so staff wasn't constantly in the field checking one of two dozen collection sites.

The result of years of design: Mecklenburg's Continuous Monitoring and Alert Notification Network (CMANN). CMANN – a network of 24 continuously sampling YSI 6820 multiparameter sondes linked by the company's EcoNet web-enabled monitoring and control system – puts real-time water quality information at the fingertips of public works officials and homeowners alike, and notifies regulators immediately when pollution events occur.

*CMANN deployment site with YSI 6820 and solar panel.*

## Sediment Loads

Mecklenburg County is home to booming Charlotte, NC and surrounding cities, so construction sites are a common feature throughout the area. So are waters with increased sediment loads – a water quality and regulatory concern in many of the area's waterways. And as in many cities, Charlotte's sewer system is not fully mapped, which means stormwater routes and illicit connections to the system are, in many cases, overlooked.

The first order of business was gathering baseline data on local water quality. Next was setting off alarm bells if pollutant levels got out of line. Spikes in turbidity or pH, or plummeting dissolved oxygen levels, could alert officials to out-of-compliance construction sites or illegal hookups to the stormwater system. With a population growth of more than 20 percent between 1990 and 2000, and development sprawling in all directions, pollution issues are becoming even more challenging to track.

"Charlotte's not huge, but when you're looking to try to pinpoint a problem in a busy area, it can be difficult," notes Olivia Hutchins, environmental hygienist with the county. ***"With this system, we can better understand what's going on in upstream areas, and identify and eliminate sites that could be contributing to the problem."***

## Continuous & Spot Checking

Mecklenburg County needed a solution that integrated both water quality monitoring and data management. After looking at the various systems and equipment available, YSI was selected. In April 2005, the county deployed the first 22 of its YSI 6820 multiparameter sondes around the county to inaugurate CMANN. Each sonde measures pH, conductivity, temperature, dissolved oxygen (DO) concentration, and turbidity. An automatic sensor wiping system cleans the turbidity probe regularly, reducing the impact of fouling and increasing the duration of deployment. Continuous monitoring data is supplemented by monitoring for macroinvertebrates and benthic invertebrates, fish, and ambient conditions.

Of the 24 stations slated for the CMANN project, four are used by the county's Water Quality Erosion Control Program to monitor construction sites for excessive erosion. Three sites are located at critical construction projects to keep a close eye on their impacts on water quality. Four sites will be outfitted as mobile units, with an EcoNet node, datalogger and modem, solar regulator and battery locked in a sturdy box that can be secured to a fencepost and connected to a PVC-jacketed sonde in the river. Last, 13 sites are permanent installations, providing short-term and long-term water quality trends.

Every 15 minutes, each station logs onto EcoNet, engages a wireless phone connection to upload its latest readings onto a web site maintained by YSI, then goes back to sleep. The data is displayed in real-time on a site that is maintained in three tiers:

- Hutchins, the program manager, can make changes in the site from her desktop or virtually any other computer with internet access;
- Other password-holding internal users can access the site's "private" level, which allows grouping and analysis of data;
- A public site (accessed via www.charmeck.org) allows local landowners and other visitors to view real-time data organized by site and date – right down to the user's backyard.

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## Trigger the Alarm

Elevated readings trigger alarm messages in the system, alerting Hutchins to a possible pollution problem. To avoid false alarms – for instance, responding to a "high turbidity" reading that turns out to be caused by a passing fish – CMANN follow-ups are only activated after two consecutive elevated readings, Hutchins says.

In addition to the steady feed of data to the internet site, the EcoNet wireless connection works smoothly both ways, notes Hutchins. "YSI can do a lot of upgrades remotely, which is great, especially compared to other equipment we've used that has to be sent back to the manufacturer for upgrades," she points out. "I can do some troubleshooting from my desktop, change transmission rates if I want to, watch what's going on with the equipment, and get an EcoNet node to detect all the equipment connected to it." A detection check provides a remote way to reboot the station after a power outage, she notes.

*CMANN deployment site.*

Seamless integration from data gathering to transmission to web tools – backed up by easy upgrades and attentive tech support – has made the YSI system a great asset for the far-reaching CMANN system, says Hutchins.

She adds that the data from CMANN has already started to prove its worth. Turbidity spikes have triggered inspections of construction sites and sparked better management of sediment. And installing the first two mobile CMANN units upstream and downstream of suspected trouble sites has had a tremendous impact on regulatory compliance – even before the probes' power was switched on. "It was unbelievable the response we got," Hutchins recalls. "Just the idea was enough. All of a sudden, the construction companies became very concerned about sediment coming off of their projects. Whether we even found a spike in turbidity was irrelevant."

Perhaps most important, Hutchins and her colleagues have been building invaluable baseline data on local water quality, which will allow the team to better identify problems when they happen. "We're going to watch these sites and look at the trends that occur," she says. "When there are pollution problems, we'll someday be able to correlate that data with the problems. We hope we'll be able to say, 'when you have a pH that reaches this value, then you probably have this type of pollution problem, and this is what we do.'"

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