THE ROLE OF SOFTWARE IN STREAMLINING WETLAND DELINEATION PROCESSES

By Lee Lance

"WHEN YOU'RE KNEE-DEEP IN MUD and carrying a stack of paper data sheets, there's always the potential for messing up those forms or losing them altogether," says Nevin Durish, Senior Biologist and Central Texas Managing Director for ESE Partners. Durish is describing the traditional method for collecting data in a wetland, a process regulated by the U.S. Army Corps of Engineers (USACE). Until recently, wetland scientists have had few technologies at their disposal, so data have traditionally been gathered manually using clipboards and pens, or with unintuitive, complex, unreliable software. All previously available options were painstakingly tedious. "There are three pages of paper for each individual sampling point," Durish explains. Each project can require anywhere from a handful to thousands of these three-page USACE sampling point forms.

In addition to the juggling of papers in swampy terrain, this year's regulatory climate presents a particular challenge for wetland scientists because of modifications and rollbacks to regulations concerning wetlands and other waters of the United States (WOTUS). The new definition of WOTUS, which became effective in June of 2020, removes federal protections from certain wetlands and other navigable waters that were previously protected – which leaves nearly half the country's wetlands vulnerable. In addition, an Executive Order issued by the current administration this summer suspending NEPA meant that many infrastructure projects could move forward without necessitating federal environmental review, a step that further put wetlands and wetland species at risk.

Fortunately, technology is available to aid scientists who are trying to navigate regulatory changes, while also reducing the paperwork required during the wetland delineation process. This article outlines the benefits of various technological advances in the field of wetland science. For a summary of several new technologies available, read here.

Advantage #1: Technology Keeps the Most Up-to-Date Information at a Scientist's Fingertips

The continued evolution of GIS mapping methods helps land-use planners and land resource managers make informed decisions. In addition, the USACE's Wetlands Delineation Manual, and the National Wetland Plant List (NWPL) which have been traditionally housed in field manuals and guidebooks, are now accessible through smartphone platforms like Ecobot. The app provides access to reference materials from the most current manual and species list and allows scientists to complete data forms on their phones, replacing paper forms. For example, when the NWPL was updated in May of 2020, Ecobot modified its vegetation lookup tool to include the new changes, as well as some additional common non-indicator species requested by its customers.

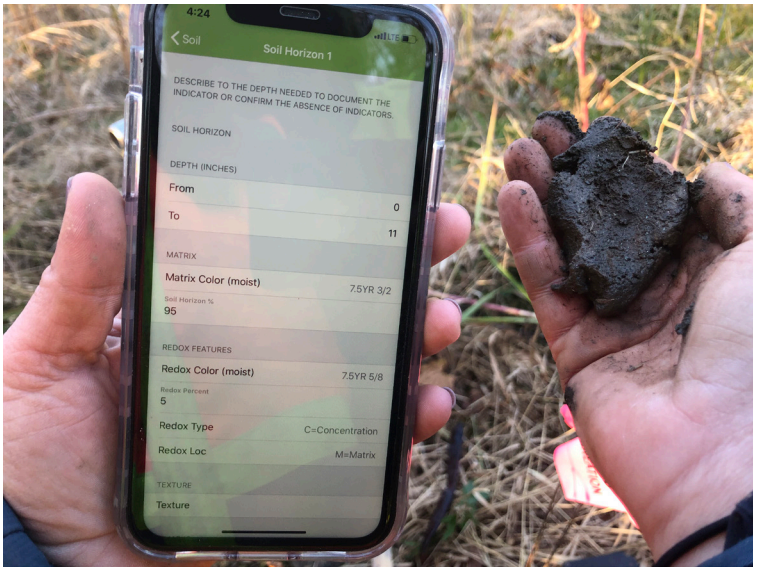
Advantage #2: Technology Saves Time

GIS Mapping Systems and software platforms save time in both the field and in the office. Apps like iNaturalist identify wetland species using the smartphone camera at the site, which reduces the need to go back later and update forms with correctly identified species.

In addition to storing a vast library of reference materials and auto-calculating completed datasheets to determine if a parcel of land contains wetlands, Ecobot can auto-fill data from one sheet to another and even allows for real-time quality assurance and control from the team in the office.

"Leaving the field with completed wetland data forms is a huge time-saver," says Olivia Haney, Assistant Environmental Scientist, Burns & McDonnell. "There may be minor changes when you get back to the office, but for the most part it eliminates an entire, large step of our workflow for producing wetland delineation reports to submit to the Corps or to the client."

"The review that's completed in the office is now truly a confirmation of accuracy," adds Durish. "There's a very significant time savings and that's time that can be put toward ensuring that we submit the most comprehensive and accurate data possible."



Advantage #3: Technology Leads to Fewer Mistakes

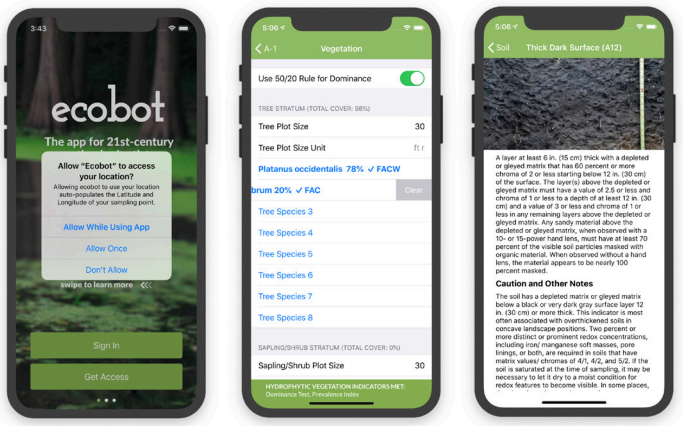
In addition to speeding up the quality review process, technology helps eliminate mistakes caused by human error while transferring field data to reports in the office. The right technology improves data accuracy whether the scientist is inputting data directly into the app and relying on a third party to interpret a handwritten form, or when working with error-prone, unreliable apps that take consultants' focus off their science. Ultimately, according to Kurtis Schlicht, Technical Director in the Houston Office – Impact Assessment and Planning Community at Environmental Resources Management (ERM), this can mean fewer legal ramifications resulting from erroneous data. "This platform adds validity to the work that we do. No longer are we at risk of someone misreading our handwriting and entering data incorrectly. Our data is substantiated by this type of technology."

Accuracy is particularly important in wetland science because there's such a fine line between what does and does not require a permit. "Small differences matter, from making sure you know where property boundaries are to pinpointing how close you are to pipeline or utility line right-of-ways. Being off by just a few feet can make a huge difference on a project," explains Haney.

Advantage #4: Technological Advances Yield More and Better Data

More data means better data, and the ease of technology encourages scientists to collect more data. For example, the manual process for collecting and documenting photos was quite tedious before the advent of technology to record and geotag photos. "You're far more inclined to take more photos if you know you don't have to write down the photo number and find the point on a map, put a dot on the map, and correlate the photo with GPS at the end of the survey," says Durish.

"That's fine for one or two pictures but when you get into the hundreds or even thousands of photos, it can be very tedious. With smartphone technology, we can collect an endless number of photos, dump them into a folder and save them to a spot on the map. Later, when we want to find photos from a particular point on the map, pulling up those photos takes mere seconds. That's certainly helped improve the quantity and quality of data we produce."



Advantage #5: Technology Helps Scientists Keep up with Changing Regulations

This year's changes to WOTUS definitions further complicate the already-challenging tasks of water planning and management, often calling into question who has jurisdiction over wetlands. Technology that gives scientists access to current regulations at their fingertips can help them navigate these changes while also streamlining the processes.

Haney experienced firsthand the ability of technology to navigate changing regulations. "When the Nationwide Permit 12 rule (NWP 12) came out, a lot of our projects that we had been working on or were in the process of permitting were impacted," she recalls. "In some cases, the rule changes led to our project plans changing slightly, and as a result we had to go out and re-delineate some areas. That was a huge disruption to construction and permitting schedules. Our goal was to make edits without losing any time, and without updated technology, it would have been a struggle to meet those deadlines."

Advantage #6: Technology Helps Businesses Better Serve their Clients

Finally, technology that streamlines and speeds the wetland delineation process enables AEC and environmental consulting firms to better serve their clients by improving efficiency. "If we can have teams out there who can complete 10 or 15 wetland delineations in a day rather than 8 or 9 wetlands in a day, that's much more progress for our clients, says Schlicht. "When our clients – many of them in the oil and gas industry – are schedule heavy, technology enables us to meet their deadlines more effectively and efficiently."

"We're constantly trying to provide the fastest turnaround times to aid in the construction and development of sites," Haney adds. "As populations grow, energy demands grow; we're constructing more and more utility lines, solar farms, wind farms, and the like. Our goal is to give back our deliverables as fast as possible and the more technology can aid in that, the more we can deliver on time for our clients."

Wetland Delineation: Then and Now

Schlicht began environmental consulting work in 2001 and says that at that time, doing a wetland delineation involved taking handheld paper

maps along with the best aerial he could find and literally drawing dots on the map to indicate wetland boundaries. "We'd bring that back and hand it to our GIS person and they would try to replicate it," he recalls.

A few years later, handheld GPS devices were introduced. Now, GPS and GIS technologies have been integrated into software applications: like Ecobot's partnership with Trimble and Ecobot's integration with Esri's ArcGIS mapping capabilities.

"Simply being able to pull up a map on my smartphone makes a really big difference," says Durish.

The Future: Advancing Our Work

What does the future for wetland science technology entail? The possibilities are endless, but one thing that is certain, says Schlicht, is that technology will continue to advance the work of wetland scientists and environmental engineers in a way that nothing else could. A couple of exciting new technologies to watch are Esri's ArcHydro Wetland Identification Model (WIM) and advances in drone deployment with paired software like Esri's Site Scan for ArcGIS for compiling photos and video for preliminary wetland assessments and monitoring.

"Ecobot is going to open the door for us to be able to collect data more efficiently and effectively. The result is providing much better and more high-quality reports back to our clients and in a real-time fashion as well."

About Ecobot

Ecobot empowers the AEC and environmental consulting industry to better serve their clients by reducing the time and expenses required to complete environmental regulatory reporting. The field scientists in these industries make critical decisions that inform land use and Ecobot's wetland management platform provides accuracy and efficiency for thousands of wetland delineation reports submitted to the USACE each month. See how Ecobot can transform your natural resources consulting workflow at ecobotapp.com.

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NEW ERA OF BIM LIFECYCLE IMPLEMENTATION

PART 4: A CRADLE TO CRADLE DIGITAL TWIN ECOSYSTEM FOR BUILDING ASSET MANAGEMENT

CONTINUED FROM PARTS 1, 2, AND 3

By Dr. Eve Lin, Dr. Xifan (Jeff) Chen, and George Broadbent

Introduction

Previously in this series, we reviewed the importance of data management behind the model handoff during BIM lifecycle implementation, in terms of data interoperability, accuracy, and sufficiency. We highlighted the necessity of developing well-defined data requirements from an Asset Management / Facility Management (AM/FM) perspective and using them to regulate delivery phase data collection and population. We also described an AM/FM Data Dictionary Management System (DDMS) that helps address commonly-seen issues which occur during the Project Information Model (PIM) to Asset Information Model (AIM) transition as well as during operations and maintenance. This article further discusses the data flow during the entire project lifecycle from delivery to the operational phases and introduces the current trend of Digital Twins – an ideal BIM implementation scenario that needs to be built on top of a solid data foundation.

BIM Lifecycle Data Management

As discussed in a previous article, Figure 1 illustrates the top-down structure of a project lifecycle from different levels. It illustrates the fundamental importance of a well-defined and managed FM-oriented DDMS to the entire BIM program. While we emphasized the importance of a DDMS during the FM stage because of its long duration, and high operational cost during the entire lifecycle, a well-planned DDMS is a critical foundation to support BIM lifecycle data management. In the real world, even a well-coordinated data management plan could collapse at any moment due to small data glitches in the data exchange process and consequently impact the downstream data flow. Without certain governance and policies to standardize the workflows and processes, it is hard for organizations to maintain data interoperability, sufficiency, and accuracy because teams and individuals tend to work in silos and make decisions based on available information.