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DIRECTOR’S MESSAGE
Providing Quality Training to Industry Professionals

MEMBER SPOTLIGHT
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The International Erosion Control Association Region One (IECA) is a non-profit, professional organization providing education, networking and research for engineers, government, consultants, construction and related professionals, for the purpose of establishing standards of practice and expertise in the fields of erosion control, sediment control and stormwater management.

*Environmental Connection* is the quarterly magazine—published January, April, July and October—for members of IECA. Our goal is to present industry and association news, highlight member contributions to society, and promote the exchange of scientific and technical information. Each issue of *Environmental Connection* includes peer-reviewed articles on a wide variety of timely erosion and sediment control topics, as well as regular features that provide thought-provoking accounts of people, programs and issues in the erosion and sediment control profession.

*Environmental Connection* welcomes the submission of articles of interest to erosion and sediment control professionals at all levels. Submission instructions can be found at www.ieca.org/SubmitArticle.

**About IECA membership:** Individuals receive *Environmental Connection* as part of IECA’s member benefits. Professional membership starts at $170 USD. Call 800.455.4322 or visit ieca.org for more information.

**Change of address:** IECA must be notified at least 30 days in advance. Magazines deemed undeliverable due to an incorrect address will be destroyed by the post office. We cannot guarantee the supply of back issues on late renewals or late address corrections.

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Providing Quality Training to Industry Professionals

IECA strives to present quality peer-reviewed education to train industry professionals. We look for different ways to offer learning opportunities that help fulfill skill gaps and go beyond the traditional classroom. We’re also looking at ways to engage the younger generation by offering nontraditional knowledge sharing.

Our biggest educational offering, the 2018 IECA Annual Conference and Expo, is an in-person event that accomplishes many of those objectives. The next conference will take place in Long Beach, California, from February 11 to 14, and will draw attendees of all career stages to engage in a learning exchange, as well as resource exploration in our Expo Hall. The upcoming conference schedule includes roundtable sessions and fireside chats with thought leaders that allow attendees to ask questions in a smaller setting. The new Contractors’ Corner provides training on how to keep a construction site stable and compliant, as well as continuing education professional development hours (PDH). Poster sessions presented by students and young professionals present a fresh look at industry research and give the presenters the opportunity to engage in active dialogue with industry leaders.

Our closing keynote speaker, Andrew Wright, is a lobbyist and popular commentator who will provide his perspective on the environmental agenda for the Trump Administration and Congress. This session will help attendees understand the current political climate, and how it can affect their bottom line.

IECA also offers an online e-learning platform featuring live and recorded webinars that professionals can access anytime, anywhere for specific training for all career stages. New education bundles offer training subject matter at a discount while maximizing PDH credits. In September, we launched a new online resource library featuring member case studies, videos and industry white papers, allowing members to search for a specific industry topic so they can learn how other professionals have conquered the same dilemma. Visit ieca.org/resourcelibrary for more details.

Membership indeed has its benefits. Check out the variety of IECA education offerings to get ahead in the industry. We’ll see you in Long Beach!

SHARAN WILSON
Executive Director
International Erosion Control Association
IECA recently spoke to member Marlene Grischuk about the value of IECA membership and how being a member of IECA has influenced her professionally. She is currently the health safety and environmental supervisor at Monroe Bypass Constructors, a joint venture between United Infrastructure Group, Boggs Materials and Anderson Columbia handling the new 20-mile Monroe Expressway construction project in North Carolina.

What factors encouraged you to get involved in IECA?
My supervisor had suggested that I look for an association to join that would help me network in the environmental community and learn new things. I did some research and picked the one that I felt was most “universal” in the environmental world, and that happened to be IECA. What closed the deal were the opportunities for continuing education credits through free webinars for members and in-person events.

How do you believe being a member of IECA has helped you and contributed to you achieving your objectives?
The resources available to members have greatly assisted the environmental efforts on my current project, the Monroe Bypass in North Carolina. I attended the MS4 Conference in Charleston, South Carolina, earlier this year and was pleasantly surprised with the information I left with. The variety of talks available was extremely informative; I walked away with a new understanding of different erosion and sediment control practices. I also learned a lot about some newer concepts being developed, such as green roof construction to reduce stormwater runoff. Considering I use a lot of erosion and sediment control products, being able to speak to vendors about newer and more efficient products for use on future projects was an asset. Between going to the conferences and listening to the briefs, getting to know products and vendors, it has given me the knowledge to think more outside the box when it comes to solving erosion and sediment control problems.

Can you share the biggest challenges you face and how IECA has the solutions that address those problems?
As a professional new to the environmental field, aside from the standard drawings and specifications it was hard to find resources to gain a better knowledge of how to do sustainable, environmentally friendly construction. IECA changed that for me. Meeting other members who have been in the environmental field for longer than I have and being able to ask them questions and where to find references was extremely helpful. Now I have the opportunity to bounce ideas for new projects off other environmental professionals and learn from their case studies and research. I have only worked on erosion and sediment control in North Carolina thus far, but my company works in a variety of states in the Southeast. Being a part of this association has given me the opportunity to be aware of how other states handle erosion and sediment control, giving me the opportunity to help plan for future projects in advance.

Would you recommend IECA to a colleague, friend or business associate?
I absolutely would recommend IECA, especially to professionals who are just starting out in the environmental field. I feel this organization allows you access to information to help establish a better knowledge base on environmental practices to help you fast track your career. Using the vast resources available can help you become a subject matter expert on erosion and sediment control, making you a valuable employee in your company.

“IECA HAS GIVEN ME THE KNOWLEDGE TO THINK MORE OUTSIDE THE BOX WHEN IT COMES TO SOLVING EROSION AND SEDIMENT CONTROL PROBLEMS.”

Marlene Grischuk has been an IECA member since 2016
Catch basin inserts (CBIs) have become an increasingly popular option for pollutant removal from post-construction stormwater because they are cost effective and manufactured to fit into existing conveyance systems. However, limited data is available to demonstrate the actual, in-field performance of various CBIs to ensure that these practices meet required treatment efficiencies. The primary objective of this research was to develop an apparatus for conducting large-scale testing of manufactured CBIs to evaluate pollutant removal efficiency. A standard testing procedure was developed that replicated realistic field-like flow conditions in a consistent and repeatable fashion.

In collaboration with the Ohio Department of Transportation, an apparatus designed for the large-scale testing of CBIs has been constructed at Auburn University—the Erosion and Sediment Control Testing Facility. The apparatus consists of three primary components: a water and sediment introduction system, a flow conveyance system and a drainage platform. Water is pumped from an on-site supply pond into a water equalization tank located at the upstream end of the apparatus. The tank is equipped with a V-notch weir for regulated water flow rate. A Schenck AccuRate series volumetric feeder provides controlled discharge of sediment at the desired concentration into the six-in (15.2-cm) PVC flow conveyance system. The flow conveyance system discharges onto an 8 ft by 8 ft (2.44 m by 2.44 m) drainage platform, allowing the sediment-laden sheet flow to enter the catch basin. The effluent collection platform collects flow exiting the catch basin that would equate to discharges into the municipal separate storm sewer system (MS4). CBIs are evaluated both for sediment removal efficiency and average total suspended solids (TSS) reduction. The sediment collected in the CBI is dried and weighed upon completion of the test to calculate the percentage of introduced sediment captured, while 32 oz (1 L) grab samples are taken at five-minute intervals, both upstream and downstream of the CBI, and analyzed for average TSS reduction. Photo and video documentation is also taken throughout the test.

The apparatus has the ability to easily adjust to different research specifications, including different flow rates, soil types, influent concentrations, and even between sheet flow and direct discharge testing, allowing CBIs to be tested for any specific geographic location. CBIs can be evaluated on a test-by-test basis, or over a series of consecutive tests to monitor the longevity performance of a device. This system allows researchers to examine CBI performance in ways that would be much more difficult in a field or small-scale testing environment, such as monitoring leakage between the catch basin frame and CBI, measuring bypass flow rates, and evaluating TSS reduction capabilities; all factors that were observed during the preliminary validation testing. The development of

By Dakota L. Basham

About the Expert
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this research has the potential to significantly impact the role of CBIs as a primary post-construction stormwater pollutant removal tool. The ability to simulate a field-like experience from a controllable testing environment allows regulators to more precisely assess sediment removal efficiency of CBI products to ensure compliance with environmental regulations, while also allowing manufacturers of proprietary CBIs to identify potential ways of improving their product.

Catch basin inserts (CBIs) are cost effective and popular for their ability to fit into existing conveyance systems, but more in-field performance studies are needed to ensure these products comply with environmental regulations.
Hard to believe that 2017 is almost behind us! There’s so many market dynamics that may already have an impact on your business. Some of these we have control over, while others we don’t. Whether it’s the turbulence in your local or national government, regulations and laws, ability to attract and retain top talent, or the weather in the form of an unforgiving hurricane named Harvey, market conditions change. So how best can erosion control companies deal with these?

No surprise here—it starts with education and an understanding of what market dynamics are, and how to read and leverage them. I hear folks in our industry often say they’re too small or inconsequential to do this type of market analysis. Lesson one: please don’t use the excuse that you’re too small or too busy. Remember, the smaller you are the more vulnerable you are to changing market conditions.

Knowledge is power so let’s begin with some market fundamentals. Since the business landscape and buyer preferences change and evolve quickly, to grow and scale your business you’ve got to adapt to the market or face obsolescence. Sorry for the harsh reality check, but by the end of this column you’ll be on the pathway to success. It’s important to learn that there are two environments you must watch, your micro and macro markets. Micro markets are those forces that are closer to your company and affect your ability to service your customers. Examples of micro-market dynamics include your company, competitors, suppliers, partners/alliances, customer markets, weather, geography, networks and marketing partners. Macro market dynamics are larger forces that affect your micro market, such as demographics, politics, technology, economy or the natural resources needed to make your products or deliver your services.

For those companies who have someone watching and proactively leveraging these two critical forces, they’ll be rewarded with the greatest opportunity for sustainable growth. Those reacting may find themselves losing market share to their competition, or worse. Remember: each person or department within your company has an impact on it. Are you prepared to leverage the markets, or will you simply be reacting to them? How tightly aligned are you with your suppliers? As a critical partner, they have a significant, whether positive or negative, impact on your business.

Do you have intelligent and effective marketing partners helping you sell, promote, brand and build a pipeline of profitable customers? This applies to all size companies, and the smaller you are the more vulnerable. Take a good look at your customer segments as they’re not all created equal. Look at trends and market data to understand their potential. How diversified are you between consumer, industrial, institutional and governmental markets, or do you have too many eggs in one basket? I see folks use the term commercial as a dumping space for commingling several market sectors. Be as specific as you can with this market category. For example, define the commercial market as multifamily, hotel/hospitality, retail. Not all these markets have the same potential, and depending upon your location the growth potential will vary.

Additionally, assess the size and talent of your competition. Mergers and acquisitions, as well as technology, can rapidly change your competitive landscape. Don’t get caught off guard here and make certain that you know and are on friendly speaking terms with your competition. Be smart and leverage your professional association partners like IECA, as well as your suppliers and local and state governments, as they have a plethora of free market data they can share with you. It’s not as difficult as you think, and there’s lots of resources out there to help you.
Santa Monica Restoration Pilot Project Aims to Reclaim Groomed Beaches for Natural Vegetation and Coastal Resilience

By Karina Johnston, Melodie Grubbs and Rodney Abbott

It is estimated that more than 17 million visitors frequent the beaches of Santa Monica in California each year. While their recreational value to the region’s economy is recognized, the beaches’ ecosystems and associated wildlife are not as widely known and are impacted by a variety of threats, including erosion, non-natural sediment and sand transport through mechanical means, pollution and loss of natural morphology due to daily vegetation and topsoil removal through grooming and other regular maintenance.

As a vital part of our coastline, beaches and dunes support and protect developments, roads and infrastructure, providing a natural buffer from rising sea levels and any tides or waves coming in from the ocean. They are critical in managing sand transport for creating resilient beach morphologies, which can naturally buffer impacts from climate change. In addition, coastal strand habitats feature varied native vegetation, including species such as red sand verbena (*Abronia maritima*), dune evening-primrose (*Camissoniopsis cheiranthifolia*) and beach saltbush (*Atriplex leucophylla*). But the current condition of groomed and flattened sand at Los Angeles area beaches, with vegetation removed for the most part, currently offers little habitat value and removes the benefits a natural ecosystem provides. Erosion thus is more frequent.

By restoring natural processes to impacted beach systems, communities can improve their ecological and utilitarian functions. In the Santa Monica Bay, a pilot project took place December 2015 through August 2017, during which restoration was implemented in two phases over the course of two weeks, including the installation of fencing and seeding of native coastal strand vegetation species. The first eight months following the pilot saw valuable successes and learning experiences for the team, which was led by the nonprofit environmental group The Bay Foundation (TBF) and the city of Santa Monica and the California Department of Parks and Recreation. As the project was meant to be an experimental pilot for the region, no specific quantifiable success criteria were originally set; however, the project can be evaluated against its ability to meet the outlined goals.

**Restoration, Monitoring and Maintenance**

The Santa Monica Beach Restoration pilot project restored approximately three acres of sandy coastal strand habitat by utilizing existing sediments to transform a portion of the current...
beach into a sustainable coastal strand and foredune habitat complex that would be resilient to sea level rise. The project aims to continue evaluating a living, restored shoreline as an alternate approach to hardscaping to combat climate change. It will provide not only a scientific basis for developing guidelines and protocols, but an integrated local program for increasing the usefulness of natural environments in a developed area. All of these benefits are expected to have low to no impact on existing recreational uses of beaches, said TBF, showing that heavy recreational beach use and meaningful habitat restoration are not incompatible goals.

The project restricted grooming in the targeted area, allowing vegetation to grow and for the beginning of sand hummocks to form along fence lines. It used low-lying sand fencing and native plant seeds to actively restore approximately two out of three acres of a highly impacted beach system. The third acre comprised the dry and wet sand shoreward of the active area that will remain ungroomed (passive restoration through not raking the sand). The area immediately adjacent to the perimeter of the sand fence will also remain ungroomed.

Design aspects feature the curved, flowing, low-lying fence lines; a path through the restoration area; and an unenclosed perimeter along the water’s edge. These components were requested by various members of the public during the first few months of outreach about the project. Many of these design aspects were incorporated to minimize disturbance. Specialized coastal strand and foredune vegetation was seeded and is reported to be currently growing, developing and trapping sand transported by wind. Wind-driven sand bumps into the vegetation, falls and accretes, naturally increasing the elevation of plant hummocks over time to a future estimated height of 1 to 3 ft. Because beach dunes have the potential to accrete sediment transported from the ocean, they could continue to grow concurrently with rising sea levels. This process has repeatedly been demonstrated in scientific literature as well as pilot restoration projects in other California counties, such as the Surfers’ Point restoration project in Ventura County. Long-term monitoring is expected to more accurately define trends at this site.

Project implementation began in November and December 2016, requiring approximately three weeks, including monitoring. Implementation occurred during the region’s rainy season to allow for natural germination and establishment of native seeds during the winter rains. The first phase of the project involved installation of fencing, including a perimeter sand fence and symbolic rope and post pathway. This was to facilitate the establishment of dune hummocks and to delineate the project boundary. The sand fence ended approximately 25 ft before the edge of the sand berm on the ocean side of the sand fence, in order to encourage recreational activities adjacent to the ocean and to allow for plenty of space for lifeguard vehicles to have emergency access, though driving within the project area is discouraged to allow for a more natural pattern of sand movement and wildlife use. The distance of the fence edge from the berm has fluctuated throughout the first eight months of the project as the berm periodically eroded and accreted with natural sand movement.

The second phase saw native coastal strand and dune vegetation hand-seeding completed by mid-December 2016. TBF consulted with restoration experts and S&S Seeds to develop a specialized plant pallet and custom seed mix design specific to local coastal strand habitat. The combined seed mix with all four species was distributed using two methods at a rate of 20.1 pounds per acre across the restoration site. The first method used a broadcast hand seeder with the combined seed mix immediately raked into the sand. The second method involved hand sowing seeds that had been soaked overnight in fresh water into small depressions in the sand and covering them by hand with adjacent sand to a depth of approximately one inch.

Post-restoration monitoring and maintenance are ongoing, which is scheduled to last no less than five years. Data will be collected to evaluate the ecological health of the created coastal strand ecosystem and its potential for long-term adaptation to accelerated rates of sea level rise. Pre-restoration baseline monitoring occurred prior to the implementation of the seeding phase, and post-restoration monitoring began January 2017.

Identifying Trends

According to TBF, data suggest that the restoration area is considerably different from both the control sites and from itself when compared to the baseline surveys, especially for vegetation and sand morphology, though vegetation cover remains fairly low after the first growing season. Several elevation profile surveys have been conducted since the installation of the restoration fence. All transects show an inland shift of berm morphology between the December and March surveys, and a change in beach face slope, typical of seasonal change due to a shift in wave energy. Berm heights remained the same in control transects, while the berm height in all restoration transects rose in elevation. Within the seeded area of the restoration site, elevation profiles showed sand accumulation beginning at the berm and sloping down towards the fence line in three out of four profiles.

It is likely that the vegetation community will continue to establish, but will probably remain somewhat patchy, as is the trend for natural coastal strand habitat types. The variability of the berm over time and the changes in elevation suggest that longer periods of scientific evaluation for these parameters will be needed for additional trends to be defined. Future monitoring will continue to inform sand morphology within the restoration site in response to vegetation growth, fence placement and seasonal changes from storms, king tides and wave energy. Additionally, elevation profile data will provide information to understand the effects of sand grooming versus the development of natural beach morphology over time.
“This project provides a novel example of a living shoreline in a highly urbanized coastal community, providing refuge for shorebirds and unique plant species while increasing coastline resiliency,” said TBF’s Melodie Grubbs. “Coastal erosion and flooding are issues many cities are dealing with today, and these issues will only amplify with future sea level rise.”

About the Experts
Karina Johnston is the director of watershed programs for The Bay Foundation, responsible for developing, managing and implementing the Bay Restoration Plan for Santa Monica Bay.

Melodie Grubbs is watershed programs manager for The Bay Foundation. She previously served as an environmental consultant for clients like the Morro Bay National Estuary Program. Grubbs is currently completing her M.S. in geospatial science and technology from the University of South California.

Rodney Abbott is watershed programs coordinator for The Bay Foundation, coordinating independent student projects and conducting outreach for the foundation. He is currently completing his master’s degree in environmental science at California State University, Dominguez Hills.
The 2017 Atlantic hurricane season has been extremely busy, first exploding when Hurricane Harvey, the eighth named storm of the season, devastated southeast Texas with catastrophic flooding in late August. It was quickly followed by Hurricane Irma, which barreled through the Caribbean islands and Florida in early September. Hot on Irma’s heels were Hurricane Jose, which churned off shore from the Atlantic coast, and Hurricane Maria, which swept across Puerto Rico on September 20. As with any other tropical storm system, historic storm surges, coastal erosion and inland flooding were among the most dangerous natural hazards expected to impact the affected regions. Early estimates predicted that combined damages from the record-breaking Hurricanes Harvey and Irma could reach $290 billion.

Federal Agencies’ Roles in Providing Vital Data
The U.S. Geological Survey (USGS) played a significant role in using technology to issue updated reports before and after Harvey and Irma made landfalls on the U.S. mainland. Technological tools provide up-to-date, easily accessible information for scientists and engineers. During hurricane season, the USGS Coastal Storm Response Team confers with the National Hurricane Center (NHC) and other federal agencies. To better understand coastal storm impacts, USGS’ National Assessment of Storm-Induced Coastal Change Hazards Group responded to Hurricanes Harvey, Irma and Jose with before-and-after photos highlighting coastal changes on the USGS Coastal Change Hazards Portal.

Predicting a hurricane’s effect on sand dunes and coastal features is a vital function of storm technology. Research scientists at the USGS St. Petersburg Coastal and Marine Science Center developed the USGS Coastal Change Forecast Model to predict geological changes along U.S. coasts. This sophisticated computer model uses NHC storm surge predictions and wave forecast models from the National Oceanic and Atmospheric Administration (NOAA) as its starting point, incorporating detailed information about beach slopes and dune heights along the entire shoreline.

To track threats to beaches and developments, the USGS Streamgaging Network operates storm tide sensors. These are housed in vented steel pipes on bridges and piers and other structures that have a good chance of surviving storm surges. Barometers and rapid deployment gauges also record water levels and other key information. Hydrologists check these to verify high river and stream flows and peak water levels, and to measure high-water marks left by floodwaters on buildings, bridges and trees. This tracking of impacts provides critical data for more accurate modeling, coordination of emergency response and, for soil and erosion experts, allows for improved structure designs.

Extreme Flooding in Southeast Texas
Hurricane Harvey made landfall on August 25 as a category 4 system near Rockport, about 175 miles southwest from Houston. With peak accumulations of nearly 52 inches, Hurricane Harvey broke the previous record of 48 inches for a single storm in the U.S. mainland, set by Tropical Storm Amelia in 1978. According to USGS research oceanographer Joseph Long, the Coastal Change Forecast model created before the storm projected that 94 percent of Texan coastline would undergo some level of beach erosion from Hurricane Harvey’s storm surge. Furthermore, 47 percent of the coast would experience a more severe level of erosion hazard known as dune overwash. This occurs when storm-induced waves exceed dune heights and sand is transported inward. Indeed, significant coastal erosion resulted, as Harvey remained a tropical storm in the region for more than 90 hours after initial landfall.

Further inland, flooding was considered disastrous. Preliminary data showed there were record flood levels at 16 locations throughout the greater Houston area. Five days after landfall, 46 USGS streamgages (or stream gauges) were above National Weather Service flood stage levels. The storm made a second landfall near Cameron, Louisiana, six days after initial impact, causing flooding in southwest Louisiana. Heavy rains also came down in Arkansas, Mississippi and Alabama. Back in Houston, critics cited problems with zoning and development,
and the degradation of wetlands by developers, as factors in the record-breaking flood.

**In the Atlantic, A Monster Follow-Up**

Not long after Harvey dissipated over extratropical latitudes, Hurricane Irma was predicted to cause dune erosion across a much longer length of coastline, from the east coast of Florida all the way north to South Carolina. USGS research oceanographer Hilary Stockdon noted that this stretch of coastline had already taken a beating from Hurricane Matthew last year, meaning that dunes originally eroded in 2016 were likely not there to protect coastal communities this time around. After wreaking havoc in the Caribbean, Hurricane Irma made landfall in the Florida Keys on September 10 and tracked its way north, slightly west than initially thought. Despite this, officials warned that storm-induced waves and surge would still inundate beaches on all sides of the Florida peninsula completely.

**Tapping into Technology to Track Impacts**

In today’s technological age, there is increased attention on available and upcoming resources to track and measure impacts. Scientists and engineers at federal agencies continue to provide vital information, employing a range of methods from drones to sophisticated computer programs. The USGS’ “Water On-the-Go” mobile-friendly website and app allows users to quickly locate USGS gauges for up-to-date information on water conditions. Satellite imagery and aerial photography from national and international partners is continuously compiled and distributed on the Hazards Data Distribution System. Such data may be valuable to erosion and sediment control experts who support developers, engineers and agencies in planning, building and maintaining coastal developments, wetlands and dunes.

With its Coastal and Marine Geology Program, the USGS conducts integrated mapping of the coastal environment to define and monitor offshore hazards and sediment processes. This program plays a valuable role in mapping and laboratory analyses, and its expertise is sought by other governmental agencies, educational institutions and private companies. Additional technologies include data modeling and visualization, combined with instruments and equipment that estimate sediment mobility, shoreline changes and characteristics of soil deposits.

**Storms Expected to Increase Call for More Erosion and Sediment Controls**

The full effects of these record-breaking tropical storms may not be known for years to come. Those in New Jersey will remember the record-breaking storm surge brought on by Hurricane Sandy in 2012, which dramatically altered the shoreline and impacted coastal towns. The increased threat posed by rising sea levels and more intense hurricanes may call on government officials and industry professionals alike to address unprecedented complexities. Furthermore, the increasing populations and developments along the coast in recent decades bring added significance to the role played by erosion control and compliance specialists. Many are seeing the fallout from these natural disasters as an opportunity for expanded awareness on low-impact development (LID) and green infrastructure (GI) approaches.

As another hurricane season comes and goes, erosion and sediment control experts are likely reflecting on the lessons that can be both learned and taught. Hurricanes are powerful forces of nature that can flatten protective swamps and barriers; flood low-lying plains inland; and dramatically alter shorelines along the coasts. Solutions will be suggested in the coming years to make vulnerable cities and coastlines more resilient to 1,000-year flood events as was seen with Hurricanes Harvey and Irma.

**About the Experts**

Joseph Long is a research oceanographer for the USGS Southeast Region. His research focuses on the role that winds, waves and circulation have on transforming beaches under seasonal, long-term and extreme events.

Hilary Stockdon is a research oceanographer for the USGS St. Petersburg Coastal and Marine Science Center and the lead developer of the group’s coastal change forecasting tools.

**References:**


How to Avoid Construction Site Compliance Violations: An IECA Conference Preview

Andrea Braga, PE, CPESC, shares some of the common issues her team sees on site, ahead of her presentation at the upcoming 2018 IECA Annual Conference in February.

At the upcoming 2018 IECA Annual Conference and Expo, February 11-14 in Long Beach, Calif., Andrea Braga, PE, CPESC, will address common stormwater regulatory compliance issues encountered at large development sites. As in her practice, her presentation will focus on helping professionals develop solutions for the complex water quality, flooding and compliance issues found on these sites. As improper site development can result in fines and delays, negative publicity or construction site shutdown, Braga’s goal is to share valuable tips to reduce risk and remain, or get back, on the right side of compliance.

IECA recently spoke with Braga to get a preview of what she has planned for her session at the 2018 annual conference.

What do you see as some of the most common regulatory compliance issues, with regard to large construction sites?
First and foremost, not keeping up to date with permit-required documentation is the most common issue. Many permits across the country require multiple documentation items including construction entrance posting. There are progress maps to keep up to date and regular stormwater pollution prevention plan (SWPPP) inspection reports that need to be documented and kept on site. Second to documentation is not properly maintaining erosion and sediment control best management practices (BMPs) on site, chiefly silt fence and inlet protection. Third is the improper maintenance of the construction entrance, the first area crews and inspectors see when on site or driving by.

What are some of the mistakes often encountered by users when it comes to implementing best management practices?
Simply stated, the No. 1 mistake is not following the plan. Basically, not paying attention to the details. With that, I’ll also say the opposite. The other big mistake is just following the plan and not questioning a design that doesn’t make sense.

How can these BMP mistakes be avoided?
I stress that dialogue is important. Everyone involved needs to make sure they understand the plan, specifically how and why it should be properly maintained and implemented. Even if someone has been doing construction all their lives, they may have never properly implemented a SWPPP. At the same time, it’s important for engineers to get input from contractors. Why? To understand that if we put something down that doesn’t make sense, the
The contractor can let us know, so we can make adjustments and do our best to design a plan that’s going to work.

**Why is this topic important to professionals in the erosion and sediment control (ESC) industry?**

Compliance involves the whole project team. Engineers need to understand that they don’t have all the answers, and that seeing their designs implemented in the field is critical. Contractors need to understand why a design is the way it is. It’s so much easier to get things done when everyone is on board and everyone understands the goal. In the case of erosion and sediment control, the purpose of the BMPs is to keep sediment from leaving your site. But the goal is to keep our water resources—our lakes, our streams, our rivers—clean and healthy so that everyone can enjoy them.

**What can attendees expect during your IECA Annual Conference presentation?**

They can expect a lot of photos and first-hand lessons learned. We’ve been to sites all over the country for 15-plus years and have seen a lot. I want to share that experience with those who can learn from it and can avoid some of the mistakes we’ve seen. This will help reduce the risk of regulatory fines and enforcement, which is obviously an important goal. More broadly, it is geared for engineers and contractors who want to do the right thing to keep our nation’s water resources clean. That’s what will drive my presentation at the conference, and is what drives me as a water resources engineer.

**About the Expert**

Andrea Braga, PE, CPESC is a principal at Geosyntec Consultants in Brookline, Mass. With 12 years of experience as a principal water resources engineer, she specializes in stormwater system design, modeling and analysis, from project planning and permitting to whole life-cycle costing, construction oversight, monitoring and maintenance. She has extensive experience conducting and managing large and small watershed hydrologic and hydraulic modeling projects. Andrea’s practice includes stormwater NPDES compliance and permit support; municipal stormwater program planning and implementation; and climate change adaptation and resiliency planning.

**LEARN MORE!**

Join Andrea Braga, PE, CPESC, and other thought leaders at the 2018 IECA Annual Conference and Expo, February 11-14, at the Long Beach Convention Center in California. For a full conference agenda and online registration, visit IECA.org/Annual18.
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Schedule-at-a-Glance

Sunday, February 11, 2018
(Separate Registration Required)
8:00 AM - 12:00 PM Half Day Courses
8:00 AM - 2:00 PM Certification Training & Exams
8:00 AM - 5:00 PM Full Day Courses
1:00 PM - 5:00 PM Half Day Courses

Monday, February 12, 2018
6:00 AM - 6:00 PM Registration Open
7:00 AM - 7:30 AM Welcome with IECA President
7:30 AM - 8:50 AM Opening Keynote
9:10 AM - 12:10 PM Concurrent Educational Sessions
12:30 PM - 1:30 PM IECA Awards Luncheon
1:40 PM - 5:00 PM Concurrent Educational Sessions
5:00 PM - 6:00 PM Chapter Meetings

Tuesday, February 13, 2018
7:00 AM - 5:30 PM Registration Open
8:00 AM - 10:00 AM Contractors’ Corner
8:00 AM - 11:20 AM Concurrent Educational Sessions
9:00 AM - 5:00 PM Expo Hall Open
1:30 PM - 3:30 PM Poster Sessions (Expo Hall)
3:00 PM - 5:00 PM Expo Hall Networking Reception

Wednesday, February 14, 2018
7:00 AM - 4:00 PM Registration Open
8:00 AM - 11:20 AM Concurrent Educational Sessions
9:00 AM - 2:00 PM Expo Hall Open
12:30 PM - 12:45 PM Poster Sessions Awards (Expo Hall)
1:00 PM - 2:00 PM Concurrent Educational Sessions
2:15 PM - 3:15 PM Closing Keynote (Andrew Wright)

Closing Keynote Speaker Addresses Current Legislative/Regulatory Environment

Andrew Wright is a lobbyist and popular political commentator who will provide a lively “inside the Beltway” perspective on the environmental agenda of the Trump Administration and Congress. Known for his amusing observations, Wright will explain the current political climate and what it means to you, your business and your bottom-line. At the end of this session, you will better understand not only what is happening in Washington and why, but how you can influence the process to ensure that your voice is heard in the halls of power.

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Evidence of Erosion and Weathering Processes Let an IECA Member Guess Where Abundant Liquid Water Might Be on Mars

By Pablo A. Garcia-Chevesich, Ph.D.

For decades, mankind has been exploring our solar system with the hope of finding suitable conditions for life, as well as useful natural resources, among many other things. Furthermore, most attention has been placed on Mars, because of its similarity to Earth and the short astronomical distance between both planets.

Recent attention has been put into recurring slope lineae (RSL) on Mars after the discovery that liquid water is present in them. It is assumed that RSL are due to flowing water, but even though that might be the case, the general characteristics of RSL as well as their seasonal and spatial distribution in the planet, and their occurrence within craters, suggest that RSL correspond to the weathering of frozen aquifers, which coincides with slope stability processes occurring in impact craters and scree slopes from Earth. In this study, we associated RSL with similar weathering processes occurring on impact craters and hydrogeological processes occurring on Earth (including ice, water and wind erosion and natural aquifer recharge processes). We were able to create a conceptual model on how RSL develop, why they are found mostly in mid-latitudes around craters, why they are present in more frequency in one side of craters in high latitudes, and why there are more RSL in the Martian southern hemisphere. Considering the whole hydrogeological processes occurring in craters that experience RSL, we were able to predict where large quantities of liquid water are most likely to be present in the red planet.

In fact, there is enough evidence to suggest that Mars was actually a very wet planet, with rivers, lakes and even oceans. Mars’s current surface topography, characterized by the presence of countless rills, gullies and channels, is a clear indication of some type of fluid (most likely water) eroding the surface of the planet, a condition that occurred billions of years ago. Many studies support the existence of liquid water flowing on Mars in the past. For example, based on water-derived erosion formations in tectonic faults, it is now known that liquid groundwater near the Martian surface was present about 3,500-1,800 million years ago, and that gullies were formed when water migrated away from the present poles to the mid-latitudes.

Thus, almost four billion years ago, the planet lost most of its liquid water and atmosphere due to solar winds. It is believed that only “modest atmospheric loss” has occurred ever since and that the Martian atmosphere’s water content hasn’t changed much for the last 165 million years. Despite the above, erosion and sedimentation processes continue to be active on Mars, though it has been suggested that gully formation is not necessarily restricted to a single hydrological process. Moreover, erosion processes in Mars are strictly associated with gravity erosion and, according to recent RSL findings, with short periods of liquid water flows.

It is now known that RSL are concentrated in equatorial latitudes, with higher occurrences in the southern hemisphere of the planet, and being relatively absent, with less numbers within craters, and with smaller dimensions in northern latitudes. Additionally, RSL occur mostly during summer months, being higher in number in south slopes of craters located in southern latitudes and in north slopes on craters from the northern hemisphere. Also, equatorial craters have a relatively homogeneous distribution of RSL along
the presence of fluid water in RSL has been confirmed, it is unclear whether RSL move downslope under fluid conditions. It is known that RSL move downslope by gravity, in a relatively viscous way, and in a relatively concentrated form (Figure 1). However, liquid flows on Earth—more specifically liquid debris flows (which is the most similar liquid process associated with rock weathering on steep slopes of Chilean Andes)—get more concentrated as the flow travels down the slope, ending up in a semi-circular, tongue-shaped form. This is not the case for RSL, in which the bottom ends get wider and in different directions, a behavior associated with dry rock flows on Earth, or "scree avalanches," which are loose rock sliding down the slope as they break apart by the action of gravity, weathering processes and occasional liquid flows, as shown in Figure 2. Scree slopes are characteristic of Andean or Alpine rock weathering processes on steep slopes, among other sites on Earth—similar to those experiencing RSL on Mars. In addition to the above, RSL material's downslope traveling speed has been estimated to be between 5.8 x 10-7 and 3.2 x 10-5 m/s, being too slow to be attributed to permanent liquid water in such steep slopes, though consideration must be taken into the lower gravitational forces on Mars' surface when compared to our planet. However, other studies documented RSL velocities of 1-7 m/s, suggesting that the moving mass should carry between 10 and 40 percent of liquid water. Moreover, based on available RSL images, no rills or gullies are formed when this interesting phenomenon occurs, also an indication that no liquid water is flowing down the slope. As a consequence, in order to better understand RSL, it is strictly necessary to study scree slope processes on Earth.

The above suggests that RSL might be some form of solid rock material that travels downslope by both gravity and intermittent fluid water during summer days, when surface temperatures can reach 20º C and melting of the water contained in the broken, frozen geologic material can flow down the slope, eroding the remaining material for short distances ("material" refers to either frozen sediments or frozen rocks, a currently unknown composition). This agrees with the finding by NASA in 2015, since liquid water is likely to be present on the crater's slopes; however, based on the geomorphological characteristics of scree slopes (mostly rocks and gravels), one could expect that most of the melted water infiltrates into the coarse media located underneath, rather than flowing down the slope.

Thus, RSL are able to travel so far down with most of their liquid water being infiltrated into the ground as it occurs with their circumference, or slopes, suggesting altogether that they are correlated with sun exposure. In other words, RSL have a tendency to occur on the most unstable slopes of Martian craters, i.e., those receiving more direct rays of sunlight during summers. Typically, one would expect the more stable slopes of a crater to have more vertical slopes (since they are not as affected by weathering processes as the slopes located in front of them).

The question now is, what is the relationship between RSL and latitudinal slope stability distribution within Martian craters, as related to terrestrial impact craters' latitudinal slope stability? Additionally, based on natural aquifer recharge processes occurring on Earth, where might liquid water be abundant in the red planet, based on the presence of RSL?

It is known that our terrestrial craters located in northern latitudes have a clear tendency to be gentler (i.e., more geologically unstable) in the northern portion of the crater's circumference. In southern latitudes, on the other hand, the south slopes of craters are usually more unstable, compared to slopes located in the north side. Additionally, craters located near our planet's equator tend to show no differences in slope stability around their edges. According to our results, this latitudinal effect on crater's slope stability distribution tends to be clearer on craters located in desert areas of our planet, where none or little plant protection exists since none or little rainfall occurs, and where temperature oscillations are broader. Finally, the most reasonable explanation for these differences in slope stability within craters is the angle in which sunrays heat the slopes of the craters. Thus, craters located in the northern hemisphere (such as Meteor Crater in Arizona) receive more direct sunrays during summers in their northern slopes, whereas the opposite happens in craters at the southern hemisphere (e.g., Montutaqui Crater in Chile). Additionally, craters near the equator receive sunrays at similar angles all year round (e.g., Tenoumer crater in Mauritania).

Coincidently, RSL follow similar latitudinal slope stability distributions than that from terrestrial craters, which is an indication that such phenomenon is probably part of a weathering process in the red planet. The occurrence of RSL in Mars is stronger in craters' slopes receiving more direct sunrays.

The recent discoveries that indicate RSL contain significant amounts of liquid water molecules suggest that such dark pathways might be the remaining of a frozen aquifer. Even though the presence of fluid water in RSL has been confirmed, it is unclear whether RSL move downslope under fluid conditions. It is known that RSL move downslope by gravity, in a relatively viscous way, and in a relatively concentrated form (Figure 1). However, liquid flows on Earth—more specifically liquid debris flows (which is the most similar liquid process associated with rock weathering on steep rocks similar to Martian craters)—get more concentrated as the flow travels down the slope, ending up in a semi-circular, tongue-shaped form. This is not the case for RSL, in which the bottom ends get wider and in different directions, a behavior associated with dry rock flows on Earth, or "scree avalanches," which are loose rock sliding down the slope as they break apart by the action of gravity, weathering processes and occasional liquid flows, as shown in Figure 2. Scree slopes are characteristic of Andean or Alpine rock weathering processes on steep slopes, among other sites on Earth—similar to those experiencing RSL on Mars. In addition to the above, RSL material's downslope traveling speed has been estimated to be between 5.8 x 10-7 and 3.2 x 10-5 m/s, being too slow to be attributed to permanent liquid water in such steep slopes, though consideration must be taken into the lower gravitational forces on Mars' surface when compared to our planet. However, other studies documented RSL velocities of 1-7 m/s, suggesting that the moving mass should carry between 10 and 40 percent of liquid water. Moreover, based on available RSL images, no rills or gullies are formed when this interesting phenomenon occurs, also an indication that no liquid water is flowing down the slope. As a consequence, in order to better understand RSL, it is strictly necessary to study scree slope processes on Earth.

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Thus, RSL are able to travel so far down with most of their liquid water being infiltrated into the ground as it occurs with
scree slopes on Earth, by the action of gravity. Since the darker material (RSL) is apparently the one that degrades at the fastest rates within the crater’s rock walls, it is an indication that water might be involved in the form of, for example, frozen saturated sediments or rocks, as previously mentioned.

Mars is a cold planet with a dry atmosphere in which physical weathering occurs at high rates as a result of its extremely cold temperatures, and wide temperature oscillations during summers when compared to planet Earth. Thus, the constant freezing and thawing occurring between day and night on the Martian surface during summers is probably enough to quickly break down the remaining RSL material. As summer goes on, RSL material continues to be broken apart into smaller pieces, after being exposed to nearly 100º C temperature oscillations, a difference that can be reached only during summers, which could explain the seasonal occurrence of RSL reported by NASA. Eventually, the RSL material most likely releases all of its water contents, since all of their water was either evaporated or melted. The process repeats itself until the frozen rocks are likely to be reduced into smaller and smaller pieces, ending up in small sediment particles, which are probably either eroded by the Martian winds or buried by wind-driven sediments being carried from elsewhere, as it occurs in scree slopes on the high mountains of Iceland. A third possibility is that the remaining RSL material is simply oxidized, a common process on Martian surface that is responsible for its red color. Despite the above, the reason why RSL vanish by the end of summers continues to be unknown and more research is needed to find out what is really happening.

This article is adapted and excerpted with permission from Pablo A. Garcia-Chevesich, Ph.D. The full study can be found in the October issue of the Open Journal of Modern Hydrology.

About the Expert
Pablo A. Garcia-Chevesich, Ph.D., is a researcher, professor and consultant in the field of watershed hydrology and management. He is a member of the University of Chile’s Faculty of Forest Sciences and Nature Conservancy as well as the International Hydrology Research Group, and the University of Arizona’s Department of Hydrology and Atmospheric Sciences and the Department of Agricultural and Biosystems Engineering.
It’s fun watching grass grow.

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**CHESAPEAKE VALLEY SEED**
This past April, Governor Edmund G. Brown, Jr. lifted the drought state of emergency throughout most of California (with the exclusion of four counties), marking an end to what were four of the driest years on record for the state. The drought period was then followed by one of the wettest seasons on record for California, demonstrating how extreme the state’s water conditions can be.

California’s typically dry climate, large economy, irrigated agriculture and diverse native ecosystems make preparation for water extremes complex. But the results of a four-year drought and subsequent wet year provide valuable lessons on ways that the state can better its water management to protect its economy, water systems and infrastructure in the face of future water extremes.

Preparation is Key
Although the drought and subsequent wet year resulted in widespread loss within ecosystems and rural communities that will be felt for years and even decades to come, preparation directly impacted the ability of communities to withstand the extremes. For example, groundwater proved to be a valuable resource during the drought and accounted for nearly 70 percent of the state’s agricultural water shortage. Because of its groundwater resources, the state—which has a large agricultural sector that relies both on high-value crops such as fruit and nuts as well as traditional, lower-value crops such as rice—only experienced a 2 to 3 percent loss in agriculture revenue in the face of a 30 percent drop in water supply.

On the contrary, local communities and ecosystems that were not prepared for the events experienced the greatest losses. It is estimated that 1 to 2 percent of Californians have substandard drinking water systems, which rendered them especially vulnerable during the drought. This is specifically true of small, rural communities. Likewise, thousands of Butte County residents had to be evacuated when the eroded spillways of the Oroville Dam were torn open after heavy rains fell in northern California. The drought and wet year revealed a need for a thorough examination of and investment into the state’s water and flood infrastructures in order to prepare for future water extremes.

Investment in Groundwater is Vital
As demonstrated in California’s increased groundwater pumping for agricultural irrigation during the drought, groundwater is an invaluable resource. It allows for greater storage for longer periods of time and is critical during water shortages. But this is something that California state officials have already known.

In 2014, Governor Brown signed the Sustainable Groundwater Management Act, which called for the formation of “locally-controlled groundwater sustainability agencies (GSAs) in the state’s high- and medium-priority groundwater basins and subbasins (basins).” These GSAs would then be responsible for “developing and implementing a groundwater sustainability plan (GSP) to meet the sustainability goal of the basin to ensure that it is operated within its sustainable yield, without causing undesirable results.”

The implementation of this plan, however, has been met with some difficulties as it involves creating new institutions that must have proper funding and resources, representation, accountability, governance structures and participation, among other elements. The scale of this task is large and will require time and consistent revision, but will be necessary if California is to properly manage and improve its groundwater resources, which have proven to be vital, moving forward.

Technical and Scientific Programs Must Be Developed
California has hundreds of independently governed water systems that are often geographically interconnected, although each has its own accounts and ways of monitoring and tracking water. The negative impact of this lack of a coherent technical and scientific water program across all
California can be susceptible to both extremes in water conditions, such as the recent four-year-long period of drought (pictured top and above left) and the subsequent wet season (above right) this year that brought record-breaking rains to the state.

agencies was evident during the past several years. It could be seen in data and modeling that was neither organized nor readily available. This resulted in the fragmentation of technical efforts, added confusion, delays and increased costs to the state.

In times of drought, easy access to accurate data regarding use across all water systems is vital in helping to better manage these scarce resources. If California is to properly manage its water resources during future drought or flood events, it will not only need to invest in the development of a program that can accurately account for water, but also provide this information to water account managers throughout the state.

Water Management in the Face of Future Water Extremes
California’s dry climate makes water problems an inevitable part of the state’s future. The impact of these water problems, however, will vary based on temperatures, economy, changes in ecosystems, and, most importantly, the state’s preparedness at the onset of a drought, flood or other large weather change.

As California continues to face the threat of water extremes, the past several years can serve as a case study to help the state identify weaknesses in current water management practices and structures, and help industry professionals create and implement strategic, diversified solutions across state, local and federal agencies.

About the Expert
Jay Lund, Ph.D., is a professor of civil and environmental engineering and director of the Center for Watershed Sciences at the University of California, Davis. His research and teaching specialties are integrated engineering of water resource and environmental systems at regional, utility and household scales, employing ideas from economics and operations research.

References:
4 Groundwater Sustainability Agencies. CA Department of Water Resources. http://www.water.ca.gov/groundwater/sgm/gsa.cfm
Much like the different regions and state entities of the United States, erosion and sediment control (ESC) practices around the world vary by country and soil type, and furthermore can be impacted by government regulations (or lack thereof) and the state of existing infrastructure. Historical events traditionally shape the calls for erosion control and soil conservation in industrialized countries. Approaches to ESC throughout Europe, for example, differ from the mandates in place in the United States and Canada, whose emergence can be traced back to the drastic erosion that occurred during the 1930s Dust Bowl. Several studies have noted that in comparison, soil erosion in Europe had not received as much environmental attention as air or water until more recently. Key in the implementation and management of erosion controls are, naturally, the roles of geography and national or state governments.

In many cases, efforts are concentrated not on a national level but on a more regional or geographic level. In France, for example, a state organization has been protecting soil in mountainous zones since the 19th century, the Restauration des terrains en montagne (Mountain Land Restoration) of the L’Office national des forêts (National Forests Office). But in the country’s rural areas, erosion problems are more prominent and arose particularly during the post-World War II urbanization, leading to increased runoff and flooding. Today, water erosion affects approximately 18 percent of soils in mainland France, and it is estimated that 30 percent of the country is “moderately susceptible to landslides and runoff.” In comparison, it is estimated that 12 percent of soils (around 115 million hectares or 284 million acres) throughout Europe are exposed to water erosion.

Similarly, government involvement in the United Kingdom is moderate but evidence indicates growing erosion problems at local or regional levels. Common best management practices (BMPs) for agricultural practices include placing grass strips on arable slopes, as well as implementing riparian buffer strips to combat flooding and erosion in susceptible areas. Today, managing the risk for increased flooding and coastal erosion remains a focus for the UK’s Environment Agency, a public body established in 1995. It is estimated that nearly one in six properties are at risk of flooding in England, which—along with other UK countries Northern Ireland, Scotland and Wales—is notorious for its rains and in recent years has seen major flood events such as the winter floods of 2015 and 2016. Common BMPs in England include raised embankments, floodwalls and seawalls, culverts and sustainable drainage systems (see Table 1 for extent of flood risk management systems)

Elsewhere, political climates and government funding can impact the implementation of erosion control programs and BMPs. In south and southeast Europe, the Balkan region has historically been prone to water erosion, and in some places erosion has actually ceased due to the elimination of soil. In the first half of the 20th century, countries such as Macedonia, Serbia and Bulgaria focused on building control works to combat soil erosion. Traditional BMPs including check dams (linear structures placed perpendicular to concentrated flows like drainage ditches and swales) and gabions (in Bulgaria specifically, separate horizontal parts of dry masonry stone inside a metal net) were used. Biologically focused BMPs such as afforestation and stream restoration were also practiced in the Balkans. These practices may have been disrupted as war erupted in the 1990s. A study reported that erosion control activities significantly decreased after 1990. In Macedonia, it was found that 96 percent of the area was significantly impacted by erosion in 1993. Today the Balkan region is considered to be one of the most erosive regions in Europe.

Around the world, the use of BMPs will vary considerably on the location and its geography and climate. While there are more technological advances available in developed and industrialized countries, it remains a goal of many organizations to help bring these to other nations in need. Essential to successful BMP implementation will be the cooperation of government bodies and community organizations, just as it is in the United States.
Table 1: Types of river and coastal flooding risk management assets in England as well as approximate division of management between public and private agencies.

<table>
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<tr>
<th>Asset Type</th>
<th>Environment Agency</th>
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<tr>
<td></td>
<td>Total Length (km)</td>
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<tr>
<td>Culverts</td>
<td>1,860</td>
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<tr>
<td>Raised defense (manmade)</td>
<td>6,930</td>
<td>5,574</td>
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<tr>
<td>Sea defense (manmade)</td>
<td>1,971</td>
<td>1,401</td>
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<tr>
<td>Total (km)</td>
<td>10,761</td>
<td>7,405</td>
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</table>

References


7 Blinkov, I. The Balkans - the most erosive part of Europe?. Bulletin of the Faculty of Forestry 110, University of Belgrade - Faculty of Forestry, Belgrade. 2015. 10.2298/GSF1511009B

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Hattanooga-based Propex has grown to become an industry leader in synthetic fabric, but its roots stem back more than 100 years to a lace and carpet mill in New York.

Until the early 2000s, Propex mainly manufactured carpet backing. Today the company focuses on geotextiles and materials for erosion control and concrete reinforcement applications. The company operates internationally, with plants in the United States, Germany, Hungary and Brazil. Lee Pierce, vice president of engineered systems and business development, said that across industries and applications, Propex's products are designed to last.

“We’re involved on the permanent side, not just the temporary side,” Pierce said. “We’re talking about protecting critical structures—like railway systems, levees, those types of things—to where we can keep them green and have the environmental benefits and carbon footprint reduction with the types of systems that we’re involved in.”

Pierce said Propex has a strong base of civil and geotechnical engineers on its staff, which brings a depth of expertise to the solutions it manufactures. Along with longevity, products are engineered with the environment as a top priority. The company’s erosion control products provide an alternative to rock or concrete that performs while allowing grass and vegetation to grow.

“With these mattings and solutions we’re talking about, we can take higher hydraulic flows for levees, canals, riverbanks and channels,” Pierce said.

One of Propex’s top products is the ARMORMAX engineered earth armoring solution, which consists of a high-performance turf reinforcement mat (HPTRM) and engineered earth anchors that lock soil in place and protect against hydraulic stresses while allowing for vegetation growth. Other top performers are PYRAMAT, which is engineered for erosion control on steep slopes and vegetated waterways, and REFLECTEX, an unbonded concrete interlayer fabric for pavement rehabilitation.

Pierce said that ARMORMAX has been instrumental in levee restoration efforts in New Orleans since it was struck by Hurricane Katrina in 2005. About 11 years ago, Propex approached the U.S. Army Corps of Engineers to propose using ARMORMAX to armor the levees in New Orleans, helping to protect against future storms.

After testing at Colorado State University, Propex's technology was chosen for full scale armoring of New Orleans’ levees.

“I would say it’s the first time in the history of this marketplace that something like that has been done at this level,” Pierce said.

Along with its innovative solutions, Pierce said Propex sets itself apart from others in the industry through its commitment to market development. Through lunch and learns, drawing from the expertise of its engineers and a strong marketing team, the company brings its solutions to market and actively promotes them to engineers and public agencies.

From stabilizing soil under roadways to armoring levees and lining stormwater ponds, Propex's solutions have a wide variety of applications. Pierce says given the company’s mission, it is a committed member of IECA.

“We recognize that water is our most precious resource, we need to protect it and being involved in the international erosion control arena is important,” he said.

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Based in Poseyville, Indiana, North American Green was founded in 1985 as a small family-owned company that primarily manufactured erosion control blankets for clients working on mine reclamation in the Midwest. Today, the company produces a wide variety of fiber-based and hydraulic erosion control solutions for regional and international markets—all while maintaining its family-owned sensibility.

“We started off as a small family company, and that’s kind of, in the big loop of things, where we’re still at today,” said Customer Service and Marketing Manager Jill Pack. “I think that has allowed us to provide quality products and develop meaningful relationships with our users.”

North American Green offers a full line of erosion control blankets ranging from temporary mats to high-performance permanent turf reinforcement mats. It also produces a line of hydraulically applied erosion control solutions and a variety of sediment control products. Across all its offerings, Pack says the company focuses on manufacturing products that aide in re-establishing vegetation long-term. Products are manufactured for a wide range of applications, including projects on slope areas, drainage channels and shorelines. North American Green solutions have been implemented everywhere, from airports to landfills to residential projects.

According to Pack, the company is most known for its innovative VMax line of turf reinforcement mats, introduced in the late 1990s, and its hydraulic mulch, which is made with a patented proprietary blend of straw and reclaimed cotton plant material. She adds that a common customer feedback is that the hydraulic mulch produces vegetation rapidly.

“We’ve found with our hydraulic mulch that it tends to green up very quickly, and that’s always a positive,” Pack says. “For a contractor, a lot of times, for them to be released from a site, they have to reach a certain percentage of vegetation cover, so for them it’s always great when you get that vegetation quicker.”

The company sets itself apart through its commitment to strong customer support. Along with a technical support team, North American Green offers an erosion control materials design software (ECMDS) that gives engineers and contractors guidance on the proper selection of materials.

A recent milestone for the company was its acquisition this year by Colorado-based Western Excelsior Corp., an erosion and sediment control manufacturer. While the two companies maintain their independence in conducting business, the merge has allowed them to broaden their reach and offer products to a wider geographic area.

Looking toward the future, Pack says North American Green will continue to innovate and provide its products to customers even faster.

“We’re always looking to find the next erosion solution that makes sense for our users,” Pack said. “We’re always continuing to look at new product development and advancing what can be done in the erosion sector.”

For more information, visit www.nagreen.com or call 800.772.2040.

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