



## Making the unpredictable predictable

Using AI and streaming analytics to prevent flood damage and predict flood patterns



#### The issue

By 2025, more than half of the world's population will live in water-stressed areas. Within five more years, the number of people affected by flooding events will more than double from today's numbers, to 147 million worldwide. When we look at the dollar impact of addressing these problems – at least \$530 million – it's easy to lose sight of the people and the businesses who are challenged to move forward.

Whether a town is located on the East Coast or Gulf Coast and anticipates hurricane season, or it's in the heartland facing fastrising rivers and streams – it's become apparent that increased development and changes in weather patterns are causing flooding events across the country. Flooding causes chaos; destroys buildings, streets and homes; cuts off access to critical services; and creates a safety risk for every person and animal around the remaining water.

Unfortunately, most local governments don't have access to advanced weather tracking and flood monitoring tools. Towns might rely on veteran staff members or local experts to remember where flooding has occurred and the details of past storm and flood damage. When we consider that danger is only increasing, this method of preparation provides little reassurance and security. The only way to improve response time and contain floodwaters is for emergency management to monitor waterways in real time. By doing this, they can predict the risk of flooding and alert the community before disaster strikes.

### The challenge

#### Empower complex coordination and large response teams.

People and businesses often neglect storm and flood preparation because it is too costly and time-consuming. For those in remote and low-density areas, not only are they limited by the time and ability to prepare, but they may not have access to technology to monitor storms and rising waters. When local governments and communities know ahead of time which areas are most likely to be affected by flooding, they can work together to focus their time and energy on the greatest risks.

# Find substitutes to inaccurate information and ineffective monitoring.

Emergency management teams can't fulfill their promise to keep communities safe when it's impossible to foresee when and where flooding might happen. Now they can apply early-warning sensors while using Paige Wireless' carrier-grade LoRaWAN network and data visualization software from SAS. This provides the advance warning needed to help more citizens.

#### Commit to watching, not overlooking, vulnerabilities.

As flood incidents increase, it becomes more and more difficult to map flood damage each year, comparing it with growth and development in the area. Local governments can work to prevent destruction in the future by using Paige Wireless and SAS to understand flooding patterns and problem areas.

٢		
	⊴≡	
	$\overline{n} =$	_
	2=	

Plan ahead with accurate historical data and current predictions



Prepare first responders to address flood risks faster to minimize damage



Use new flood data and analytics to improve regional planning

#### Making a difference with technology

Local governments need tools to predict floods so they can approach problems early and watch out for citizens, their property and community facilities. It's impossible to deliver on these promises without gathering information on flood areas and maintaining this data year after year.

Leveraging the powerful AI and computing power of SAS<sup>\*</sup>, Paige Wireless is offering connectivity, software and services tailored to each town.

- Uncover the data that matters most. Quickly find and review weather, environmental, sensor and development data used for modeling, simulation and generating insights.
- Forecast flood conditions. Using early-warning sensors and data visualization software in conjunction with Paige Wireless' LoRaWAN network, municipalities can track data over time. This builds a database of insights to review for everything from storm magnitude to where historical flooding took place.
- Build accurate data models. The measurement and analysis of stream and river height in real time over a highly secure network allows for enhanced monitoring and the prediction of flooding events.
- Follow changes in land planning and development. Take existing weather and flooding data and simulate the potential impact of land planning and development decisions on streams and floodplains.
- **Provide real-time tracking and alerts.** Create awareness of high-risk flooding areas based on real-time information and generate alerts to emergency management and the community.





### The Paige Wireless SAS® difference

Using Paige Wireless and SAS, governments have easy access to past and current data from floods in their area. Using Paige Wireless LoRaWAN network, sensors transmit data in real time to track water level and weather data, alerting emergency managers when there is a potential problem. SAS provides analytics and AI to help predict what problems may arise during the next flooding event. To build upon the data and analytics model, data visualization software provides easy-to-understand dashboards for monitoring data and alerting during potential flood events. This comprehensive solution allows local governments to make the best decisions to keep citizens and infrastructure safe.

#### Paige Wireless and SAS provide:

- Insightful and interactive visualizations that highlight current dry and wet conditions. These visualizations also are an easy way to take in large data sets collected by a range of sensors, such as those using LoRaWAN, to help show the effects of potential changes.
- An alerting system that notifies emergency workers and citizens about rising water for a quick response to dangerous situations.
- Automatic, large-scale forecasting that enables predictive modeling for the most accurate forecasts.
- A solution that uses your understanding of the towns and communities around you to build the most accurate models for current and future situations.





#### PROBLEM

Like many communities, the town of Cary, NC, faces flood-related challenges. When the town sees excessive rainfall, emergency personnel often scramble to address overflowing stormwater systems, but even a burst watermain can create a spontaneous flood event.



To combat this problem, Cary installed water level sensors at various points along the Walnut Creek stream basin and rain gauges at several town-owned facilities. SAS uses data from these sensors – LoRaWAN and data visualization software – to create userfriendly visual forecasts for the town to see where flooding problem areas are and when flooding events might occur.



### RESULTS

Now, after several months of using the solution, Cary continues to see positive outcomes. Town personnel can now visualize flooding events in real time, and stormwater monitors receive notifications and generate work orders automatically. The town has used this information to locate new infrastructure and modify architecture to best handle flooding.

Learn more about how SAS and Paige Wireless enable flood prediction and preparedness at **sas.com/flood-prediction**.







At SAS, we love bold questions. And when we combine our analytics leadership with the innovative technology and expertise of our partners, we help our customers turn data into answers. That's the kind of curiosity that moves the world forward. That's the **Power of the Partner**.

Semtech, the Semtech logo and LoRa are registered trademarks or service marks of Semtech Corporation or its affiliates. LoRaWAN is a licensed mark.

SAS and all other SAS Institute Inc. product or service names are registered trademarks or trademarks of SAS Institute Inc. in the USA and other countries. © indicates USA registration. Other brand and product names are trademarks of their respective companies. Copyright © 2022, SAS Institute Inc. All rights reserved. 113068\_G230755.0822