

# Making the unpredictable predictable

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



Optimize emergency planning with improved situational awareness and historical insights.



Reduce flooding incidents by streamlining the emergency response.



Better plan for infrastructure initiatives based on enhanced flood mapping.

## The Issue

By 2030 it's estimated that the number of people affected by annual flooding events will more than double to 147 million globally. Annual cost estimates will also rise to more than \$530 million.

Significant development throughout the world and recent weather patterns have caused more frequent flooding events that affect even many inland municipalities. These flooding events wreak havoc on communities, closing roads, destroying infrastructure, interrupting essential services and posing a safety risk to all that live, work and play in the affected areas.

Many governments rely on citizens to report flooding events to implement emergency response plans. Some local governments have long-serving employees who remember the locations of flood events and can guess what a storm might do in certain areas. But traditional flood response is not protecting people and properties well enough. To respond faster to flood events and contain future flooding, governments need to monitor waterways in real time, predict the risk of flooding, and alert emergency personnel and citizens in advance of a flooding event.

## The Challenge



**Labor intensive and complex coordination.** Emergency response preparedness is incredibly time consuming, and a slow reaction can mean more death and extensive damage. Having a clear picture of problem areas allows for a more efficient and straightforward strategy when dealing with floods.



**Latent awareness and insights.** Without a way to proactively identify rising water levels and alert emergency management teams and the public, there is a higher risk of substantial property damage and more danger to citizen safety. Early-warning sensors, such as those using Semtech's LoRa® devices and the LoRaWAN® standard, reduce response times to help keep citizens, first responders and infrastructure safe.



**Lack of institutional knowledge.** Understanding vulnerabilities involves expensive mapping and surveys that need to be kept up to date with changes in land use and urban growth. By using SAS® to understand flooding patterns and problem areas, cities can take preventive action.

## Our Approach

Governments need a way to predict potential flood events to know how to approach the problem early and protect their citizens and infrastructure. It is key that they have knowledge about flooding areas and past insights to properly prepare.

We approach the problem by providing software and services to help you:

- **Access all relevant data.** Quickly access and prepare relevant weather, environmental, sensor and development data used for modeling, simulation and insight generation.
- **Forecast flood conditions.** Identify weather and development trends that can provide timely insights regarding the magnitude of storm events, the impact of development, and the location and magnitude of flooding.
- **Develop more accurate forecasting models.** The ingestion and analysis of real-time stormwater data over a highly secure and reliable wireless communication network allows for enhanced monitoring and prediction of flooding events.
- **Identify the effects of land planning and development changes.** Perform microsimulations using weather and flooding data to better understand the potential impact of land planning and development decisions on streams and flood plains.
- **Provide real-time tracking and alerts.** Improve awareness of impending flooding and generate alerts to emergency responders and citizens.

## The SAS® Difference

Using SAS, governments have an easily accessible view of the past and current data from floods in their area. Using SAS AI provides data and analytics to help predict what problems may arise during the next flooding event. Constant feedback from machine learning models helps governments visualize the water flow to see what's happening, allowing them to make the best decisions to keep citizens and infrastructure safe.

SAS provides:

- Insightful and interactive visualizations that highlight current dry and wet conditions. These visualizations also are an easy way of ingesting 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 institutional knowledge to ensure you get the most accurate models.

## TOWN OF CARY, NORTH CAROLINA



### PROBLEM

Many communities face flood-related challenges, and Cary, NC, is no different. When the town sees excessive rainfall, its personnel often find themselves scrambling to address overflowing stormwater systems, but even a burst water main can create a spontaneous flood event.



### SOLUTION

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 – featuring Semtech's LoRa devices and the LoRaWAN standard – to create user-friendly analytic visualizations for the town to see more clearly where flooding problem areas are.



### RESULTS

Now, after several months of using SAS, Cary continues to see positive outcomes. Town personnel can now visualize flooding events in real time, and stormwater workers receive notifications and generate work orders automatically. The town has used this information to locate new infrastructure and modify architecture to best handle flooding. These changes make the town's work easier and will continue to benefit Cary, as well as surrounding areas.

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Learn more about how **SAS** enables flood prediction and preparedness.

