Minitab

Nitrate Contaminated Water Control

Products	Personas	Verticals
Minitab Statistical Software, Predictive Analytics, Model Ops	Operations 	Government 

CHALLENGE

A government agricultural agency manages the water supply and quality around surrounding areas of farms and residential areas. Nitrate from fertilizers used in big farms is known to contaminate groundwater that runs into residential areas, which is a big concern of this government agency's efforts. To calculate and provide levels of contamination to the public, the government agency predicts nitrate levels by looking at the land's use from decades prior, utilizing nearly 60,000 nitrate tests and analyzing it with R, taking weeks to even months with only slim accuracy.

TOOLS

Random Forests

EXAMPLE KPI'S

Water Contamination Level, Nitrate in groundwater, Area Contamination Estimate

SOLUTION

Utilizing Minitab Statistics Software's Predictive Analytics module, the government agency was able to identify both the timing and cause of nitrate contamination in groundwater near large farms. This allowed proactive monitoring to ensure groundwater near residential areas did not get exposed to nitrate. To have a deeper understanding and more accurate prediction, they used the Random Forest feature. Model Ops was utilized to construct a model that companies and residents could interact with by inputting their personal information to see the level of nitrate contamination in their groundwater. Finally, a Root Cause Analysis revealed the underlying factors and timeframes behind the spikes in contamination.

RESULTS

Using the analysis in Minitab, the government agency was able to identify the sources of high nitrate contamination, and the most affected areas. Roughly less than 5% of all regional groundwater was contaminated with an undesirable level of nitrate. In contrast to R, Minitab had a faster turnaround and saved the agency money in the long term. Based on these insights, the government agency developed a plan to monitor nitrate exposure, which improved quality control for organic sites, and enabled public awareness. Major polluters were properly fined based on results of the root cause analysis. The implementation of Minitab's tools contributes to sustainable agriculture and long-term ecological health.