

3D model measures coal ash spill

February 27 2014, by Will Ferguson



The image shows the flight path of the zone over the coal ash pond.

With a 3D model created using aerial images from an unmanned aircraft, Wake Forest researchers are providing a new look at the extent of coal ash contaminants leaked into a North Carolina river earlier this month. The approach holds promise as an effective means to monitor environmental contamination in the case of similar incidents.

The model shows how many million gallons of arsenic-contaminated water and ash spilled into the Dan River in Eden, N.C., after the initial pipe burst.

Wake Forest biology professor Miles Silman and a team of researchers

used aerial images taken from the drone to create a 3D model of the coal ash pond spill site. A video of their high-resolution model clearly depicts where ash washed out from the pond basin and where the water line was when the pond emptied.

Using their model and existing aerial images of the pond taken before the spill, the researchers estimated that 16-20 million gallons of ash and water spilled out of the pond on Feb. 2, with up to 15 million gallons being released in subsequent days.

"We think we have a precise estimate of the ash and water slurry that flowed out of the pond based on our methodology. The uncertainty comes from the amount of water that continued to drain from the ash, which is a question for hydrologists," Silman said. "Our work provides an independent estimate of the spill."

The researchers have released all of their observations and data to Duke Energy, the U.S. Environmental Protection Agency, the North Carolina Department of Environmental Resources, the Southern Environmental Law Center, The North Carolina River Keepers, and the Dan River Basin Association.

"Our goal is to help stakeholders deal with the spill and its consequences, and show the technology as a cheap and cost-effective way to monitor the environment," Silman said.

To create their model, Silman and Messinger attached a camera to their [unmanned aircraft](#) and flew a grid-like pattern over the ash pond taking pictures at regular intervals.

"The software uses multiple camera viewpoints to build the 3D model, in much the same way that your brain infers 3D structure using your two eyes," Messinger said. "Once the 3D model is constructed you can then

navigate through it as if you were there."



Wake Forest biology graduate student Max Messinger ('13) and biology professor Miles Silman pose with their remote controlled helicopter and fixed-wing aircraft.

In the future, Messinger said drones could be used to monitor similar incidents.

"We are currently working on methodology to put this approach into play elsewhere," he said. "It could be an effective means to monitor the extent of [environmental contamination](#) in the case of similar incidents."

Funding for this project was provided by Wake Forest University's Center for Energy, Environment and Sustainability. Silman, Messinger and Marcus Wright, a chemistry lab manager and key developer of Wake

Forest's environmental drone program, are also applying their drone technology to explore climate change in the Peruvian Amazon.

Provided by Wake Forest University

Citation: 3D model measures coal ash spill (2014, February 27) retrieved 11 May 2024 from <https://phys.org/news/2014-02-3d-coal-ash.html>

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