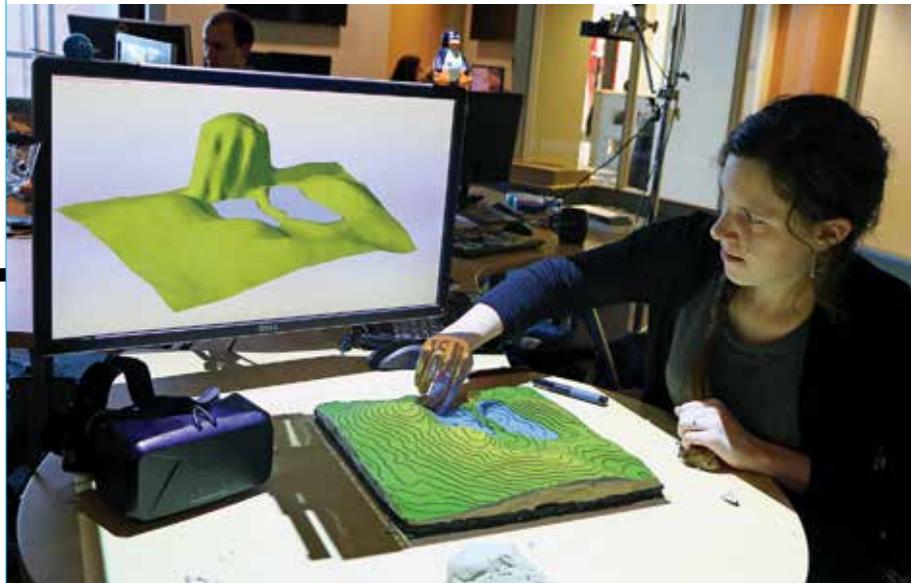


## HAND MODELS

**A NEW TOOL ALLOWS USERS  
TO MOLD GIS WITH  
THEIR HANDS.**

BY HANIYA RAE



**LEFT**  
A researcher sculpts a pond as the contour, elevation, and water maps are scanned and computed in real time.

**T**ime limitations and traditional landscape architecture tools have tended to make design a somewhat linear process, says Brendan Harmon, a landscape architect who teaches GIS at North Carolina State University. But Tangible Landscape, a type of simulated modeling environment, allows for creative thinking as a tactile, iterative process of continual experimentation, questioning, and critique. At least, that's the idea.

"Landscape architects face challenges modeling and visualizing landscapes, understanding how sociocultural, ecological, and physical processes change landscapes," Harmon says. Tangible Landscape, an open-source tool developed with the landscape architect Payam Tabrizian and geovisualization scientists Anna Petrasova, Ross Meentemeyer, Douglas Shoemaker, and Vaclav Petras, along with many others, is designed to make the visualization process easier, integrating scientific analysis and 3-D sketching that can give continual computational feedback.

The tool makes use of CNC-cut plastic models filled with polymer-enriched sand, which are able to represent real-world locales. Projected on top of the model are aerial maps generated by Geographic Resources Analysis Support System GIS—maps that can show the flow of water through the area, the damage a wildfire might wreak, or the spread of disease, all with the click of a button.

To create the base model, a user can deploy a drone to take super-high-resolution photographs of a landscape. These images in turn can be made into orthophotographs and digital surface models that can show a section of land. Once a computer-generated 3-D model has been made, a CNC-cut version out of resin can be produced. The data projected on top of this model can be changed to reflect different scenarios when pieces are moved across its surface. Things that most landscape architects need to keep in mind when designing, such as water flow, sediment transport, and

sunlight, are simulated nearly instantaneously on screen.

"Tangible Landscape is about representing data that the user has already collected and prepared in a really intuitive way so that they can understand it more easily," Harmon says. "With this data, a landscape architect can reshape that topography to create a new landscape and change those simulations, generating new data."

In time, Harmon hopes that Tangible Landscape will enable a dialogue between scientists and engineers who produce these models and simulations, the designers who will use them, and the public. "Perhaps the biggest challenge is balancing the need to understand the landscape in terms of science, engineering, and culture," Harmon says, "while at the same time having the creative and artistic freedom to imagine and express something novel, something beautiful." ●

*To learn more, go to [tangible-landscape.github.io](http://tangible-landscape.github.io).*