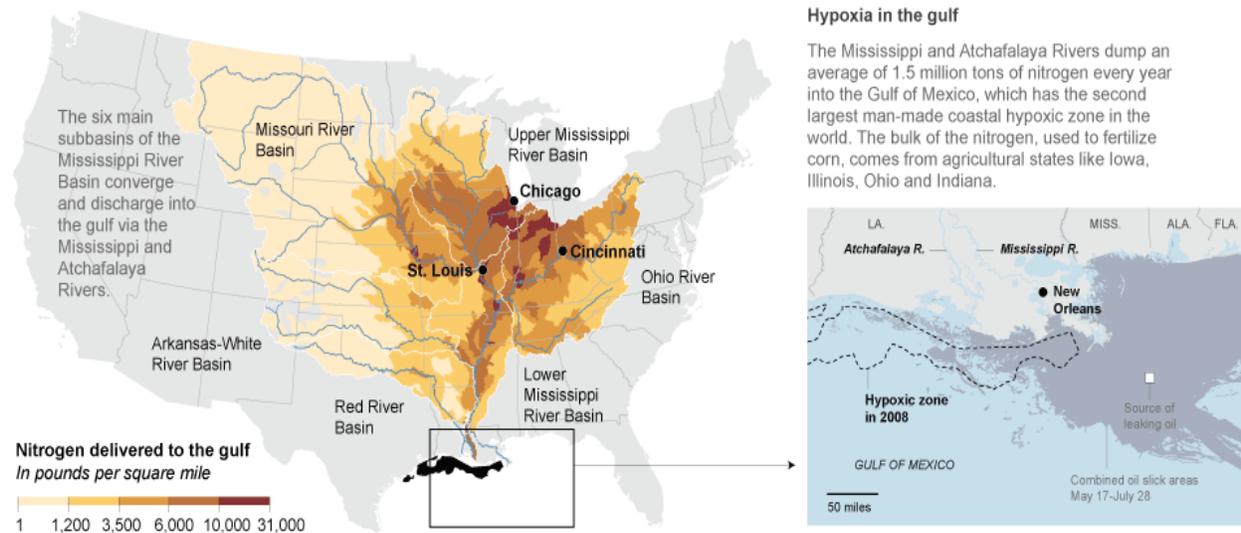


ARCH 433 Making MIMAL: Fabricating the Mississippi River Basin



Source: New York Times <http://www.nytimes.com/interactive/2010/04/28/us/20100428-spill-map.html>

LOGISTICS

M/W, 10.00-11.20 AM, 3 Credits, 1055 Communications

INSTRUCTOR

Shelby Doyle AIA LEED AP | doyle@iastate.edu
Assistant Professor of Architecture

OPEN TO

Graduate and 4th/5th Year Undergraduate Students

COURSE FEE

\$150 This will include digital fabrication materials which would be otherwise expensive or difficult to obtain. Examples include but are not limited to: 3D printing filament, CNC router bits, and climatic sensors. This will cover the majority but not all course costs.

REQUIRED SOFTWARE Rhinoceros (Rhino) v5.0 PC Version, Grasshopper, Adobe Creative Suite. An understanding of 3D modeling is highly recommended.

BACKGROUND

Nutrients carried in agricultural runoff are a primary cause of hypoxia (low-oxygen) in the Gulf of Mexico. Agricultural fields are typically drained by a system of tiles and pipes that resembles urban plumbing. Tiles are buried four feet to six feet deep shunt groundwater away from fields and into pipes that are akin to city water mains and are operated by the drainage districts. Water from the pipes flows into ditches and streams carrying with it nitrogen and phosphates that travel downstream and eventually arrive in the Gulf of Mexico. The Clean Water Act (1972) allows for two explicit exemptions for agriculture — exemptions for storm water that runs off of fields, and for excess irrigation

water, called return flows. Consequently, drainage tiles are not considered 'point sources' for pollution and are not subject to the Clean Water Act.

METHODS

MIMAL is a geographical acronym referring to five states in the United States: Minnesota, Iowa, Missouri, Arkansas, and Louisiana. The term is used as reference to the states comprising the western edge of the Mississippi River. *ARCH 433 Making MIMAL* explores the translation of mapped data into physical models through analog (wood shop, hand craft) and digital fabrication tools (laser cutting, 2D/3D CNC milling, 3D printing). The flood conditions acting upon Iowa originate with the intense infrastructural and environmental management of MIMAL and the Mississippi River Basin. Students will begin by mapping these systems and then will experiment with material and digital fabrication technologies to produce physical models of these systems. Work will be done iteratively, individually and in small groups.

PROJECT

Recent lawsuits in Iowa and beyond threaten the exemption status of drainage tiles and open up opportunities to reconsider their design. Using digital fabrication methods and Arduino sensors, students will propose and fabricate drainage tiles which filter or measure nutrient flow at the point of origin. Through this process the full-scale design idea will be aggregated at the scale of Iowa and then the Mississippi River Basin. Redesigning drainage tiles as points of filtration and water management could provide a valuable alternative to current methods and produce interdisciplinary collaborations between design and agriculture.