

RUNNING RIGHT HEAD: SOIL QUALITY IN CLEAR CREEK, IA

SOM Loss and Soil Quality in the Clear Creek, IA Experimental Watershed

University of Iowa researchers are conducting a soil and water study in the Clear Creek watershed area east of Conroy and South Amana that could change views nationally on the cause of pollution at the mouth of the Mississippi River in the Gulf of Mexico.

Thanos Papanicolaou, associate professor of civil and environmental engineering and associate faculty research engineer at IIHR-Hydroscience & Engineering, is requesting help from area farmers to aid in what he calls "pioneering" research.

Papanicolaou told farmers at a meeting at Hilton Hall in Conroy Dec. 5, he received a two-year, \$150,000 research grant from the U.S. Natural Resources Conservation Service (NRCS) to study how water either enters the soil or becomes runoff.

In particular, Papanicolaou will study the process of infiltration, the entry of water into the soil through rainfall, snowmelt or irrigation, that determines the amount of runoff as well as the supply of water in the soil. The project will focus on the Clear Creek Watershed, near the University of Iowa campus.

"The overarching goal of this research is to expand the current knowledge on soil infiltration by performing for the first time detailed field experiments under different soil aggregate attributes, landforms and management conditions. To do so, this research will utilize state-of-the-art methodology including sensor technology to obtain measurements of infiltration and conductivity in a non-intrusive manner," Papanicolaou said.

Among the variables affecting run-off and soil retention of water are: the slope of the hillside, soil type, land management and rainfall intensity. He added that knowledge of infiltration is important in predicting surface runoff, water quality properties and hillside erosion.

"Overall, this research will lead to development of a versatile and robust method useful in TMDLs (total maximum daily loads) for measuring surface runoff and transport of contaminants," said Papanicolaou, whose co-principal investigator on the project is Lee Burras, associate professor of agronomy at Iowa State University.

Because the project includes extensive water quality sampling, it should reveal the amount of time required for the benefits of best management practices (BMP) programs to show up downstream.

"This would be a great benefit to watershed planners who will apply BMP programs," said Papanicolaou. "Over the long term, the research will be useful to farmers in the region interested in minimizing nutrient loss to surface waters as part of ongoing BMPs, and to the Iowa Department of Natural Resources in strategic planning to clean-up Iowa's surface waters."

Papanicolaou, a native of Greece, said the Clear Creek watershed was chosen for the study because "it is the green belt of the corridor." Because of the watershed's impact

on the Historic Amana area, he said the state want to improve the water quality so it is a place where visitors can enjoy nature.

The area of interest is, for the most part, between Conroy and US 151 and 190th Street and US-6.

Also, the local NRCS has conducted vast research already, so there is an abundance of data already collected regarding land use in the area, Papanicolaou said.

The objectives of research are to prevent bank erosion, improve soil and water quality and help the NRCS.

The study will help determine how soil behaves, Papanicolaou said. If fine soils erode from farm fields, there is much less organic material in soil and more fertilizer needed, which also means more money out of the farmer's pocket, he said.

He added, the upper Mississippi states, including Iowa, are being blamed for the water pollution at the mouth of the Mississippi River in Louisiana. The gulf is suffering from Hypoxia, or oxygen depletion, which leads to stress and death in aquatic organisms.

Papanicolaou said the Mississippi River carries high amounts of nitrate and nitrite due to certain fertilizers running into the river, ultimately depleting oxygen levels in the gulf. He said he has attended conventions where other researchers blame this problem on farmers in north, including Iowa farmers.

"I know scientifically that is not sound," Papanicolaou said. "What we are looking to prove is we can have good agricultural production and optimize use of fertilizer and not to cause problems to water quality."

He said southern states, such as Louisiana, have removed marshlands adjacent to the Mississippi River, in turn eliminating buffer zones. He said there is no resting time for water pollutants to dissolve before they hit the river.

Papanicolaou is looking for volunteers in the South Amana and Conroy area to give researchers access for soil sampling twice per year. Researchers will study the soil properties and compare the results with existing models.

Researchers are also looking to take core samples by extracting soil with a two-foot long auger that has a diameter of three-inches.

Thirdly, researchers need to install 10 infiltrometers at different locations. The two-foot contraptions measure how much rain infiltrates into the soil and how much gets into the water. They are looking to install the infiltrometers in the South Amana area.

"Pretty much the whole Midwest will learn from the project," Papanicolaou said. "We are the pioneers."

Papanicolaou has worked with Lloyd Trimpe, South Amana, for the last year, by taking erosion measurements from land he owns next to Clear Creek. The study involves studying two strips of land, one covered in grass and one strip completely bare ground. Researchers then test the difference in soil erosion.

The land being used was waste ground, Trimpe said, and he didn't have to take any of his farmland out of production. He is contracted to participate in the project for one more year.

"(Trimpe) has been a tremendous source," Papanicolaou said.

Stewart Maas, South Amana, began participating in the project last summer. Researchers took out soil core samples from his land. Papanicolaou said they took 15 scoops of soil from Maas' land, a "very small disturbance."

Maas said he “feels good” about participating in the project and is glad he can help out the research.

“I don’t want to be blamed for other problems down south,” Maas said. “We need to fix our problems, but we don’t need to change our growing habits for something that is not our fault.”

Papanicolaou said he is looking for at least two or three more areas to extract soil cores, and about four different locations to install infiltrometers. He said he sees the project going for at least three years.

Anyone interested in participating, can contact Papanicolaou at (319) 335-6448 or at apapanic@engineering.uiowa.edu.