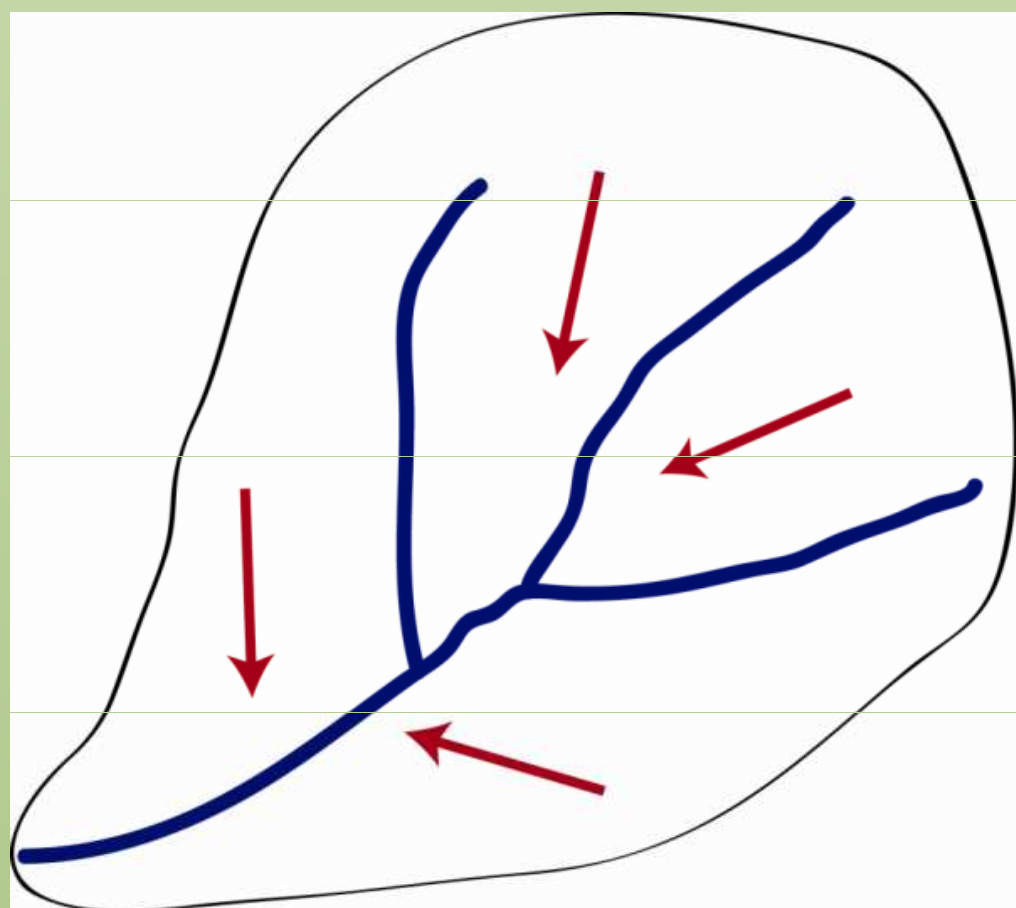


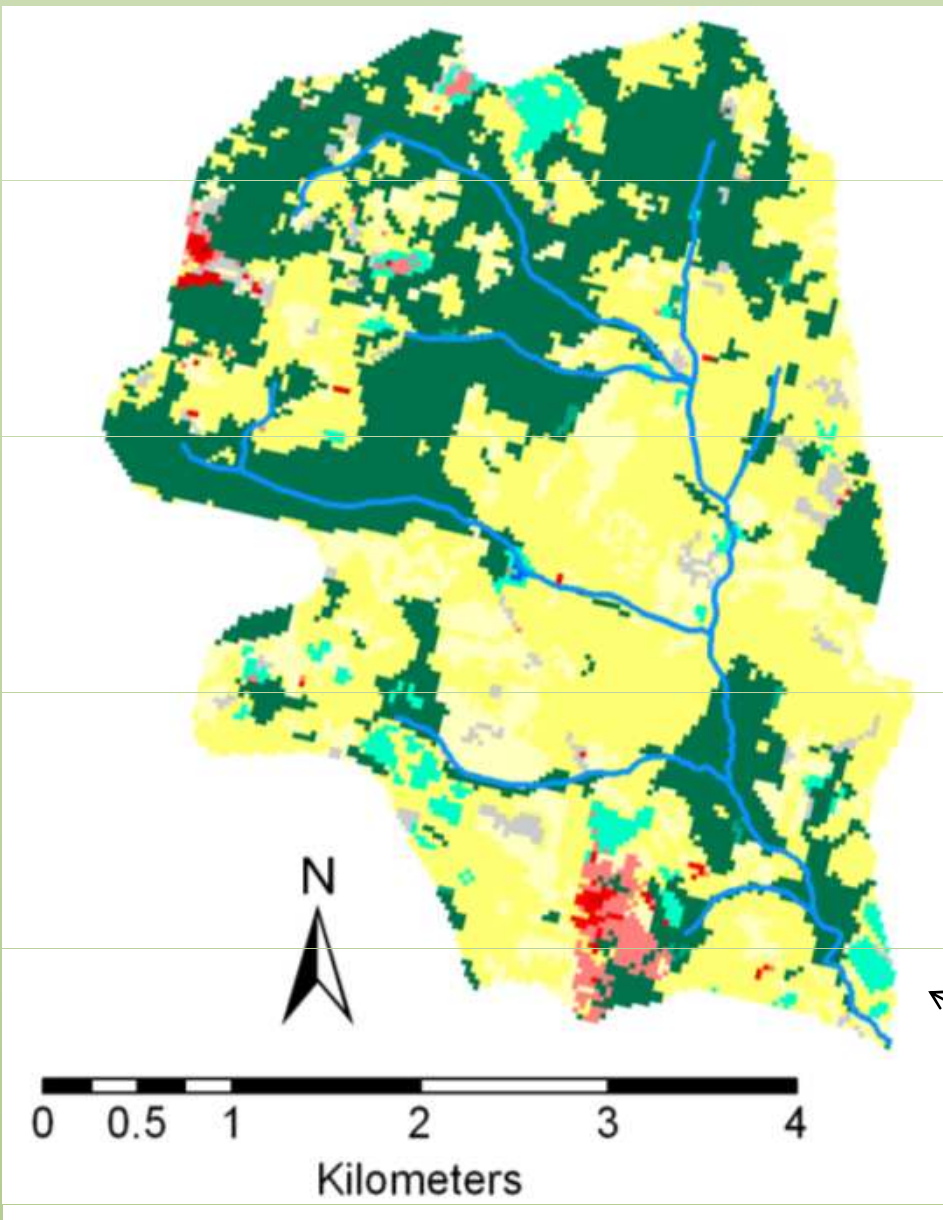
Using Radionuclides to Investigate NJ Rivers for Sources of Excess Fine Grained Sediment

Nicole M. Bujalski and Jared M. Lopes

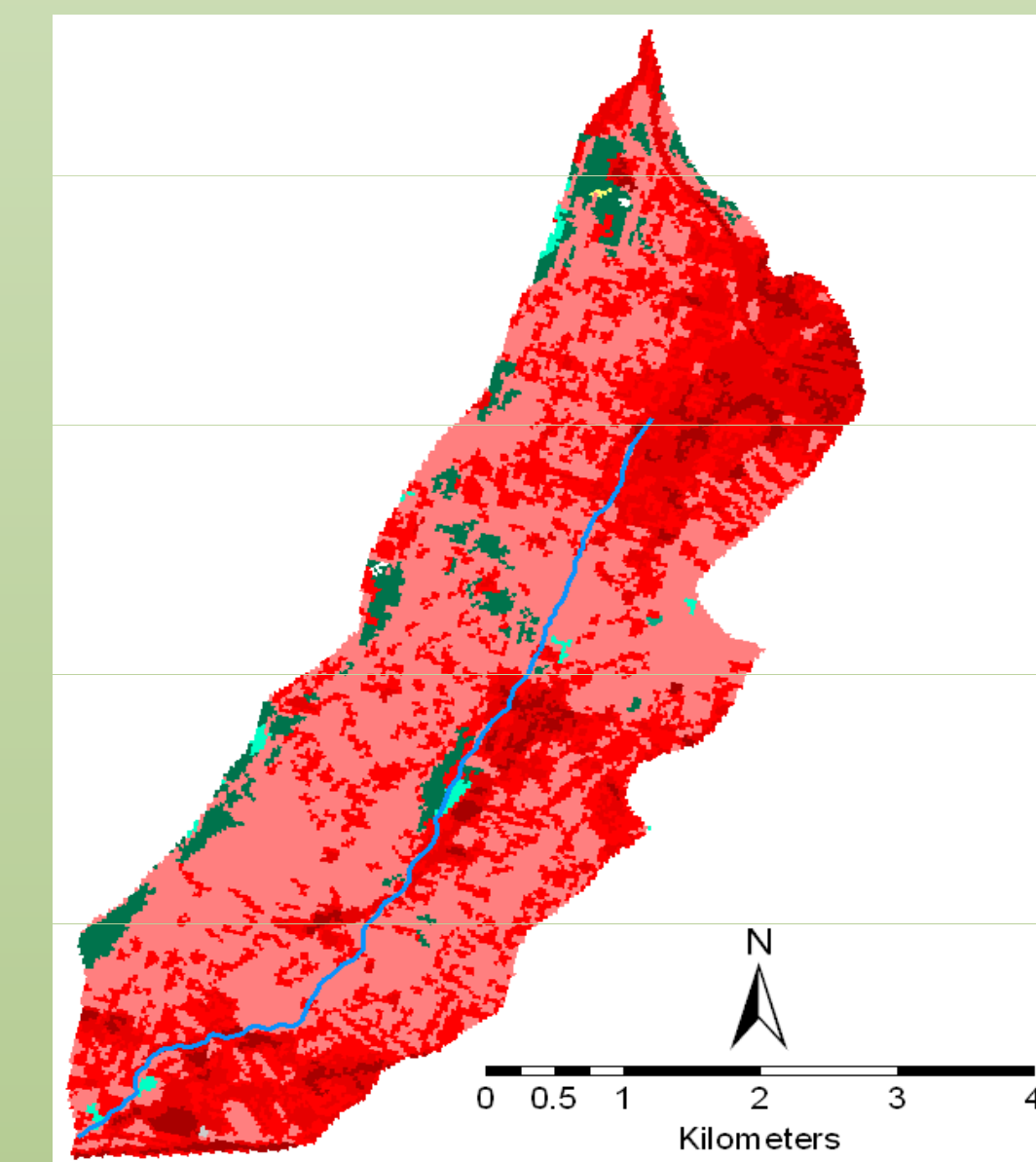
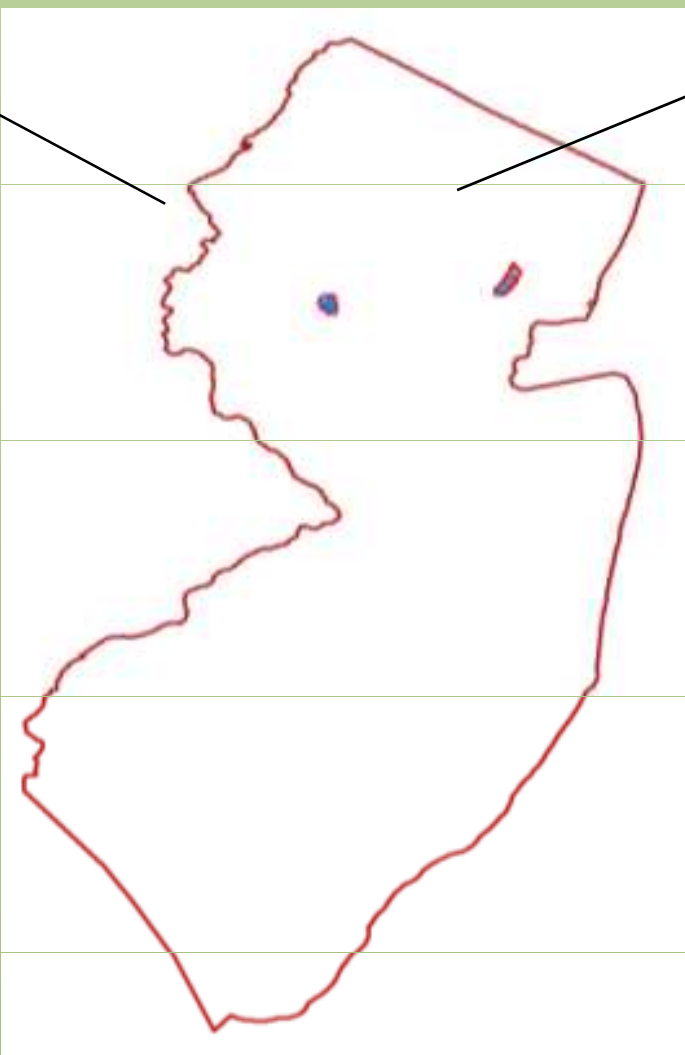
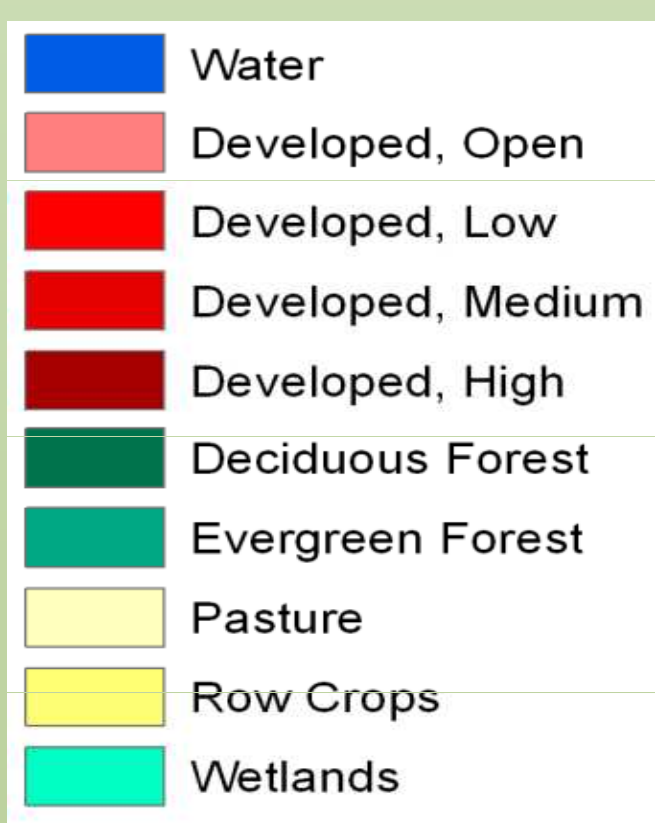
Advisors ~ Dr. Josh Galster, Huan Feng, Kirk Barret, Department of Earth & Environmental Studies MSU



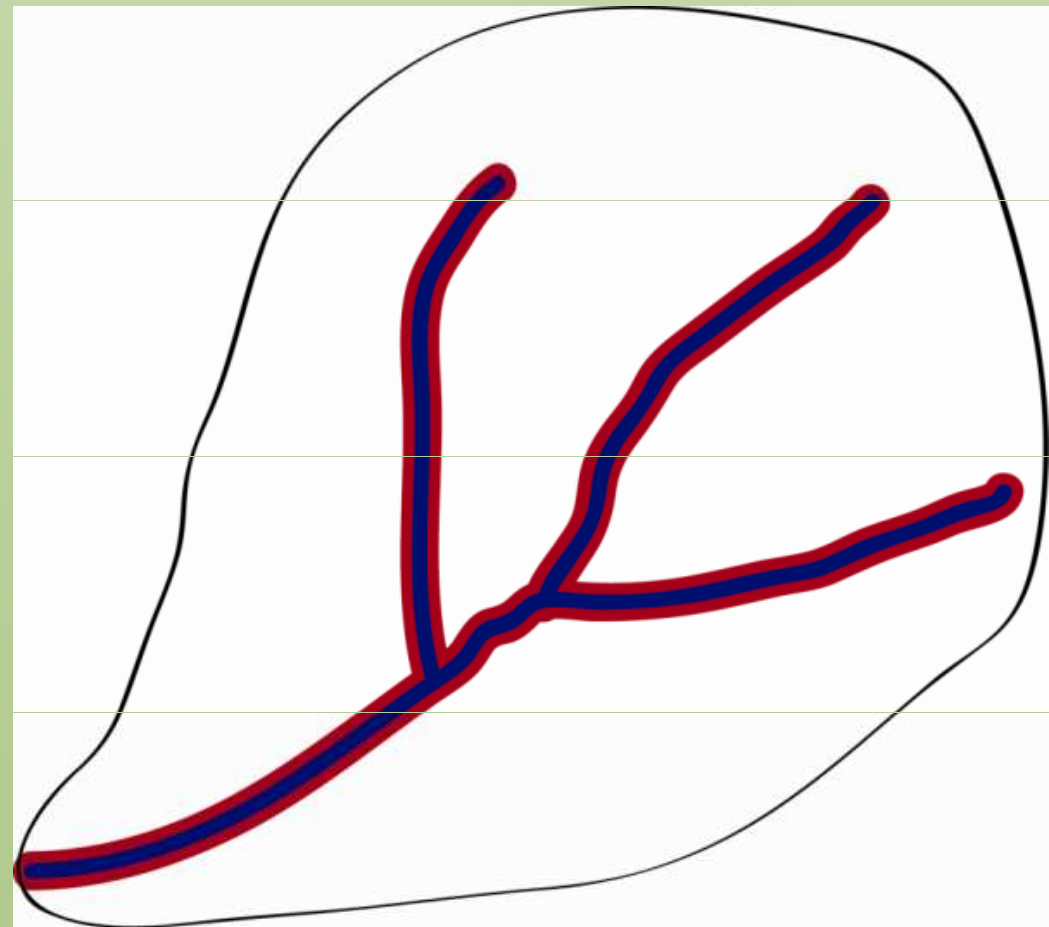
Surface erosion



Cold Brook
(Agricultural Site)



East Branch of the Rahway River
(Urban Site)

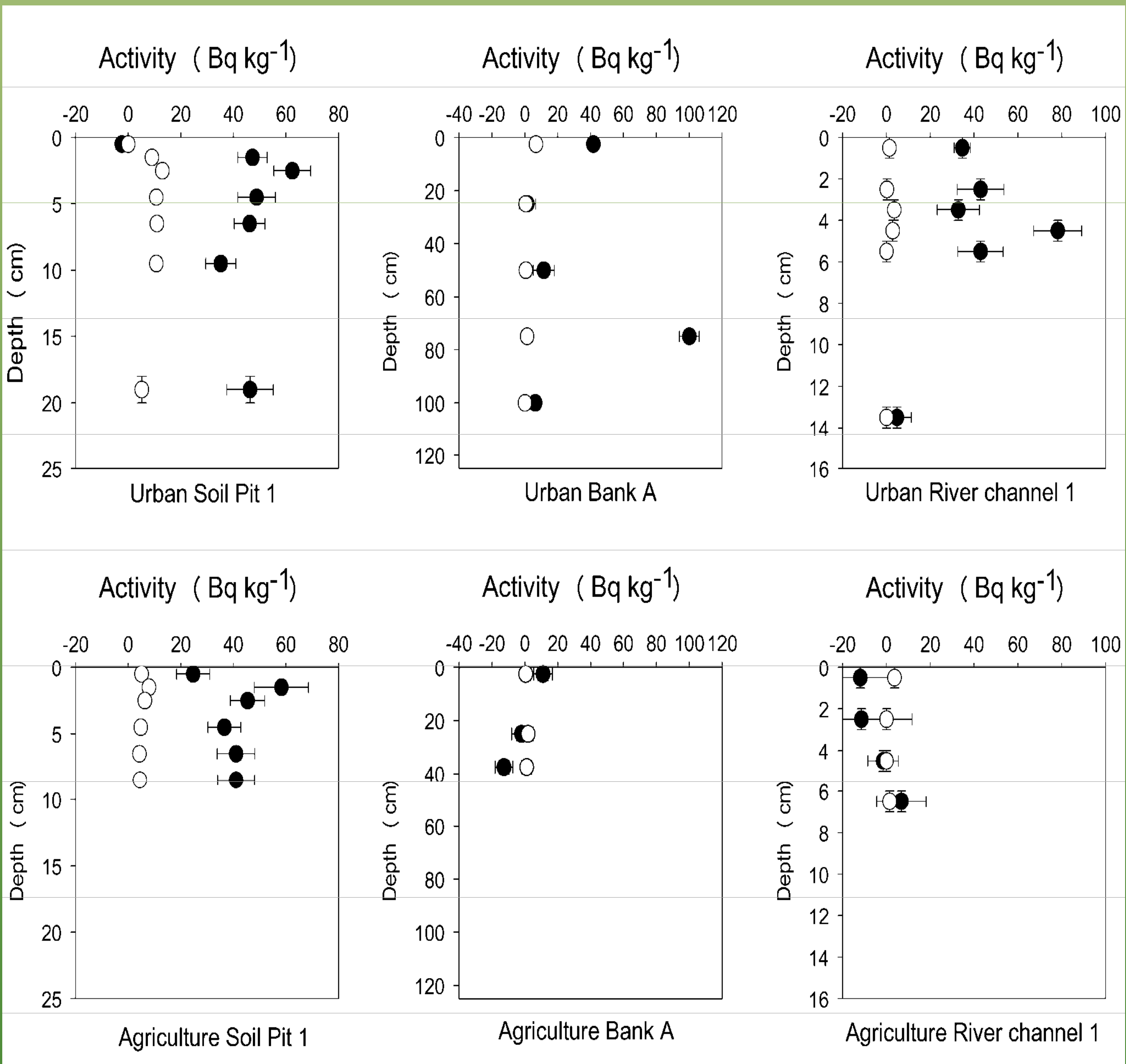


Bank Erosion

Abstract:

In 2007 the Environmental Protection Agency declared excess sediment loading as the largest cause of stream impairment in the United States. The turbidity from excess sediment can cause ecological and biological damage as well as affecting recreation and drinking water sources. The source of this sediment loading can be caused by bank erosion or overland runoff, but the difficulty comes in determining the source. Characterizing the sediment using the radionuclides ^{137}Cs and ^{210}Pb may allow the source to be determined. Due to the atmospheric deposition of the radionuclides, it is assumed that sediment coming from surface erosion will have a higher activity than bank erosion. Case studies of urban and rural water sheds were conducted to better understand how these processes occur. The general hypothesis was that urbanized land would cause sediment loading from bank erosion. Vast amounts of impermeable surface will cause an increase in urban runoff. Larger discharges in rivers will cause added stress on the system, often resulting in bank erosion. Rural or agricultural watersheds on the other hand are characterized by frequent tilling and more permeable surfaces. This causes sediment loading from surficial (rill and sheetwash) erosion. When the source can be identified, best management practices can be employed to remediate waterways and for future land use planning.

What are we looking for?



Methods:

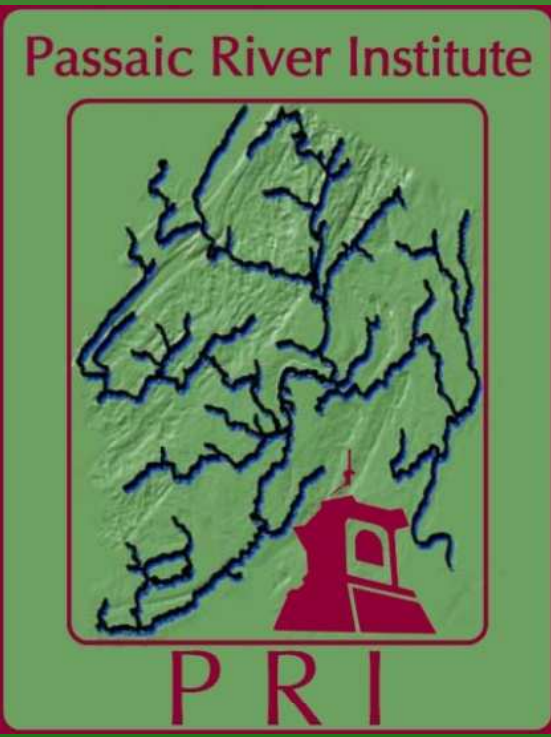
At each site three different sample collection methods were employed. River channels were sampled using a simple hand help corer to recover sediment at 1- 2 cm intervals. The average river channel core is 10 cm depth. Soil pit samples were also taken at 1-2 cm intervals and the average depth was 20 cm. Bank samples were taken by hand at 5 equal intervals. A Canberra Gamma Ray Detector was utilized to analyze for ^{210}Pb and ^{137}Cs radionuclides.



Nicole Bujalski and Jared Lopes taking river channel samples.

Conclusions:

Sampling and data analysis has revealed that both the urban and agricultural channel sediments are well mixed. The Urban watershed had opposite results than what was predicted because its sediment source had more surficial material and therefore more activity then the agricultural site. The next step is to expand the study by sampling from other locations in the same watershed, and eventually sampling from other sediment impaired streams.



Acknowledgements

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