

## Abstract

- a. **Funding Opportunity:** Integrating Human Health and Well-Being with Ecosystem Services. EPA-G2016-STAR-A2: Early Career Projects
- b. **Project Title:** “Community-level Management of Human Health Risks from Concentrated Animal Feeding Operations (CAFOs) with Defensive Natural Capital Investments”
- c. **Investigators:** Lead PI: Jacob P. Hochard<sup>1</sup>, Co-PIs: Randall Etheridge<sup>1</sup>, Ariane L. Peralta<sup>1</sup>, Charles Sims<sup>2</sup>; PI contact: [hochardj15@ecu.edu](mailto:hochardj15@ecu.edu)
- d. **Institutions:** <sup>1</sup>East Carolina University, Greenville, North Carolina (lead institution); <sup>2</sup>University of Tennessee, Knoxville, Tennessee
- e. **Project Period and Location:** May 2017-April 2020; Duplin, Sampson, Harnett, Cumberland, Bladen and Pender counties, North Carolina
- f. **Project Summary:** Concentrated Animal Feeding Operations (CAFOs) support local economies but are associated with air, surface and groundwater pollution. Community-level management of pollution-related health risks requires (i) a local capacity to identify at-risk neighborhoods and (ii) an understanding of how community defensive investments into physical capital and natural capital relate to one another in their capacity to reduce human exposure to contaminants. Such community-based responses to health externalities recognize that command-and-control style upstream regulation may be less cost effective *and* potentially more harmful to downstream communities when livelihoods depend critically on local industries. Community-led mitigation of human health risks must make targeted investments into public infrastructure and natural capital to expand the flows of public services *and* ecosystem services to at-risk households.
  - (1) **Objectives.** We propose a multidisciplinary social-ecological (economics/econometrics, ecological engineering, soil ecology) modeling and empirical investigation to **(i) identify and measure the effect of swine production operations on local human health, (ii) examine if land cover, soil types, hydrographic relationships and public institutions mediate health outcomes and (iii) construct neighborhood-specific recommendations to inform community-level management of human health risks.** We hypothesize that CAFO-linked contaminants cause downstream adverse health outcomes, which are attenuated by natural capital between source contaminants and households. We also hypothesize that natural capital is more valuable to those communities lacking public services, which buffer communities from upstream contaminants.
  - (2) **Experimental Approach.** We will examine the effect of upstream ground and surface water and airborne pollutants on local health outcomes within six North Carolina counties from 1997 to 2015. Empirical identification of health effects from novel residence-level vital statistics and emergency room visits datasets will exploit (i) a series of natural experiments (e.g. districting of public water and storm water drains) and (ii) biological (soil type, land cover), atmospheric (precipitation, wind direction) and hydrological (flow direction, water table, flooding) stressors that are plausibly exogenous to certain health outcomes.
  - (3) **Expected Results.** Our research will identify health-vulnerability hotspots and natural capital hotspots, located within our six study area counties, based on temporal and atemporal stressors that will provide residents a basis of information with which to make defensive investments in (i) the targeted expansion of public services to at-risk neighborhoods and (ii) the maintenance of those local ecosystems most critical to supporting community health.
- h. **Supplemental Keywords:** averting behavior, ecosystem services, health externalities.