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CONCENTRATED ANIMAL FEED OPERATIONS (CAFOs): IMPLICATIONS FOR COASTAL AND WATERSHED LAND USE PLANNING WITHIN THE GREAT LAKES COASTAL ZONE OF NW OHIO

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Introduction

The emergence of large scale animal production facilities, also commonly known as “megafarms”, factory farms or Concentrated (or Confined) Animal Feed Operations (CAFOs), has raised serious concerns over the potential environmental impacts especially in regards to animal waste handling and water contamination. CAFOs are “agricultural facilities that house and feed a large number of animals in a confined area for 45 days or more during any 12-month period” (<http://www.cdc.gov/cafos/>). A research team from the University of Toledo and Bowling Green State University has received funding support from USDA to examine various issues associated with the human health and environmental impacts from the practice of the application of sewage sludge and other biosolids to farmland. The project is being undertaken in the Wood and Lucas Counties, NW Ohio that are located within the coastal zone of the western basin of Lake Erie.

Figure 1. Ohio Coastal Management Program Area, highlighting counties (green) and designated coastal area (yellow) (from ODNR)



As part of the research project a collection and review of available studies and information regarding CAFOs was undertaken to identify the key issues and future studies that would be needed to examine the potential environmental impacts from liquid manure generated by CAFOs within NW Ohio. The effort focused on examining the current literature, scientific studies and published reports regarding CAFOs with special focus on water quality impacts and the handling and disposal of the liquid manure waste from these facilities.

Concentrated Animal Feeding Operations (CAFOs) are agricultural operations where animals are kept and raised in confined situations. CAFOs generally congregate animals, feed, manure, dead animals, and production operations on a small land area. Feed is brought to the animals rather than the animals grazing or otherwise seeking feed in pastures. Animal waste and wastewater can enter water bodies from spills or breaks of waste storage structures (due to accidents or excessive rain), and non-agricultural application of manure to crop land (Wilde et al., 1999).

CAFOs meet the regulatory definition under the NPDES permitting program when:
1) Animals have been, are, or will be stabled or confined and fed or maintained for a total of 45 days or more in any 12-month period, and 2) Crops, vegetation, forage growth, or post-harvest residues are not sustained in the normal growing season over any portion of the lot or facility. CAFOs can contain large numbers of livestock with the largest facilities having upwards of 1,000 or more cattle, 2,500 or more swine, 55,000 or more turkeys, or 125,000 or more chickens.

CAFOs can be a major source of water pollution and drinking water contamination because they concentrate enormous amounts of animal waste in relatively small areas (Dickerson, 2007). Animal waste is rich in phosphorus and nitrogen and can be a useful fertilizer when applied to crops at appropriate rates. However, but when over-applied to land or spilled and leaked from waste lagoons, these nutrients can enter groundwater, rivers and lakes, killing fish and other aquatic life and contaminating drinking water supplies. The 22 states that categorized specific types of agricultural pollution concluded that animal wastes pollute about 35,000 of the river miles they assessed. (USEPA/USDA, 1998). Animal manure is a greater contributor than point sources to in-stream total nitrogen in 1,802 (88%) of the 2,056 watershed outlets in the U.S., based on a national modeling effort by the US Geological Survey. (USEPA/USDA, 1998)

Numerous cases of water quality contamination from CAFOs have been documented. In Iowa, Minnesota, and Missouri, which account for 36% of hog production, 20 spills in 1992 killed at least 55,000 fish. By 1996, the number of spills had doubled, resulting in 670,000 dead fish. (US Senate Committee on Agriculture, 1997). A 1995 North Carolina State University study found severe seepage of nitrogen from more than half of the lagoons included in their survey.

Very few studies have considered the site location factors associated with CAFOs. Dickerson (2007) has completed a model for determining site locations for CAFOs in Williams County in Ohio.

December 2000, the Ohio state legislature gave the Ohio Department of Agriculture the responsibility for overseeing and permitting Ohio's largest livestock and poultry farms. Effective August 2002, when the staff and science-based rules were in place, as required by the legislature, the ODA Livestock Environmental Permitting Program (LEPP) began regulating concentrated animal feeding facilities (CAFFs) and how these farms are built and operated to protect surface and ground water quality. The US National Pollutant Discharge Elimination System (NPDES) program regulates the discharge of pollutants from point sources to waters of the United States. Concentrated Animal Feeding Operations (CAFOs) are point sources, as defined by the CWA [Section 502(14)]. Centner (2006) provides a review of NPDES permitting of CAFOs.

In recent years communities within NW Ohio have experienced increasing numbers of CAFO's. Currently, 77 CAFO's are located in Northwest and West Central Ohio, according to the Ohio Department of Agriculture, Livestock Environmental Permitting Program. Proposed CAFO's that are undergoing the licensing process are not yet licensed, so they will not be included in the count by county until that process is completed. Since 2006 five new CAFO's have been licensed in Wood (2), Mercer (1) Auglaize (1) and Paulding (1) counties. Plans for new CAFO's in Wood, Williams, Hancock, Hardin and Wyandot Counties are underway.

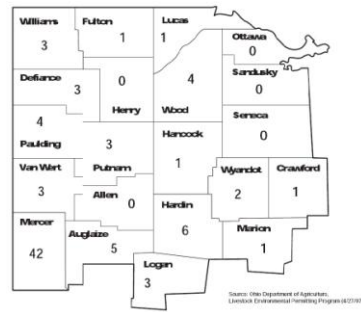


Figure 2. Number of CAFOs in Counties within NW Ohio

Implications for Coastal Management and Planning

Wood and Lucas Counties in NW Ohio are located with the Lake Erie Western Basin. Lucas County is within the program area for the Ohio Coastal Management Plan. The counties also lie within the Maumee Great Lakes Area of Concern (AOC) – one of 43 such sites identified for priority cleanup actions by the 1987 Great Lakes Water Quality Agreement. The recently completed Watershed Restoration Plan/Stage II report for the Maumee AOC identified Efforts are currently underway in the area of Wood and Lucas County on the preparation of coastal management measures for critical coastal areas and impaired or threatened waters under the requirements of the Ohio Coastal Nonpoint Pollution Control Program. This program is administered by the Ohio Department of Natural Resources (ODNR) and follows from various state and federal program requirements including Ohio EPA, US EPA, NOAA, US Coastal Management Act, and the Clean Water Act. Water quality concerns associated with the storage, handling, and disposal of liquid animal manure wastes from CAFOs will be a significant issue requiring management attention within Wood and Lucas Counties which contain numerous ditches, streams and rivers with direct discharges into the western basin of Lake Erie.

Discussion

Based on work completed to date in this study, the following decision-making matrix was prepared (Table 1) in order to provide direction to the UT/BGSU Monitoring Agricultural Sewage Sludge Project Team in determining the necessary follow-up tasks in regards to liquid manure wastes from CAFOs.

Table 1. CAFO Study Decision-Making Matrix

Issue	Concerns	Research Needs	Tasks
CAFO Locations	Limited information on location sites	Map CAFOs and associated conditions	Develop GIS database
Facility Practices	Need data on liquid manure production	Examine permits and policies for manure uses	Determine if facilities present potential risk
Field Applications	Practice of disposing of manure on fields	Need to determine levels of applications	Monitor site application
Soil Conditions	Dominance of clay soil types	Detailed mapping of soil factors	Model soil aspects
Proximity to water bodies	Many natural streams and flows into Lake Erie	Locate CAFOS relative to water bodies	Complete proximity assessment
Regional Drainage	Farmland is extensively ditched	Develop a detailed 1 ft DEM and model flows	Complete a local runoff model
Climate Conditions	Year round precipitation and winter snow	Compile historical and current trends	Import climate data into runoff model
Water Quality Monitoring	Lack of water quality data	Assemble existing data	Establish a monitoring site

Conclusions

Concerns regarding the location of CAFOs and their potential water quality impacts within Wood and Lucas Counties in NW Ohio are increasing as more facilities are being put into operation. Environmental conditions (climate, drainage, soil types, proximity to streams and Lake Erie) present issues for water contamination from liquid manure from CAFOs, including application on farm fields. Better information on CAFOs will be essential in future coastal planning.

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