Quady

Allie Quady, Assignment 2, 1-2-08 1. I would like to use GIS in a project involving the spatial and geographical features of a landscape with regard to the rate of cryptosporidiosis infection. Cryptosporidium is present in 97% of our surface waters, according to a report from the CDC. Many of us have been exposed to either Cryptosporidium parvum or hominis at some point in our lifetimes. The result is diarrhea and nausea, ranging from mild to severe. It is thought that those who have been exposed develop partial anti-body resistance, thus decreasing the effect of CP or CH for future exposures. However, for immunocompromised individuals and the elderly, cryptosporidiosis can be a life-threatening disease.

Several forms of cryptosporidium are carried by livestock and wild animals. When it is found in a river, the source is difficult and costly to trace. Dairy farms have often been identified as the culprit in outbreaks, due to high rates of CP infection in calves. In Massachusetts there are approximately 189 dairy farms, and 9,000 head of cattle. Dairy farms are often located in rural areas, and are surrounded by wooded areas. Unfenced and heavily fertilized farm-land (with manure) bordering rivers is common. These spaces are regularly crossed by wild animals, such as deer, who are commonly infected with cryptosporidium, although it may not be parvum, the species infectious to humans.

2. This study proposes to use GIS analysis to study geographic and spatial features of dairy farms. If feasible, these landscape features can be overlaid with a dataset of cryptosporidiosis by zip code in Massachusetts. The proposed geographic and spatial features to be identified are: proximity to surface water, number of head of cattle, acres of fertilized land, proximity to forested area, and slope of land. If possible, the municipal use of surface waters adjacent to dairy farms will be identified and included on the map.

3. References:

Iain R. Lake et al. 2007. Case-control study of Environmental and social factors influencing cryptosporidiosis. "European Journal of Epidemiology." 22:805-811.

Naumova, Elena et al. 2000. "Use of Passive Surveillance Data to study Temporal and Spatial Variation in the Incidence of Giardiasis and Cryptosporidiosis." *Public Health Reports*. Vol. 115.

Cohen, Steven et al. "The SEEDs of two gastrointestinal diseases: SocioEconomic, Environmental, and Demographic factors related to cryptosporidiosis and giardiasis in Massachusetts." (Not yet published, researchers from Tufts University).

Sischo, W.M. et al. 2000. "Cryptosporidia on dairy farms and the role these farms may have in contaminating surface water supplies in the northeastern United States." Preventive Veterinary Medicine. Vol 43, 253-267.

US EPA. 2005. "Detecting and Mitigating the Environmental Impact of Fecal Pathogens Originating from Confined Animal Feeding Operations: Review." Publication of the US Environmental Protection Agency.

Woolhouse, M.E.J. 2002. "Population Biology of emerging and re-emerging pathogens." *Trends in Microbiology*, 10:S3-S7.

US Census of Agriculture, 2002, Massachusetts Dairy Cattle. Uscensus.gov.

4. Existing Data Sources:

1. Cryptosporidiosis incidence by zipcode, acquired by Tufts researcher (Elena Naumova) from the Dept. of Public Health.

2. US Census: I couldn't find information by county for head of cattle, only by state, online. I should call Mass Dept. of Ag.

3. Locations of dairy farms, I know of a private company that has this information, but do not know if they are willing to share

4. Forest cover: USGS, National Agriculture Imagery Program

5. Municipal water use: National Hydrography Data Set