Using Landsat Satellite Imagery in Cancer Research

Exposure to agricultural chemicals has been associated with diseases such as cancer, adverse reproductive outcomes, and neurological disorders. To study the relationship between agricultural chemical exposure and health outcomes, information is needed on the types of agricultural chemicals that a person may have been exposed to in the past. Human health scientists have been hampered in their research by the lack of information on historical environmental exposure to agricultural chemicals for rural populations in particular.

Agriculture Contaminants
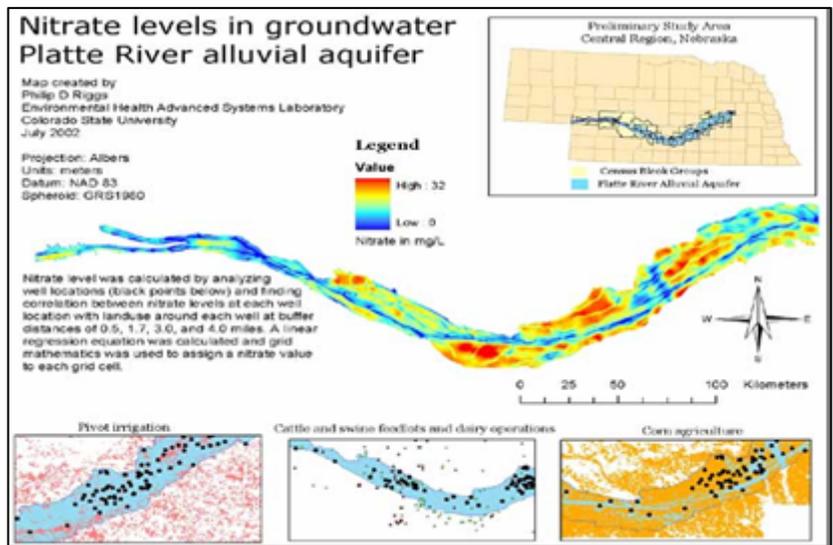➢Fertilizers
➢Pesticides
➢Animal waste and bi-products

Exposure Pathways
➢Spray drift
➢Dust
➢Water supply

The U.S. Geological Survey EROS Data Center is collaborating with the National Cancer Institute and the Environmental Health Advanced Systems Laboratory at Colorado State University to evaluate the potential of remote sensing technology to identify land cover features such as specific crop types, irrigation practices, and large animal feeding operations. Studies of rare diseases like many cancers may cover large geographical regions and often exposures must be estimated over several decades. Historical exposure assessment can only be accomplished using historical satellite imagery such as the Landsat archive. Land cover information is integrated with other environmental data (e.g., chemical use, hydrology, atmospheric) in geographical information system models to predict agricultural chemical exposure to human populations. Current study areas are in the Platte River Valley (Colorado and Nebraska) and Iowa.

Crop Type and Irrigation Method

Cattle Feedlot

Satellite images: agriculture cover types of interest

Nitrate levels in groundwater Platte River alluvial aquifer

GIS modeling: identification of populations on private wells at risk to nitrate in drinking water

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