

Intelligent solutions in public health: models and opportunities

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We are developing TerraFly-based Web-tools to inform the Community about issues of Environmental Public Health, based on visual correlative maps, ergonomic query mechanism, and data analytics. Our tool will inform and facilitate decisions support at three levels: publically accessible data and module to facilitate personal and communal decisions and to inform the public, a tool for public health decisions by epidemiologists and other public health professionals, and a tool for executive understanding and political decision making by leaderships of communities, from a village level to state level. With grants of over \$30M from NSF, NASA, and DoI, and \$10M in-kind support from IBM, we have developed a geospatial query and visualization engine TerraFly. Users have spatial and multi-temporal web-fly view of 40 terabytes of aerial imagery, street vectors, demographics, parcels, year the buildings were built, public facilities, and environmental data. In collaboration with a team of public health researchers, we are creating pilot applications for the public health community. These applications involve overlaying a variety of geographically referenced datasets on top of TerraFly's existing database of remotely sensed imaging. Examples of this sort of public health data include the mosquito-borne illnesses, data on lead poisoning incidents, cancer incidents, injury and accident data, environmental hazard data, obesity, infant mortality. Combining epidemiological data with remotely sensed imagery will enable public health workers and epidemiologists to make correlations between environmental data and the spread of diseases. A number of studies have documented the successful use of remotely sensed imaging technologies to track the environmental conditions that encourage the spread of malaria. In these studies, predicted levels of malaria-vector mosquito populations based on remotely sensed imagery and GIS data approximated actual observed levels with upwards of 85% accuracy. TerraFly is building on the success of these studies with rich analytical query engines, maps and multi-spectral multi-temporal satellite imagery. By visualizing changes in the environment over the course of time, correlations may be made between these changes and the number and location of incidences of diseases or conditions.