

Location-based Epidemiology: The new Frontier

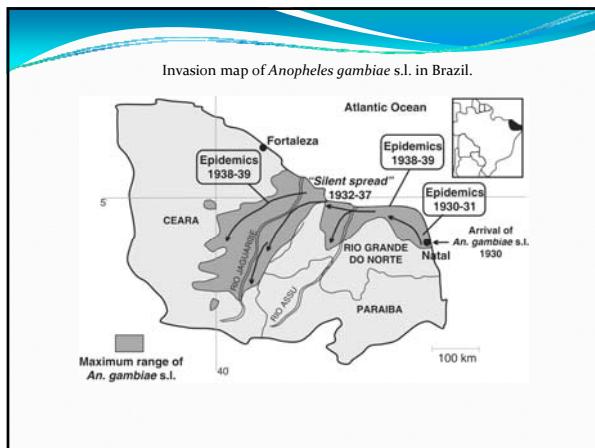
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From Location to Informative Pixels

Location
Prediction
Identification

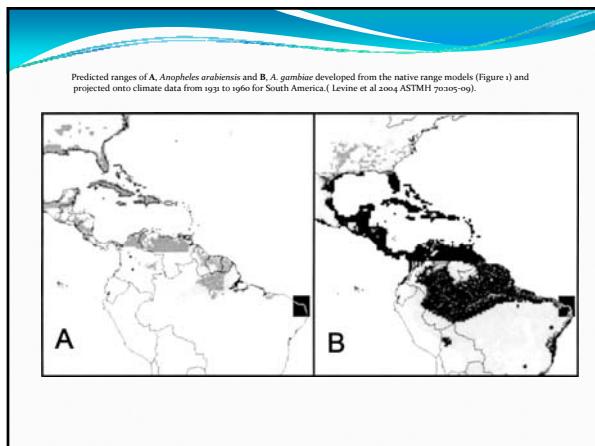
Dr. John Snow's Original Cholera Cases in London Map, 1854



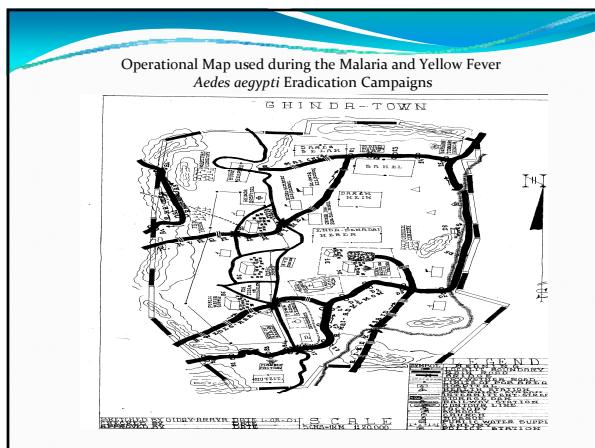
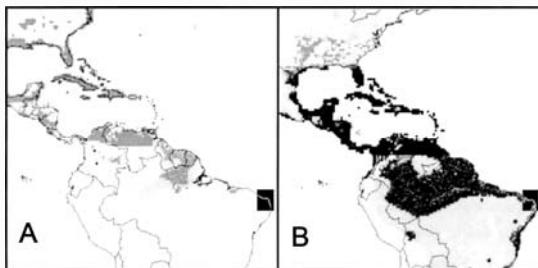


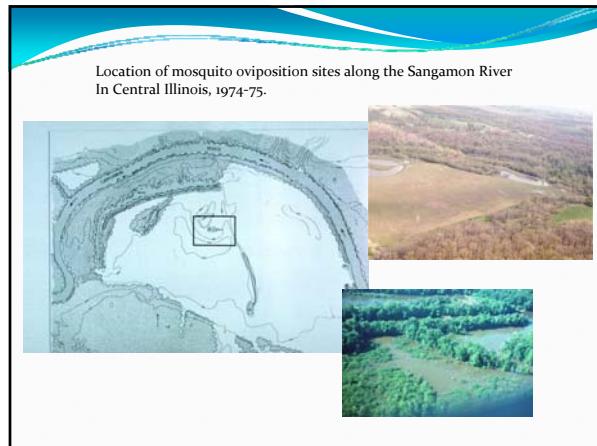
Invasion map of *Anopheles gambiae* s.l. in Brazil.

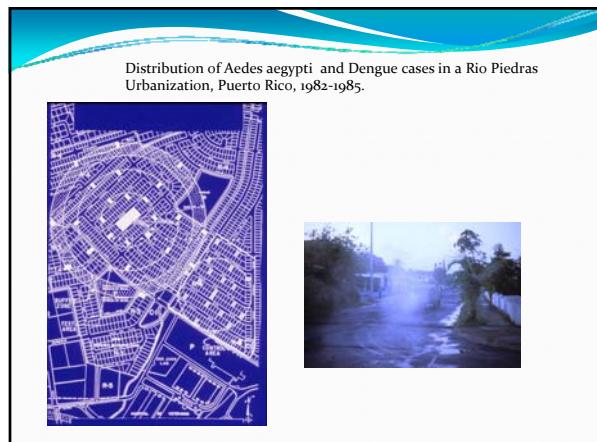
Map illustrating the spread of *An. gambiae* s.s. in Northeastern Brazil during the 1930-39 epidemics. The map shows the states of Ceará, Rio Grande do Norte, and Paraíba. The 'Silent spread' (1932-37) is shown by arrows pointing inland from the coast. Epidemic centers are marked with shaded areas and labeled 'Epidemics 1938-39'. An inset map shows the location of the study area within the context of the entire Brazilian coastline. A scale bar indicates 100 km.



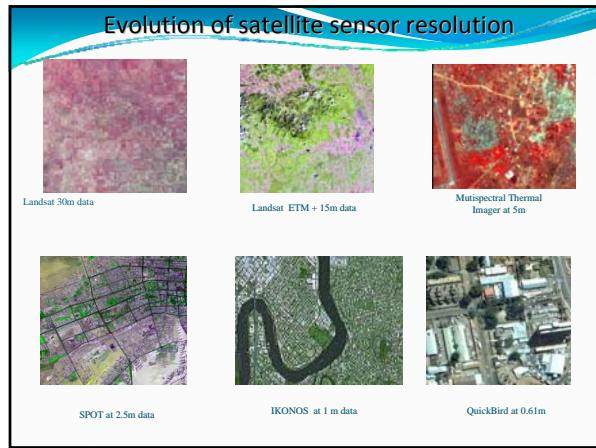
Predicted ranges of A. *Anopheles arabiensis* and B. *A. gambiae* developed from the native range models (Figure 1) and projected onto climate data from 1931 to 1960 for South America. (Levine et al 2004 ASTMH 70:05-09).



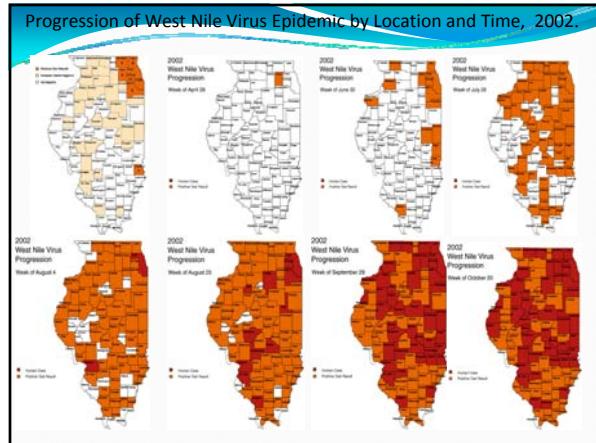




THE IMPORTANCE OF PIXEL DIMENSIONS



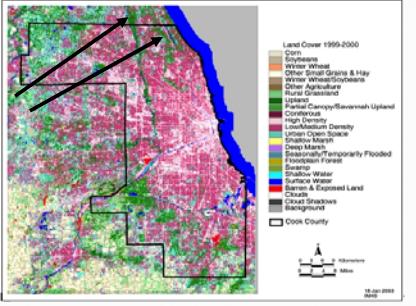
WEST NILE VIRUS



Effect of birds on the transmission dynamics of WNV

Landscape

- mosquitoes
- weather
- birds



Assistance from MADs

Radio-Tracking and Mapping Crow Movement

WHY ??

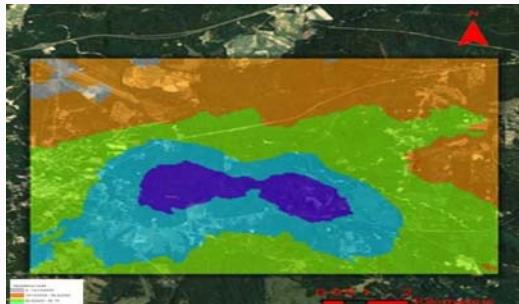
- First sign of WNV activity
 - Importance in the zoonotic cycle??



Crow Roost locations in Champaign and GIS Radio Tracking



Kriging is a geostatistical technique to predict the values of a random field at an unobserved location from sampled observations at nearby locations.



Predictive map of *Culex erraticus* habitats in Tuskegee, Alabama overlaid onto QuickBird data.

Distribution of risk exposure of West Nile virus in Chicago



Application of High Resolution Imagery and GIS for Epidemiological Studies



Informative Pixel

QuickBird at 0.6 meter per pixel
WorldView at 0.2 meter pixel

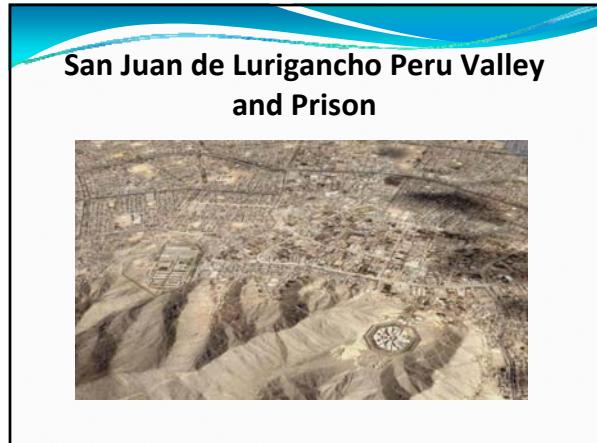
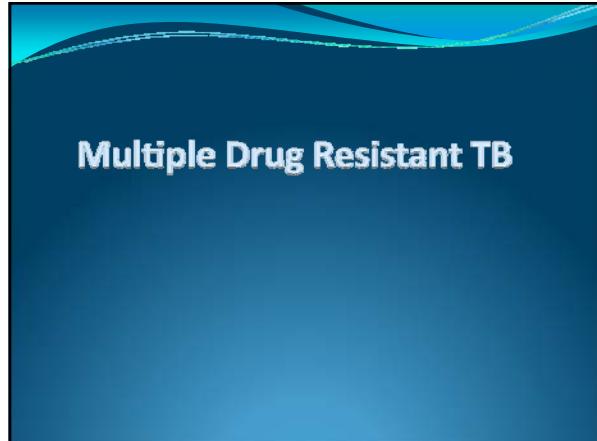
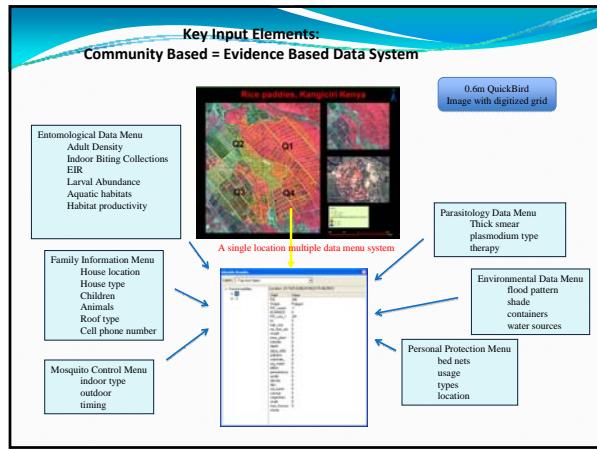


QuickBird 0.61m image of the Kangichiri, Mwea Rice Scheme, Kenya



Operational Map used during the Eradication Campaigns 1950-1962 versus
2010 QuickBird Satellite Image with 0.6 Meter resolution.

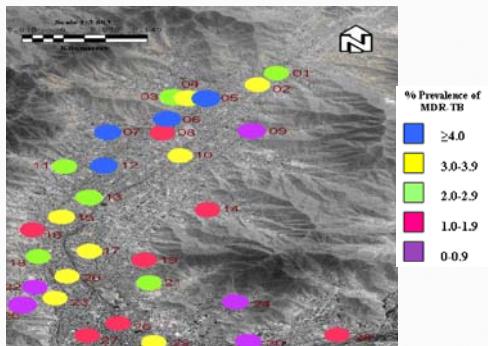




Location of Health Clinics San Juan de Lurigancho , Peru.



Geographical clusters of MDR-TB in San Juan de Lurigancho , Peru associated with a Prison.



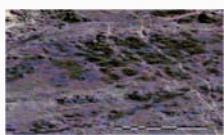
Environmental Variables that may Effect MDR-TB Transmission



Prison



Urban Land Cover



Vegetation



Hydrology

