Use Of Google Earth To Facilitate GIS-Based Decision Support Systems For Arthropod-Borne Diseases

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OBJECTIVE

As part of a Dengue Decision Support System project funded by the Innovative Vector Control Consortium, we used satellite imagery and mapping tools freely available through Google Earth to: 1) generate data for basic city structure that could be imported into a Geographic Information System (GIS); and 2) serve as the spatial underpinning of a Decision Support System for arthropod-borne disease management.

BACKGROUND

Arthropod-borne diseases such as malaria, dengue, Chagas disease, filariasis, leishmaniasis, and trypanosomiasis place tremendous public health burdens upon developing countries [1]. The operational value of Decision Support Systems for management of these and other arthropod-borne diseases is enhanced by a GIS spatial backbone allowing for visualization of spatiotemporal arthropod vector and disease patterns [2-4]. However, resource-poor environments in desperate need of GIS-based solutions to more effectively manage arthropod-borne diseases can be faced with the reality that even the most basic GIS data are lacking and that investment in the infrastructure (high end computers, sophisticated GIS software, technical personnel) needed to develop such data is cost-prohibitive. This problem was addressed by use of Google Earth which freely provides access to both satellite imagery and mapping tools capable of generating polygons, lines and placemarks.

METHODS AND RESULTS

Two cities in southern Mexico were used to demonstrate that a basic representation of a city useful as the spatial backbone in a Dengue Decision Support System can be developed at minimal cost from satellite imagery and mapping tools accessible through Google Earth. Although there were small patches of cloud cover in the images, their overall quality was adequate to determine the outlines of city blocks, streets, and even individual buildings. Keyhole Markup Language (KML) files generated using Google Earth included labelled polygons representing city blocks, lines representing streets, and points showing the locations of schools, health clinics etc. City blocks also were color-coded to show presence and abundance of dengue cases. The KML files were successfully imported as shapefiles into a GIS software using Arc2Earth. A stand-alone management tool for extraction of information from a data warehouse and generation of text-format reports and Google Earth-based map outputs also was developed.

CONCLUSIONS

The combination of free mapping tools and free or low-cost GIS software has tremendous potential for use in Decision Support Systems to facilitate control of arthropod-borne diseases in resource-poor environments. Basic GIS data can, if lacking, rapidly be generated at minimal cost from satellite imagery and mapping tools available through Google Earth. Because Google Earth is a stand-alone desktop application, access to the internet (which can be a problem in resource-poor environments) is only needed for a short time period during the initial "capture" of the satellite image.

REFERENCES

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