COMMENT: REMOTELY-SENSED AND GIS RESEARCH ON JARDINES DEL REY AND HABANA VIEJA

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The papers "Before and After the Cayo Coco Causeway: A Critical View from Space" by Cepero and Lawrence and "Evaluación de mapas de riesgos y recursos de la problemática actual en el Municipio de La Habana Vieja" by Muñoz, both in this volume, usher in a new era of Cuban environmental analysis at both the regional and metropolitan-county levels of analysis.

Cepero and Lawrence shed much new information about the rapidly changing tourist landscape of Cuba's northern archipelago. These pearls of islands consist of the Los Canarreos, De Los Colorados, Jardines de la Reina, and Jardines del Rey archipelagos. Little information is known about the environmental impacts of extending a landfill bridge-road (causeway or *pedraplen*) from the mainland to access these islands. There, prime oceanfront property, has become the site of several joint-venture hotels.

The authors use remotely sensed images to assess land cover change over time, especially mangrove. Impacts assess ground cover reflectivity levels before and after the causeway. Their hypothesis is that a change in the circulation of Perros Bay waters will alter the normal water nutrient flow to the mangrove. In turn, vegetative health may be detected by different levels of reflectivity. By comparing pixel change detected by the Normalized Difference Vegetative Index (NDVI) between 1990 and 2000, the authors provide an estimate of acreage that has been altered by the causeway. They estimate that 37,627,200 m² of mangrove has been affected by this civil engineer-

ing project, with about one-sixth of the area nearly destroyed by this invasive road project.

Particularly welcome in this study is the authors' attempt to triangulate their findings with local media reports. Although these and other secondary data sources provide some instrumental validity to corroborate these findings, Cepero and Lawrence enlist a carefully crafted methodology. While one might quibble about exact acreage undergoing stress because changes in water salinity, it is a longstanding paradigm that mangrove (black or red) is an appropriate surrogate measure for regional biogeographic health in the Antilles. By extension, the authors' assertion that plant communities have suffered further since the 2000 data analysis, seems reasonable.

Muñoz's interesting paper switches the scale of analysis from the regional and coastal level to the municipality of Habana Vieja, one of 15 constituting Havana City Province. Specifically, he couples property- and household-level data into a GIS data set that includes the quality of the built environment, demographic profiles, local economy, and general environmental information. While the use of shapefiles and layers of GIS data allow one to print multiple maps, employing several planning agencies, the use of resource and (high) risk maps, and neighborhood workshops (*talleres*) coordinated by Popular Councils captured 16 key variables on public services and quality of life issues. Not surprisingly, Jesus María and Tallapiedra—all located outside the core cultural tourism sites and adjacent to power plants and industrial- and port-based facilities—reveal the highest

levels of risk. In like fashion, more than half (69% or 18,435 out of a total stock of 31,245) of all buildings are in bad condition. The report also documents in unprecedented fashion the high number (1,218) of inner city slums and tenement houses (*ciudadelas*) in the municipality. Herein lies a vicious cycle that is not unique to Habana Vieja but remains nonetheless alarming: rising population coupled with poor quality building maintenance and crowding leads to an alarming number of building collapses (795 between 1995 and 2001). Cuban creativity is reflected by the 17,074 make-shift lofts (*barbacoas*) in the area. This is the first detailed census of the quantity of these precarious structures that I have seen. The balance of the quantifies the physical limitations in the government's once venerable badges of honor: health clinics, athletic facilities, schools, and related infrastructure.

Muñoz brings to light previously unseen discussions about vulnerable groups in Havana and his GIS-generated maps show the spatial correlation between such maladies as building abandonment and, for instance, criminal activity and public intoxication. The implications of these socio-spatial profiles of Old Havana's human geography harkens back to the pioneering research done by the British geographer David M. Smith (1977) and, even further back, to the Human Ecology School at The University of Chicago in the 1920s (Park, Burgess and McKenzie 1925).

Like the work by Cepero and Lawrence, the research presented by Muñoz provides a stepping-stone for addressing, remedying, and preventing the degradation of the built environment. Strategic planning is premised on the statistical profiles outlined in these two papers, and their contributions are benchmarks in ameliorating these conditions.

REFERENCES

Park, R., Burgess, E. and McKenzie, R. 1925. *The City*. Chicago: University of Chicago Press.

Smith, D. M. 1977. *Human Geography: A Welfare Approach*. New York: St. Martin's Press.