May 3rd, 9:00 AM - 10:15 AM

The State of the Upper Bay of Panama Wetlands: Ecological Significance, Environmental Policy, Urbanization, and Social Justice

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Description
I conducted this research while studying abroad with SIT Panama: Tropical Ecology, Marine Ecosystems, and Biodiversity Conservation. This is a multidisciplinary investigation of the Upper Bay of Panama wetlands, a 49,000 hectare region east of Panama City that features mangrove, intertidal mudflat, and grassland habitat internationally recognized as a stopover site for two million shorebirds every migration season. However, with economic pressure to increase urban development in the area, this land's protected status under the Ramsar convention was suspended for a year in April 2012. By compiling scientific studies, news articles, photographs, and interviews with local conservationists and community members, this project describes the ecological, political, and social conditions surrounding this area today. I found that this ecosystem contains plentiful nutrients from both seasonal upwelling and mangrove detritus, supporting a thriving aquatic food chain, including major fisheries, but also experiences garbage, agrochemical, and heavy metal inputs from human activities. Because of reduced infiltration caused by new developments, plus ongoing construction, much of the eastern Panama City district of Juan Díaz is now regularly subject to flooding too severe for its current drainage system to control, for which I provided photographic evidence, and receives little compensation. By law, though, Panama's government is obligated to protect these people's right to live in a healthy environment. Strategies for ecosystem management should be planned for the long-term and include economic incentives, citizen involvement, and government support. There is also a need to promote education of wetlands ecosystem benefits and the repercussions of their removal.

Location
Science Center 2 and 3 Lobby

Disciplines
Ecology and Evolutionary Biology | Environmental Health and Protection | Environmental Policy | Environmental Sciences | Urban Studies

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Introduction

Along the Upper Bay of Panama east of Panama City, Panama, at the Costa del Este district begins a 49,000 hectare matrix of wetland grasslands, intertidal mudflats, and mangroves, stretching 70 kilometers to the mouth of the La Maestra River (fig. 1). East of the capital, the coastline becomes increasingly rural. In 2003, this ecosystem gained recognition as a Wetland of International Importance under the Ramsar Convention. The last few decades have seen changes in the wetland habitat on the edge of Panama City from expanding urbanization, such as new factories and roads. The national government removed the Ramsar protection status between April 2012 and 2013, and there is still pressure to build country clubs and golf estates in the area. Even after conservationists prevailed in insisting the return of protection status, the Panamanian government still wishes to reduce the area protected by Ramsar.

This project compiles this research to present a case for the protection of the Upper Panama Bay through scientific evidence of its ecological significance and the environmental impact of human activity around the ecosystem, as well as shedding light on the legality behind increasing urban development in this area and the damage that has already occurred in local coastal communities as a result.

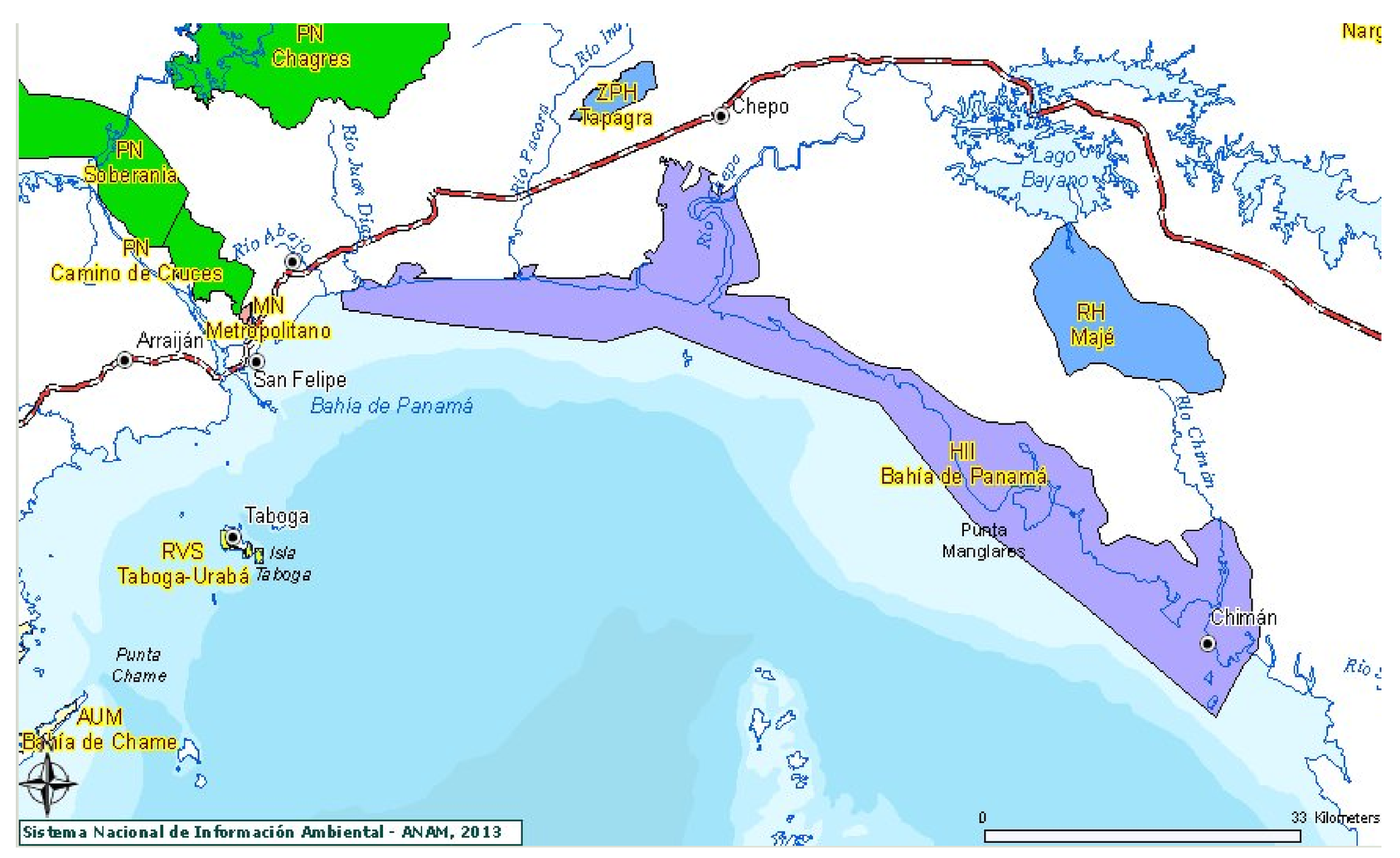

Figure 1. Upper Bay of Panama Wetland of International Importance site, in purple; *Sistema Nacional de Áreas Protegidas*; ANAM

Methodology

I compiled and analyzed scientific studies on various ecologic characteristics of the Bay of Panama on the biochemical, organism, and ecosystem level. I searched for news articles to investigate current political and social conditions regarding the Upper Bay as well. Gathering information that may be used to inform environmental decision-making regarding this ecosystem also included

- identifying stakeholders around the Upper Bay and their interests
- investigating the environmental policy-making process in Panama
- interviewing representatives from environmental organizations based in Panama City, including Wetlands International, WWF, and the Panama Audubon Society
- within Juan Díaz, one of Panama City's eastern districts, gathering information from a public official, an environmental engineer, and residents
- observations of the proximity of the wetlands to city development from touring the Costa del Este and parts of Juan Díaz affected by flooding, using digital photography to document the conditions

Results

1. The Unique Ecology of the Upper Bay

- as the dry season approaches, winds from the Gulf of Mexico cross Panama's flat central zone and push coastal waters in the Gulf of Panama offshore, causing upwelling of deeper waters rich in nitrogen and phosphorus, feeding high phytoplankton productivity
- tides bring leaves shed by mangrove trees onto the mudflats, which, decayed by microorganisms, become the basis of the intertidal food chain
- most of Panama's commercial fishery species, such as snapper, sea bass, and many species of clams rely on the sheltered mangrove waters as breeding grounds, valuing each hectare of mangrove at over $500,000
- within 30 km of intertidal zone east of Panama City, shorebirds in October alone require over 50 metric tons of marine worms for basic energy needs
- mangroves play a role in climate change mitigation by the carbon sequestering capacity of both above and below-ground biomass

2. Politics and Urban Development

- businesses hold interest in development around these wetlands because of the proximity to the Tocumen International Airport and downtown Panama City
- Panama requires public consultations to designate protected areas, but in practice, this never happened for most of the country's protected areas, which was used to argue against the Ramsar site
- the government's request to the Ramsar convention to revise the protected site boundaries would actually reduce the total protected area
- in August 2011, the time given to submit studies for environmental impact assessments was reduced, including comments from the public for Categories II and III (more impactful projects)
- newer developments such as the gated communities of Costa del Este and a neighboring industrial park lie adjacent to the Juan Díaz mangroves on former wetland area that was filled, elevated, and paved over
- current construction projects within Costa del Este and over remaining habitat area include the Zona Sur Industrial Park, to be built over 40 hectares of Juan Díaz mangroves, 12 of which lie within the Ramsar site (fig. 2)

Figure 2. Construction site outside of Costa del Este Industrial Park near Corredor Sur highway

3. The Current State of the Ecosystem

- major changes include the Corredor Sur highway over the Panama Viejo mudflats, factories on rivers feeding the Upper Bay, a water treatment plant on the Juan Díaz River, and the Santa Maria Country Club south of the highway
- due to deforestation for shrimp ponds, cropland, and cattle pastures, most mangrove forest along the Bay of Panama is classified as critical or endangered
- Gomez et al. (2006) found trace metals accumulated within the finest sediments between the Canal and the Juan Díaz River, plus a significant presence of lead
- people in the eastern wetland area report finding dead fish and shrimp, believed to be caused by herbicide and pesticide runoff
- high trash accumulation along mudflats and mangroves (fig. 3)
- the wetlands' shrinking capacity to absorb excess rain is shown by a December 2010 rain storm that triggered over 500 mudslides in the Alajuela Lake watershed; resulting sedimentation forced the capital's main water treatment plant to shut down, leaving most of the city without potable water for 50 days

4. Community Conflict, the Case of Juan Díaz

- flooding frequency in Juan Díaz rose after adjacent land was paved over and raised for development
- many in Juan Díaz cannot continually afford to replace flood-damaged belongings; the most that affected families used to receive for flooding compensation was cleaning supplies
- recently, as more local people exercise their rights and force the government to recognize their role in the increased flooding, more stoves and refrigerators are being sent, but many residents still feel this is not enough
- construction companies working in the area often make environmentally unsound changes after approval of the original project
- a few years ago, some homes were told to redirect their sewage lines to a new main line being built; not all complied and instead dump sewage into the Gallinaza Creek, which was artificially expanded to accommodate drainage systems being joined with it (fig. 4)
- the drainage system has not been expanded to accommodate this
- flood waters carry sediment and trash into rainwater drainage systems, worsening flooding (fig. 5)
- the main drainage canal leading into the creek often overflows during heavy rains (fig. 6)
- in 2010, the Panama Audubon Society began the program "Aulas Verdes" ("Green Classrooms") to show instructors in Juan Díaz schools how to teach students about the local wetlands

Figure 3. Trash along mudflats of Costa del Este

Figure 4. Great Egrets (*Ardea alba*) amongst trash in Gallinaza Creek

Figure 5. Drainage channel containing sediment and trash in Juan Díaz

Figure 6. Homes along main drainage canal of Juan Díaz

Conclusions

The Upper Bay of Panama is a valid protected area that, by several Panamanian laws, must be preserved as public land from private interests that do not serve greater society. This area is highly valuable ecologically because of ecosystem services provided by mangroves and nutrient richness that supports hundreds of thousands of shorebirds stopping here annually. This ecosystem also holds high economic value, from supporting commercial fisheries to flood mitigation potential. Wetland ecology and the effects of urbanization are highly intertwined, provoking need for environmental justice in local communities, as deforestation for highways and housing generates costly food damages for many citizens in the Juan Díaz district of Panama City. This demonstrates the range of external costs related to development; environmental impact assessments and decision-makers must thoroughly consider the potential implications for humans and ecosystems outside the immediate area of proposed projects. Civilians can raise their voices in environmental decision-making by understanding their rights, which are supported by national and international decrees, and wetlands ecosystem services. Establishing successful environmental policy requires the support of local stakeholders, those whose livelihoods may be affected by a regulation change in land accessibility or resource use. Knowledge of each side's needs and values is necessary to developing a fair policy so that in the long-term, people and ecosystems can coexist.

Literature cited

Bryce, Emma. "Panama Bay: Decision Sends Mixed Message." Audubon Magazine, 9 April 2013. Web. 9 Nov. 2013.

D'Croz, Luis. "Status and Uses of Mangroves in the Republic of Panama." Conservation and Sustainable Utilization of Mangrove Forests in Latin America and Africa Regions (1993): 115-127. Web. 17 Nov. 2013.

Gomez, J.A. et al. "Características Geoquímicas de los Sedimentos Superficiales de la Bahía de Panamá." Tecnociencia 8.1 (2006): 113-132. Web. 20 Nov. 2013.

"Important Bird Areas Factsheet: Upper Bay of Panamá." Sites – Important Bird Areas (IBAs). BirdLife International, 2013. Web. 20 Nov. 2013.

"Panama Enacts New Environmental Legislation." Pardini & Associates, 2009. Web. 29 Nov. 2013.

Pravia, Jairo V. "Manglares y su Rol en el Cambio Climático." La Prensa, 20 May 2013. Web. 16 Nov. 2013. Translated by panamanglar.org.

Watts, Bryan D. "Migrant Shorebirds within the Upper Bay of Panama." The Center for Conservation Biology, The College of William & Mary. (1997). Web. 9 Nov. 2013.

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For further information

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