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

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Introduction
Along the Upper Bay of Panama coast of Panama City, at the Costa del Este foci of construction, the coastal wetlands, intertidal mudflats, intertidal mudflats, mangroves, and mangroves, stretching 70 kilometers to the mouth of the Las Mareas River (fig. 1). East of the capital, the coastline becomes increasingly rural. In 2003, the 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 Ramset protection status between April 2012 and 1.30 km during the project period due to a pressure to build country clubs and golf courses in the wetland habitat on the edge of Panama City from expanding urbanization. This project compiled this research to present a case for the protection of the Upper Bay of Panama within 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.

Ramsar Convention
The project compiled this research to present a case for the protection of the Upper Bay of Panama due to 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.

Methodology
I compiled and analyzed scientific studies on various ecological characteristics of the Upper Bay of Panama, including chemical, 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
- inquiring about the environmental policy-making process in Panama
- interviewing representatives from environmental organizations based in Panama City, including Wetlands International, WWF, and Panama Audubon Society.
- within the Juan Diaz River, and the San Carlos Country Club south of the highway, making by understanding their rights, which are supported by national and international decrees, and wetlands-ecosystem services. Estimating successful environmental policy requires the support of local stakeholders, whose livelihoods may be affected by a regulation change in land accessibility or tax incentives. Knowledge of who the stakeholders are and why they are involved in developing a fair policy so that in the long-term, people and ecosystems can coexist.

Results
1. The Unique Ecology of the Upper Bay
- as the dry season approaches, winds from the Gulf of Mexico cross Panama’s flat coastal zone and push coastal waters in the Gulf of Panama offshore, causing upwelling of deeper waters rich in nutrients and phosphorus, forming high phytoplankton productivity.
- This results in blooms led by mangrove trees onto the mudflats, which, dried by high temperatures and vents of the intertidal mudflats, become the basis of the intertidal food chain
- Many of Panama’s commercial fisheries species, such as snapper, sea bass, and tuna, live in the sheltered mangrove waters as breeding grounds, taking each billion of mangroves at over $300,000.
- within 10 km of intertidal zone count Cats City, dead in October alone exceed 100 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 Ramset protection
- the government’s request to the Ramset convention to remove the Ramsar site boundaries would actually reduce the total protected areas
- 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)
- never developed as the grand communities of Costa del Este and a neighboring industrial park lie adjacent to the Juan Diaz 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 Diaz mangroves, 15 km of which lie within the Ramsar site

3. The Current State of the Ecosystem
- major changes include the Comar Sire highway over the Panama Viojo mudflats, the Canal Bridge, a water treatment plant on the Juan Diaz River, and the San Carlos Country Club south of the highway
- due to development, shrimp ponds, cropland, and cattle pastures, most mangroves, along the Bay of Panama is classified as an undisturbed or endangered
- Gomez et al. (2006) found trace metals accumulated within the finest sediments due to deforestation for shrimp ponds, cropland, and cattle pastures, most of Panama’s commercial fishery species, such as snapper, sea bass, and tuna, live in the sheltered mangrove waters as breeding grounds, taking each billion of mangroves at over $300,000.
- high trash accumulation along mudflats and mangroves (fig. 3)
- 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’ drying capacity to absorb excess rain is shown by a December 2010 rain storm that triggered over 500 mudslides in the Almirante Lake watershed, causing additional forest loss of the capital’s main water treatment plans to shut down, leaving most of the city without possible water for 50 days.

Community Conflict, the Case of Juan Diaz
- flooding frequency in Juan Diaz rose after adjacent land was paved over and reused for development.
- many in Juan Diaz cannot financially 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 streets and refrigerators are being sent, but many residents still feel this is not enough
- construction companies working in the area often make environmentally sound changes after approval of their original plans.
- 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 drainage canal of Juan Diaz, 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 riverine 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 instructions to Juan Diaz schools how to teach students about the local wetlands.

Conclusions
The Upper Bay of Panama is a valid protected area that, by several Panamanian laws, must be protected from public land by 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 thousands of shrimp farms in the area annually. This ecosystem also holds high economic value, supporting commercial fisheries to flood mitigation potential. Wetland ecology and the effects of urbanization on ecosystems are highly intertwined, creating a need for environmental justice in local communities, as delimiting for highways and housing, many communities struggle to stay under the many criteria in the city of Panama 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 areas of proposed projects. As citizens 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 policies requires the support of local stakeholders, whose livelihoods may be affected by a regulation change in land accessibility or tax incentives. Knowledge of who the stakeholders are and why they are involved in developing a fair policy so that in the long-term, people and ecosystems can coexist.

Literature cited

Please contact Maddie Prico at pricma02@gettysburg.edu for more information on related projects that can be obtained at http://digitalcollections.sit.edu/pne/pricma02@gettysburg.edu

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