The economic value of natural capital in

PANAMA CITY'S WATERSHEDS AND ASSOCIATED ECOSYSTEMS

As one of Latin America's fastest growing populations, Panama's economy depends on nature. The communities within the Panama District rely on benefits provided by 11 ecosystem services, which contribute over $1.6 billion each year in critical ecosystem services from the surrounding watershed.

Annual values of ecosystem services for Panama District Communities.
The below units represent 2015 values per year across 10 land cover types

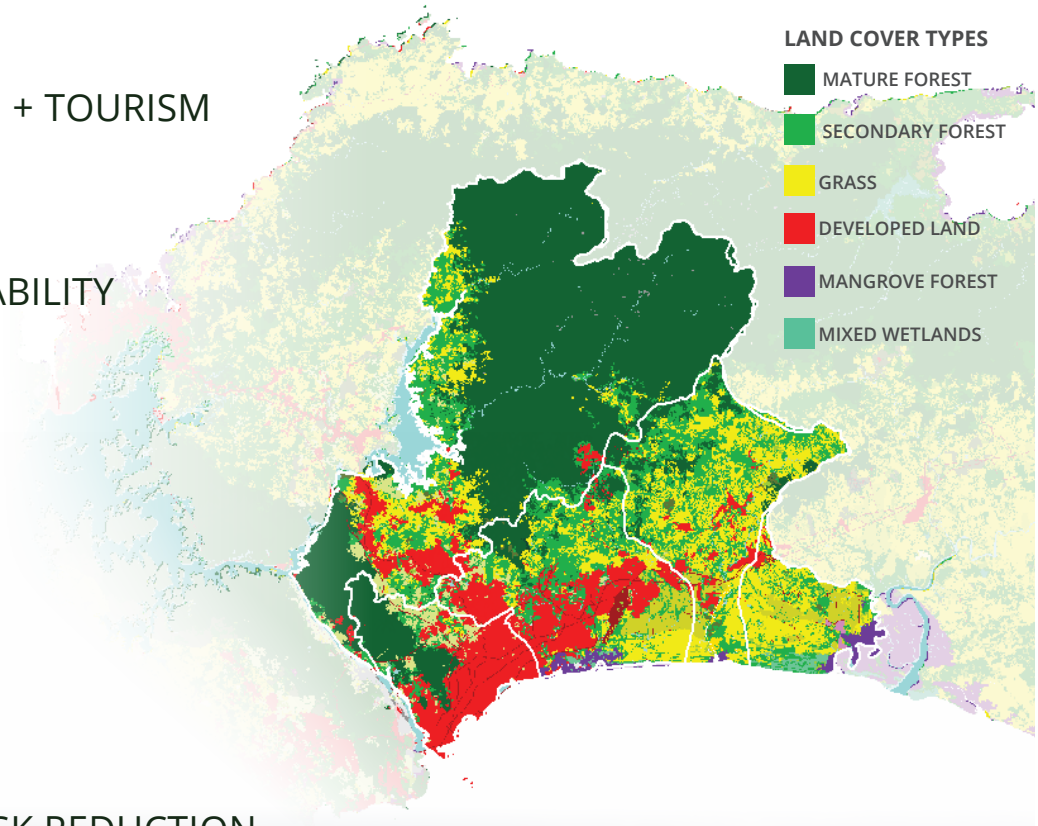
$577M
RECREATION + TOURISM

$380M
CLIMATE STABILITY

$106M
HABITAT

$50M
FOOD

$24M
DISASTER RISK REDUCTION



If the diverse ecosystems that provide these services to the people of Panama City are damaged or destroyed, we will need to build costly, less effective infrastructure in their place. **We need to invest now in protecting the valuable natural assets that we already have.**

INVESTING IN MANGROVES TODAY

for a more resilient Panama tomorrow

It is estimated that **53%** of Panama's mangrove forests have been destroyed in the last 50 years as urban areas have spread into the wetlands[2].

Every year Panama receives nearly **$5,000** worth of storm protection from a single hectare of mangrove[3].

One hectare of mangrove captures about **10 times** more carbon each year than an acre of temperate forest and **50 times** more than a hectare of tropical forest[4].

Timeline[5,6] of Mangrove Protections in Panama

1990 The Ramsar Convention, the international treaty on the conservation and management of wetlands, entered into force in Panama

2003 A total of 48,919 hectares of Mangroves and other types of wetlands to the eastern part of the city become protected in the Bay of Panama under the Ramsar Convention

2008 Government instates fines ($300,000/hectare) and permits ($150,000/hectare) for removing mangroves outside of protected areas for infrastructure development projects[7]

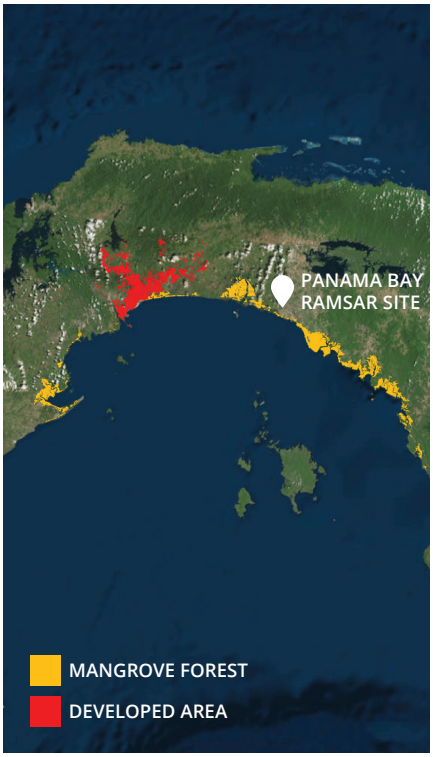
2009 The Bay of Panama Ramsar Site is designated as a National Wildlife Refuge with an expanded area of 89,000.00 hectares

2012 The protected status of the Bay of Panama National Wildlife Refuge and Ramsar Site is lifted due to a private sector demand and fines for logging are lowered by the central government

2013 The protected status of the Bay of Panama National Wildlife Refuge and Ramsar Site is reinstated by the Supreme Court

2015 Following a lawsuit, Courts reinstates the original fines for the illegal felling of mangroves after the former government stated an intention to lower fees. Panama's Aquatic Resources Authority (ARAP) Resolution Number 1 is still applicable in 2018, now under the Ministry of Environment.

2015 The Protected Area status of the National Wildlife Refuge and Ramsar Site is improved through a new law



PIONEERED BY THE ROCKEFELLER FOUNDATION
100 RESILIENT CITIES

EARTH ECONOMICS

The ecosystem services values in this document are preliminary estimates. They are intended for awareness-building, education, and making the case for a more comprehensive valuation. They should not be cited in litigation, official project evaluations, or policy development.

[1] Córdoba, M. 2007. Plan de Proyecto Campaña por el orgullo humedal Había de Panamá. Audubon

[2] Autoridad Nacional del Ambiente y Autoridad de los Recursos Acuáticos de Panamá. 2013. Manglares de Panamá: importancia, mejores prácticas y regulaciones vigentes. Panamá: Editora Novo Art, S.A., 19 pp.

[3] Earth Economics – Ecosystem Valuation Toolkit units in 2015$ per hectare per year.

[4] Bouillon, S., Rivera-Monroy, V., Twilley, R. & Kairo, J. Mangroves. In: Laffoley, D. and Grimsditch, G. (eds). The management of natural coastal carbon sinks. IUCN, Gland, Switzerland (2009).

[5] Kaufmann, K., 2012. Nuestros humedales, nuestro futuro. Plan de conservación para los humedales de la Bahía de Panamá. Sociedad Aubudon de Panamá 73

[6] López-Angarita, J., Roberts, C.M., Tilley, A., Hawkins, J.P., Cooke, R.G., 2016. Mangroves and people: Lessons from a history of use and abuse in four Latin American countries. Forest Ecology and Management 368, 151–162. https://doi.org/10.1016/j.foreco.2016.03.020

[7] The Aquatic Resources Authority (ARAP). 2008 Resolution 1. Approving some fees and charges for services provided by the ARAP.