Session: Nature based solutions for City Resilience

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ECONOMIC VALUE OF NATURAL CAPITAL
US$ 16 billion per year

RECREATION AND TOURISM
US$ 577m

DISASTER & RESILIENCE
US$ 24m

FOOD
US$ 50m

CLIMATE STABILITY
US$ 350m

HABITAT
US$ 105m

Unrepresentative annual value for 2015.

Types of soil coverage:
- Secondary forest
- Mature forest
- Mangrove forest
- Other wetlands
- Grasslands
- Populated area

Source: Resiliente Assessment Study conducted by BDTM Economics, 2016.
• Promote integrated mobility and empower human capital to improve access to opportunities

To promote community integration through social infrastructure.

• Rethink the infrastructure, communication, coordination, management.

• Risk Management Policy and outreach

• Strengthen management, resource optimization, public participation
Se establece la zonificación ambiental, a partir de las unidades de paisaje, áreas naturales protegidas, conectores ecológicos y áreas de amenazas naturales.
Resilient Urban Juan Diaz Basin

The Juan Diaz River basin has undergone an accelerated urbanization process, especially since 1930. The lack of ordering plans and forceful enforcement of environmental protection regulations has resulted in a high degradation of the river's water course. At this moment, Juan Diaz River's riverbanks present some illegal occupations, infrastructure works not matching the basin's flows, and developments carried out in violation of the river protection covenants, hence, the resultant frequent and raging floods, public and private property damages, and allow quality of public space.

The project of regeneration of the urban basin of Juan Diaz River aims at the design and construction of green and blue infrastructure measures intended to mitigate the climate vulnerability, increase the value of environmental assets, and thus improve the quality of urban habitat along the basin.

The project has three components:

1. Strategic canalization of Juan Diaz River, which includes developing retention ponds. This green infrastructure is a low impact measure to supplement strategic drainage works that are necessary in various sections of the river. In the upper area, it is proposed to create runoff micro-extraction measures and works to reduce the speed of water flows. In the intermediate sections, the construction of green water absorption and retention infrastructure, such as flood parks and green areas, will be given priority, jointly with the landscape recovery and regularization of the river bed. In the lower basin of Juan Diaz River, as in Radial City (a mostly low- and medium-income community) and Metro Park (a logistical development with high income), specific infrastructure measures intended for reducing floods to a minimum, such as the recovery of coastal meadows and swamps, will be given priority.
MEF

Alcaldía de Panamá

BID

Funds $100 M
Principles

- Recovery of the natural space.
- Sustainable mobility
- Green and Blue Infrastructure Network
- Management of changes and improvements to the territory Flood risk mitigation
- Community participation in the vision
INFRASTRUCTURE OF FLOOD MITIGATION

COMPONENT I
1. Performances: Channeling of the Juan Díaz River
3. Performances: Underground drainage works in Radial City
3. Performances: Underground drainage works in Radial City
IMPROVING THE QUALITY OF PUBLIC SPACES

COMPONENT II
RED VERDE: Conector ecológico entre la Cuenca Alta y los manglares Cuenca Baja

CUENCA ALTA

CUERPO NORTE

CUENCA MEDIO

CUERPO BAJA

Av. Domingo Díaz

Av. Sur
02 Call e 141 Este
Generación Calle 141 Este en menos de patente cubierta hacia Avda. Francisco J. de la Peña con avenidas como un elemento con aceras. Se propondrá la adecuación del nivel de la viabilidad de la nueva que se adapte a la altura de la misma. Se procurará la diferenciación de zonas con la creación de un nuevo pavimento y aceras.

03 Sección Calle 132
Generación de Calle 132 con operas y sin paso peatonal con indicación de su ubicación en el plano. La adecuación del diseño y vegetación de la misma estarán en la línea de la nueva. Se considerarán elementos de infraestructura con la creación de un nuevo pavimento y aceras.
Sección Calle 133 Oeste

Contracción perimetral de la Calle 133 O. Creación de parques controlados a lo largo de la calle, con áreas verdes y espacios verdes. Se propone también la creación de nuevos puntos de servicios y la adaptación de superficies de uso para el tránsito.

05
Sección Calle 134 Oeste

Acolchamiento de la calle para la creación de nuevas zonas verdes. Se propone la creación de nuevos puntos de servicios y la adaptación de superficies de uso para el tránsito.
Parques Fluviales

01 / 02 / 03 / 04
Parque Fluvial Padre Renato Poblete, Chile / Boza Arquitectos, 2015

05
Parque del Agua Luis Buñuel, España / Alday y Jover Arquitectura y Paisaje, 2008
PARQUE ARANZADI – PAMPLONA, ESPAÑA
Coastline System of Open Spaces

Panama City is located on the shores of Panama Bay, which occupies some 20 kilometers of waterfront. Over its history, the city has been developing different interfaces with the Pacific Ocean, mostly invading and degrading coastal swamps, and often constructing high-density buildings up to the coastline.

The Coastline Belt project was initiated in 2007 as an opportunity to establish a network of public spaces along the waterfront. The Action Plan titled Metropolitan Panama, made by the Municipality of Panama, jointly with the Interamerican Development Bank (IDB) in 2015, proposes the extension of this public space system towards the east. The waterfront taken into account for this stretch of land is located at a point where several significant environmental factors converge, namely: the nearness to the Pacific ocean coast, the network of rivers flowing into this area, the rapid development of slums without a suitable control of the use of soil, the degradation of swamps, the limited drainage and sewage systems, and the isolation of communities.

Therefore, the city seeks to develop a large-scale project, to be coordinated by means of the Urban Planning Division, jointly with the World Bank. The objective of this initiative is to create an integration plan for the coastline edge so as to foster measures intended for the mitigation of present and future risks, including a better drainage from slums into coastal plains, improvement of urban infrastructure to create multimodal access to the coast, and the strengthening of the institutional capacity to move infrastructure funding resources.

The extension of the Coastline Belt and the System of Open Spaces is then a comprehensive initiative for the renewal and transformation of the coastline zone through the introduction of green infrastructure by way of dampeners for vulnerabilities such as the effects caused by floods and storms. This project involves reinforcing the protection of coastal swamps and basins in order to improve the provision of local ecosystem services; thus enhancing the public’s access to the coast, the enjoyment of the coastal landscape resource and available spaces for multimodal mobility.

The project includes three sections:

1. **Central Zone with existing coastal interventions (from Amador to Marbella)**: This segment is largely developed and interventions will consist of connectivity and access.

2. **Urban Expansion Zone without coastal treatment (from Punta Patilla to Punta del Este)**: A section with the interventions seeking to connect neighborhoods, create public access to the pier, and improve the neighborhood at Boca La Caja.

3. **Protection Zone of wetlands in Panama Bay (Ramsar Swamp Reserve)**: This section includes Juan Díaz River where interventions will focus on mitigating floods, protecting natural habitats, and connecting the coastline edge.

This project will be accompanied by a Resilience Communication Plan.

**CONTRIBUTION TO THE CITY’S RESILIENCE**
- It will encompass mitigation actions for vulnerabilities in the coastline area nearest to tidal variations and runoffs of storm waterfalls.
- It will make the most of the landscape resource for more citizens’ enjoyment, while promoting the conservation of ecosystems, their valuation and the use of environmental services, including among others, fishing, tourism, and environmental protection against the pounding of climate change.
- It will improve urban development by means of better distribution and integration of uses of soil.

**RESPONSIBLE AUTHORITY**
Urban Planning Division (MUPA).

**PARTNERS**
World Bank (WB), Vice-Office, Resilience Division (MUPA), Environmental Management Division (MUPA), Works and Constructions Division (MUPA), Citizenship Participation Division (MUPA), Ministry of Environment (M Elambiente), Sponsoring Office for the Panama Vayo, Ministry of Public Works (MOP), Ministry of Housing (MINVIT), Community Boards, Wetlands International National Committee of Wetlands of Panama (CNHIP).

**NETWORK OF CITIES**
Boulder, Pittsburgh, Melbourne, Santiago de Chile.

**INDICATORS**
- Percentage of project in project execution.
- Coverage area of restored and recovered wetlands.
- Number of people annually benefiting from landscape resource.
- Percentage of progress in cleanup infrastructure.

**RESILIENCE QUALITIES**
- Robust
- Inclusive
- Integrated
What is the city’s relationship to its coast and Watersheds?
The Built-up Environment
Informal Settlements
.. next to Panama’s riches
Coastal “access”
Coastal “access” for urban fishing communities
Degradation of wetlands
General Objective

Make Panama City a more resilient urban center through the implementation of measures that improve the relationship of the urban environment with the natural environment.
Specific Objectives

• Integrated assessment of natural and urban dynamics along the coastline to define a future development strategy.

• Create awareness on the importance of improving the relationship of the city with its coastal edge by exposing the most vulnerable elements of the territory (wetlands, mangroves, rivers).

• Analyze the legal and institutional framework on the use of land and the sea front to design regulations based on adaptation, Resilience and mitigation.

• Design and implementation of green infrastructure projects, public spaces and non-motorized mobility systems along the coastline.
Recovering access to the sea
Mobility corridor
Connect towns outside the city
A network of urban parks
Safe & Resilient Neighborhoods
Addressing floods through watershed development
**Green-Blue Micro-Infrastructure Program**

- **Proposal:**
- **Timeframe:** Immediate start

**Contribution to the City’s Resilience**
- It will allow the landscape to play a key infrastructural role to not exacerbating the risk of floods. Also, the areas will provide high-quality public and recreational spaces.
- It will create public spaces that will end up integrating green infrastructure with preserving biodiversity in certain areas of the city.
- It will face challenges posed by climate change by integrating an approach to green infrastructure, thus forming healthy, safe, and sustainable settings.

**Responsible Authority:**
- Urban Planning Division (UPD)

**Network of Cities:**
- Santa Fe, Oakland, Addis Ababa, Mexico City, and Athens.

**Indicators:**
- Percentage of progress in the implementation of green infrastructure pilot projects.
- Percentage of flood areas for monitoring effectiveness.
- Reduction volume in dumping areas during the interventions.
- Annual percentage of progress in the maintenance of green infrastructure.

**Infrastructure Affected by Flooding:**
- Road sections

**Partners:**
- Works and Construction Division (WCPD), Public Works Division (UPA), Environmental Management Division (UMPDA), Ministry of Public Works (MOP), National Aqueducts and Sewage Systems Institute (IDAE), Ministry of Environment (MMA), Technological University of Panama (UTP), Florida State University (FSU), WiBundas International Panama.
Recovery of water courses: Matasnillo River at City Center
The Matasnillo River is among the most polluted in the country located in the City Center.

- Pollution from domestic discharges and industrial activities.
- Problems of healthiness and discomfort.
- Solid Waste contributes to the appearance of flooding episodes during the rainy season.
General Objective

Recover the Matasnillo river as an environmental resource of great value that can be enjoyed by the population and avoid the health risks involved in the contamination of its waters.
Specific Objectives

- Identify those areas on both banks of the river that can be recovered to incorporate suitable surfaces for public space by installing cycle paths and pedestrian routes, places to stay with urban furniture and conditioning slopes with vegetation.

- Avoid the deterioration of water courses, controlling the discharges and keep the beds clean to avoid overflowing and minimize the risk of flooding in times of heavy rain.
Figura 75. Imagen de Río Matasnillo en la actualidad

Fuente: Elaboración propia en visita de campo (2017)

Figura 76. Imagen de Río Matasnillo en la actualidad

Fuente: Elaboración propia en visita de campo (2017)
Fuente: Elaboración propia
Overall expected Benefits from Nature Based Solutions to enhance Panama City Resilience

• **Flood Risk Reduction**
• **Pollution Control**
• **Green Open Spaces for Human Wellbeing**
• **Biodiversity conservation and ecosystems connectivity**
• **Reduction of Heat given green coverage**
• **Sustainability of local and commercial fisheries due protection of coastal wetlands (e.g. Mangroves)**
Lessons learned and key Challenges

• Interinstitutional Coordination is Crucial for increase resilience.

• Political will for accept and Implement the Decentralization.

• Fragmented governance for the Management of Water, Ecosystems and Natural Resources.

• Coastal Development lacking of clear regulations, ordination plans.

• Lack of Priorization of Financial Resources

• Weakness of the Civil Society Cohesion and organization to demand conservation of resources.

• Political Transitions.
GRACIAS

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