RESILIENCE ACCELERATOR

MONTEVIDEO

WORKSHOP REPORT
PANTANOSO BASIN

APRIL 2019

100 RESILIENT CITIES

COLUMBIA Center for Resilient Cities and Landscapes

Intendencia de Montevideo

100 RESILIENT CITIES - PIONEERED BY THE ROCKEFELLER FOUNDATION

100 Resilient Cities - Pioneered by The Rockefeller Foundation (100RC) helps cities around the world become more resilient to the social, economic, and physical challenges that are a growing part of the 21st century. 100RC provides this assistance through funding for a Chief Resilience Officer in each 100RC city who will lead the resilience efforts; resources for drafting a Resilience Strategy; access to private sector, public sector, academic, and NGO resilience tools; and membership in a global network of peer cities to share best practices and challenges. Learn more at www.100ResilientCities.org.

The team: Alvaro Soldevila, Associate Director
Helena Monteiro, Associate Director
Michelle Mueller, Program Manager

CENTER FOR RESILIENT CITIES AND LANDSCAPES AT COLUMBIA UNIVERSITY

The Center for Resilient Cities and Landscapes (CRCL) uses planning and design to help communities and ecosystems adapt to the pressures of urbanization, inequality, and climate uncertainty. CRCL works with public, nonprofit, and academic partners to deliver practical and forward-thinking technical assistance that advances project implementation through interdisciplinary research, visualization of risk, project design scenarios, and facilitated convenings. CRCL integrates resilience thinking into design education and academic programming, bringing real-world challenges into the classroom to train future design leaders.

Established in 2018 at the Columbia University Graduate School for Architecture, Planning and Preservation (GSAPP) with a grant from The Rockefeller Foundation, CRCL extends Columbia's leadership in climate-related work and supports the interdisciplinary collaborations and external partnerships needed to engage the most serious and challenging issues of our time. CRCL is allied with the Earth Institute's Climate Adaptation Initiative and works across disciplines at Columbia by bridging design with science and policy to improve the adaptive capacity of people and places.

The team: Kate Orff, Director
Thaddeus Pawlowski, Managing Director
Grga Basic, Associate Research Scholar
Linda Schilling, Associate Research Scholar

PARTNERS

EXECUTIVE RESILIENCE UNIT, CITY OF MONTEVIDEO DEPARTMENT OF CITY PLANNING

The Executive Resilience Unit in the City of Montevideo Department of City Planning seeks to identify and implement multidimensional solutions to create a more sustainable and inclusive city that improves the quality of life for all residents. The Executive Resilience Unit is responsible for overseeing the implementation of Montevideo's Resilience Strategy, promoting the concept of resilience across all departments, and identifying resilient policies and actions.

The team: Gabriella Feola, Director of Resilience
Soledad Mantero, Associate Director of Resilience
Guzman Robania, Analyst

UNIT OF LAND USE AND REGIONAL PLANS, CITY OF MONTEVIDEO DEPARTMENT OF CITY PLANNING

The mission of the Unit of Land Use and Regional Plans in the City of Montevideo Department of City Planning is to create and manage land use plans in the City with the goal of improving the quality of life, creating social integration, and valuing sustainable and environmental practices. The Department develops and deepens policies to protect natural and built heritage, and maintains information on territory, land use, cartography, and research.

The team: Pablo Sierra, Architect
Fernando Errandonea, Architect
Fabiana Castillo, Technical Analyst of Plan
Maria Roda, Director of Unity of Land Use and Regional Plans

UNIVERSIDAD DE LA REPÚBLICA URUGUAY, URBAN WATERS INTERDISCIPLINARY GROUP

The Urban Waters Interdisciplinary Group at the Universidad de la República Uruguay brings together a multidisciplinary team of designers, planners, and scientists to understand water through design at all scales. The group is developing an integrated approach to water management in Montevideo and studying planning and measurement as it relates to risk. The team contributes findings to develop localized public policy and sustainable solutions.

The team: Adriana Piperno, Architect and Co-Director
Franco Teixeira, Biologist

CONTENTS

PARTNERSHIP AND PROGRAM OVERVIEW

The Resilience Accelerator Program—a partnership between 100 Resilient Cities - Pioneered by the Rockefeller Foundation (100RC) and the Center for Resilient Cities and Landscapes (CRCL) at Columbia University—connects cities with design expertise and a global network of practitioners and researchers to expand the resilience value of projects, generate investment opportunities, deepen relationships between project teams across sectors, and accelerate implementation strategies. The Accelerator leverages the strengths of 100RC and CRCL to support the city partners most directly responsible for the implementation of priority resilience projects. It is enhanced by local academic partners that coordinate place-based research to advance the analysis, design, and planning explorations.

The Accelerator aims to match the research, planning, and design expertise at Columbia with local knowledge and relationships with partner cities to advance pre-design work of high priority projects within the 100RC network by:

- Delivering analyses, visualization of issues, and design in support of project development, and leveraging Columbia University and other academic partners to advance resilience-based design, research, and decision-making.
- Facilitating immersive workshops that bring together multi-disciplinary teams to advance strategy, project design, and implementation.
- Convening the perspective of hundreds of international and place-based thought leaders, designers, and technical experts chosen for their ability to facilitate and advise on topical subject matter.

Since its launch in April 2018, the Resilience Accelerator has identified 13 projects across eight cities in the 100 Resilient Cities network.

EXECUTIVE SUMMARY

Source: Google Earth

The City of Montevideo has worked with Pantanoso Basin communities for more than 10 years to reduce the impacts of flooding on neighborhoods, and improve the watershed's social and ecological vitality and resilience. The Executive Unit of Resilience and the Unit of Land Use and Regional Plans are working on the Integrated Transformation of the Cuenca Panantoso This program is realized in a strategic planning document, the Plan Parcial Pantanoso (the Plan), that brings together and coordinates multiple actors and projects under a strategic vision. Montevideo has reduced poverty tremendously over the past 10 years, from 26 percent in 2006 to 8.3 percent in 2016. But the Pantanoso region has not benefited at the same pace. Basin communities remain poorer, with less access to economic opportunities and an environment degraded by pollution, waste, and poor ecosystem management. The goal of the Plan is to collectively build social resilience, manage flood risk, expand economic opportunity, increase safe affordable housing, improve the quality of the natural environment, support biodiversity, and create new incentives for the Pantanoso region and the rest of Montevideo.

To advance design concepts for this transformation, the City partnered with 100 Resilient Cities (100RC) and the Center for Resilient Cities and Landscapes at Columbia University (CRCL) to design and deliver the Pantanoso Basin Resilience Accelerator. This effort included a Resilience Accelerator workshop devoted to exploring design considerations for two sections of the Plan and three neighborhoods: Maracaná, La Cantera del Zorro, and La Cachimba del Piojo. These neighborhoods present a range of complex issues, so the workshop and partners sought to develop strategies for each site that address existing landfill, toxic soil, wetland restoration, housing, and the creation of a public walkway or "edge" between the natural green areas and the urban fabric. This report outlines the process and possible design and implementation strategies generated during the Accelerator workshop.

To prepare for the workshop, staff from 100RC and CRCL visited Montevideo in November 2018 to collect relevant case studies from other wetland restoration projects and carry out a scenario planning exercise with the City Planning Department. In April 2019, the Accelerator workshop convened employees from the City of Montevideo, local government staff, university faculty, potential funders, and subject matter experts for a two-day facilitated workshop to explore the following objectives:

- Identify specific actions in Cachimba del Piojo, Cantera del Zorro, and Maracaná that can restore lost wetlands, manage illegal dumping, strategically relocate informal housing that is subject to repeated flooding, create a remediation process for contaminated sites, enforce zoning, and avoid wetlands loss.
- Explore the social, ecological, built, and economic implications of future edge conditions along the planned park and define the nature of that park relative to the larger network of landscapes in the region.
- Evaluate and expand understanding of the potential social, ecological, and economic value of the Pantanoso Plan for the Lower Basin.

During the workshop, participants discussed local issues at the two sites with subject matter experts. Together, they established design and implementation concepts to serve the needs of the existing neighborhoods and the broader ecological system.

- The Rambla concept can be expanded from the waterfront of the Rio de la Plata and applied to the Pantanoso Creek. This new Rambla can be considered an "Eco-Rambla" or long path that runs along the edge of the Creek. This edge would help define the limits of the built area, connect neighborhoods and people with nature, and limit the expansion of unregulated growth. The Rambla has the potential to create a sense of neighborhood pride and be a symbol of change.
- Montevideo can leverage some of the existing non-toxic landfills to create public programmed space. The City will need to evaluate and consider the removal of abandoned vehicles, plastic debris, and specific landfills that block the flow of the Pantanoso Creek and prohibit the growth of wetlands.
- In partnership with communities and neighborhood organizations, the City can work to ensure that new housing developments for relocated neighborhoods have a vibrant urban fabric with access to community facilities, transportation, and services.
- In addition to some larger hydrological connections and reclamation, the City will take a phased approach to restoring more neighborhood wetlands by engaging community groups and students in the planting and debris removal process. This has the potential to reduce the cost of implementation as well as educate and inspire residents.
- The City and partners will embrace a culture of data collection and monitoring to create a baseline of natural areas, flora and fauna, and measure the impact of interventions.

This report seeks to visualize and synthesize discussions of workshop participants. The Department of City Planning will use visualizations and images from the workshop findings as a part of the final presentation of the Plan Parcial Pantanoso al Junta Departamental in May 2019. If approved, the Planwill have legal standing and give the City the opportunity to secure funding for pilot projects and initiate the design process with local groups.

Pantanoso Stream. Source: Mindert de Vries

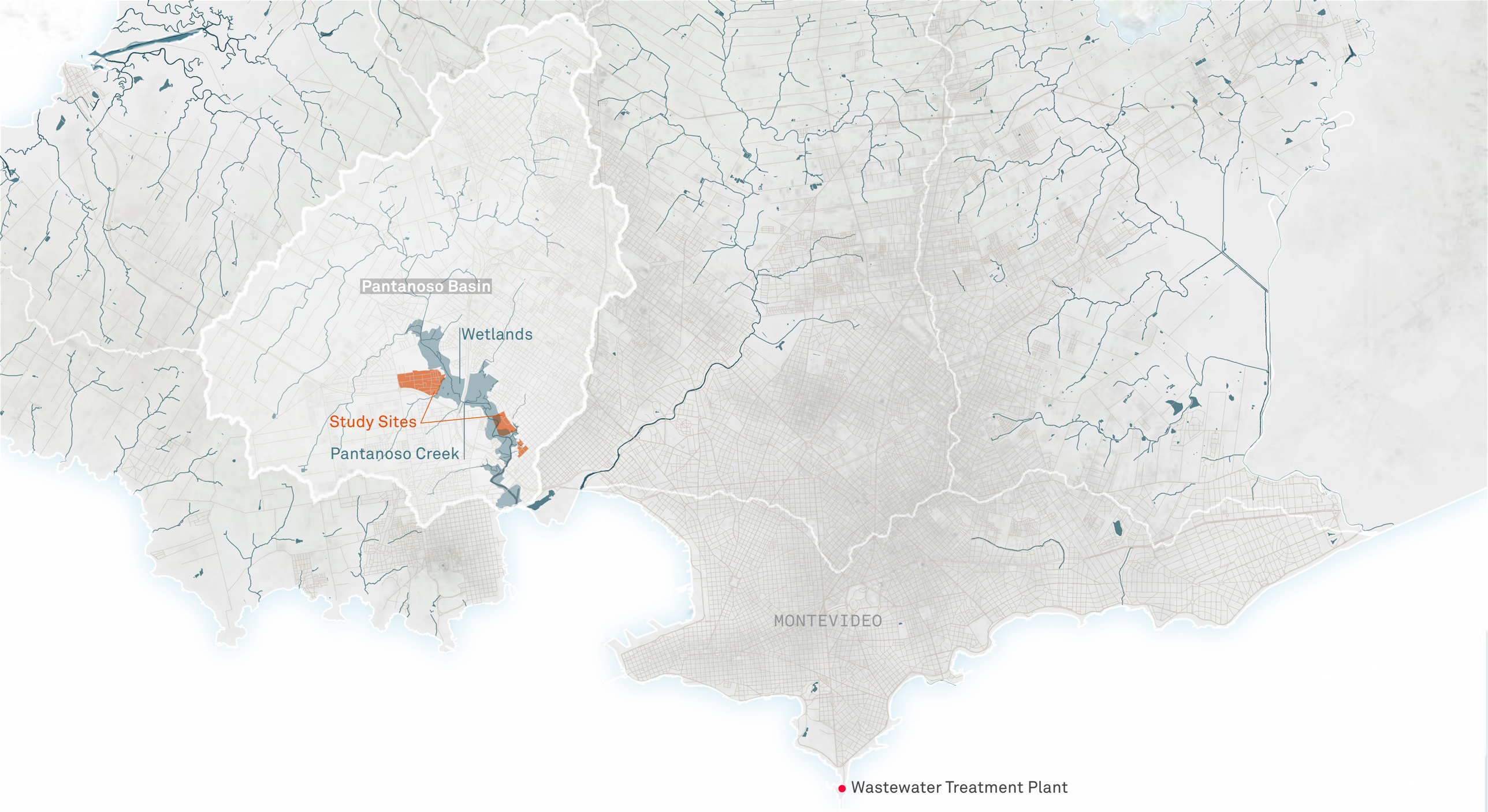
CONTEXT AND BACKGROUND

PANTANOSO BASIN AND ACCELERATOR CONTEXT

The City of Montevideo sits on the bank of the Río de la Plata. The Pantanoso Stream Basin, in the west of Montevideo, is defined by a natural spring that flows through agricultural, industrial, and residential zones before meeting the Río de la Plata. The landscape includes woody forest and pastures near the headwaters, wetlands in the lower part of the stream, and an estuary at the mouth. A city of over one million people, Montevideo is known for its high quality of life where agriculture, tech, and tourism contribute to its economic strength. This prosperity is visible in the east and notably absent along the Pantanoso Stream Basin in the west where the quality of life has not kept pace with the more affluent parts of the city.

Approximately 195,000 people live in the Pantanoso Basin. According to the City, 15 percent of households in the Basin fall below the poverty line as compared to the City average of eight percent. There are more than 35,000 informal houses in the region; approximately 2,000 of those houses are at critical risk of flooding, exposure to pollutants, or are precarious self-built structures. The Pantanoso Plan characterizes the Pantanoso Basin as an area with a shortage of employment opportunities, poor education, and low housing standards, social capital, connectivity, and green space. The Basin also has a degraded landscape and extreme environmental concerns including poor water quality, inadequate solid waste management, pollutants, and illegal dumping.

In the Lower Basin, where the Accelerator workshop was focused, the water lacks oxygen and has high levels of fecal matter. Years of industrial dumping have significantly contaminated the Lower Basin. In “La Teja” neighborhood, residents worry about lead pollution and contaminants from the leather tanning industry. In addition, a climate change study completed by the DHI Group and Inter American Development Bank found that residents along the Pantanoso are increasingly susceptible to flood risk during extreme rainfall events and extreme tides, which can be especially problematic in the lower Basin during a combined event.



Map of Pantanoso Basin and sites in city context

THE INTEGRATED TRANSFORMATION PROGRAM OF THE CUENCA PANTANOSO RESILIENCE LAB AND PLAN PARCIAL DEL ARROYO PANTANOSO

The Integrated Transformation Program of the Cuenca Pantanoso Resilience Lab is a program created under the Resilience Strategy to define the intervention model that will be adopted in the region, the project portfolio, the detailed design of the prioritized projects, and the inter-institutional agreements and articulations required for its implementation. The program conducts the necessary studies to inform the decisions that are made for the financing and governance of the Pantanoso Region. The four unifying objectives of the Program are:

ENVIRONMENTAL HEALTH

A landscape with a healthy environment that serves as an education and recreation resource for the entire City.

EQUITABLE

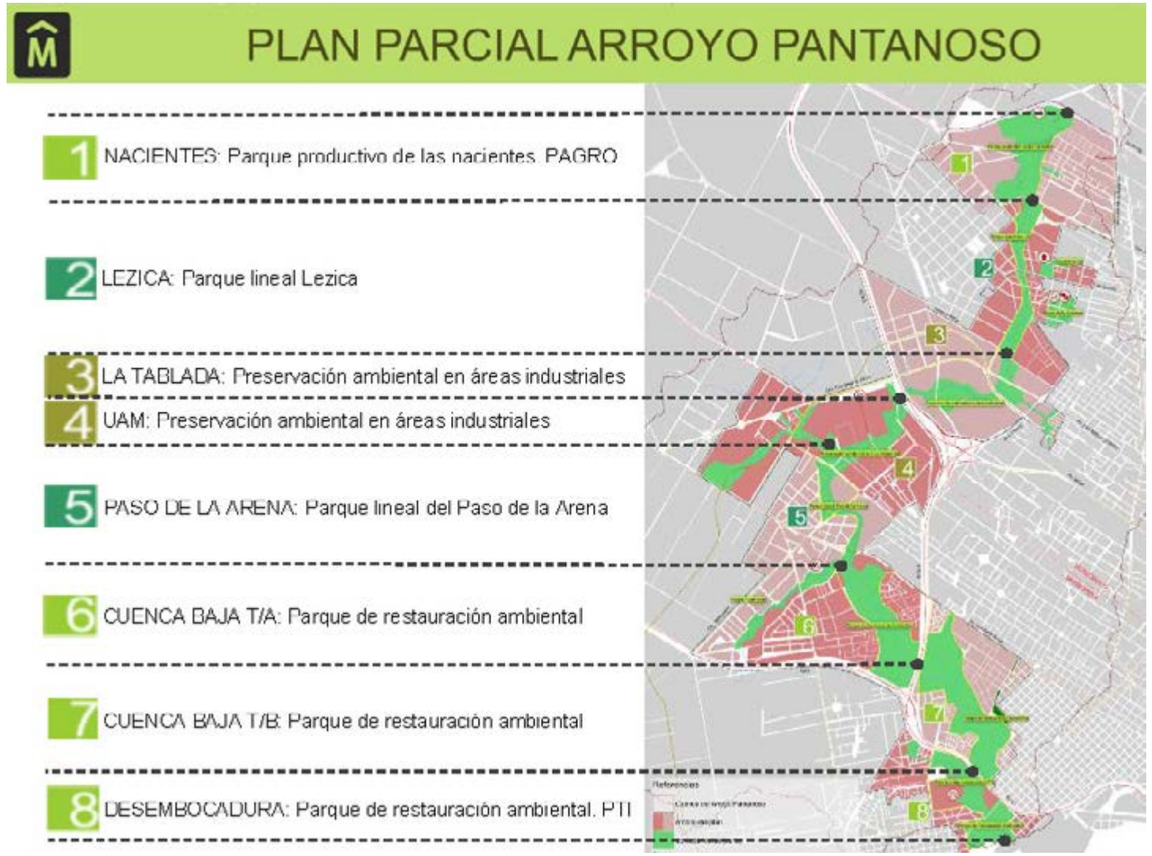
A landscape where area residents have a healthy environment and receive quality services.

OPPORTUNITY

A landscape where new job and training opportunities are created.

CONNECTED

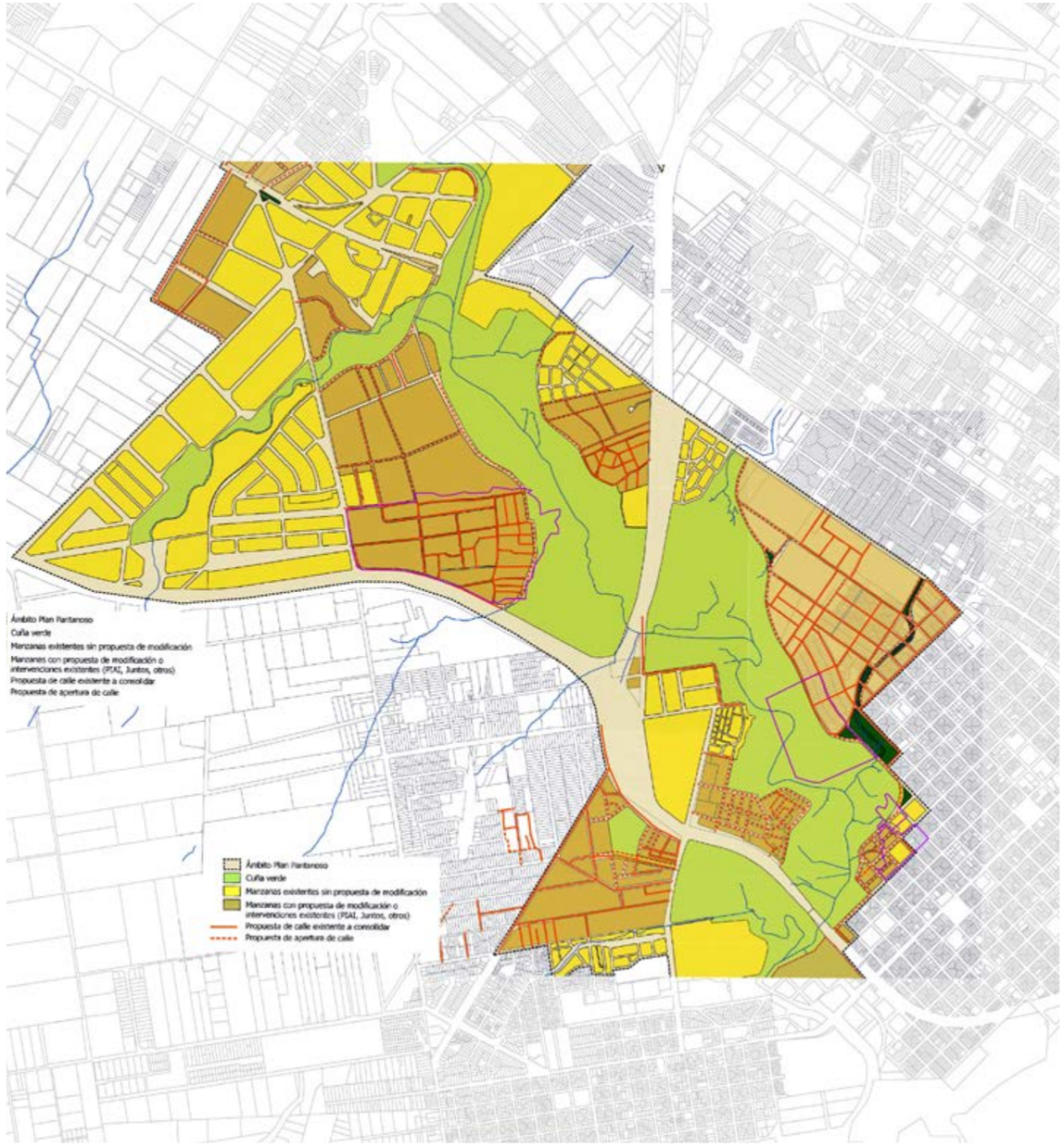
A landscape that is integrated with the City and recognized and valued for its unique characteristics.



Overview of Plan Parcial Pantanoso

Pantanoso Plan

The Plan Parcial del Arroyo Pantanoso seeks to transform the City's relationship to the Pantanoso streams and tributaries, build a unifying vision for multiple projects, and establish the region within the City by connecting actions upstream and downstream. The Plan document looks at the Basin in three different scales: the Basin, the green area along the stream, and eight unique sectors or "tramos." Each section has specific actions unique to its characteristics.



Tramo 6 and Tramo 7 of the Plan

SITE SELECTION

The Executive Resilience Unit and the Unit of Land Use and Regional Plan chose the Lower Basin for the Resilience Accelerator workshop to build on existing momentum and focus design on the wetlands landscape and community concerns. Tramo 6 and Tramo 7 of the Plan were selected with specific neighborhoods identified.

Both sections represent working-class neighborhoods with residents living in flood zones. Houses are predominantly single-family, self-built, one-story homes made of concrete blocks or lightweight material. Some homes are connected to municipal sewage systems, while others use concrete ditches or septic tanks for waste. These tanks are not monitored regularly and contribute to groundwater pollutants; some sewage flows directly into the Pantanoso. In both sections, there is organized crime related to illegal dumping. It is common to see vehicles, plastic, and industrial waste at each site that blocks the flow of water in the Pantanoso and creates a public health risk.

RELATED PROJECTS

The Accelerator team visited two neighborhood improvement pilot projects in the Lower Basin and met with project leaders to understand the lessons learned from existing projects.

Public space and programming at Mailhos

Mailhos housing typology

Mailhos Bellaca Cañada tributary

Mailhos

The Ministry of Housing and Environment (MVOTMA) and the City of Montevideo designed and built new housing for families in the Mailhos neighborhood under the Neighborhood Improvement Program and the Irregular Settlement Integration Program (PIAI). In April 2019, 22 families were relocated and moved into the new development.

Residents who lived along the Bellaca Cañada, a small tributary that flows into the Pantanoso, experienced regular flooding. The City of Montevideo and the local municipality worked with these families during the relocation process and offered them three options. Residents could (i) choose to receive a plot of land and build their own home, (ii) purchase a home with a subsidy through the Programa de Compra de Vivienda Usada, or (iii) move into new housing near the cañada built by MVOTMA.

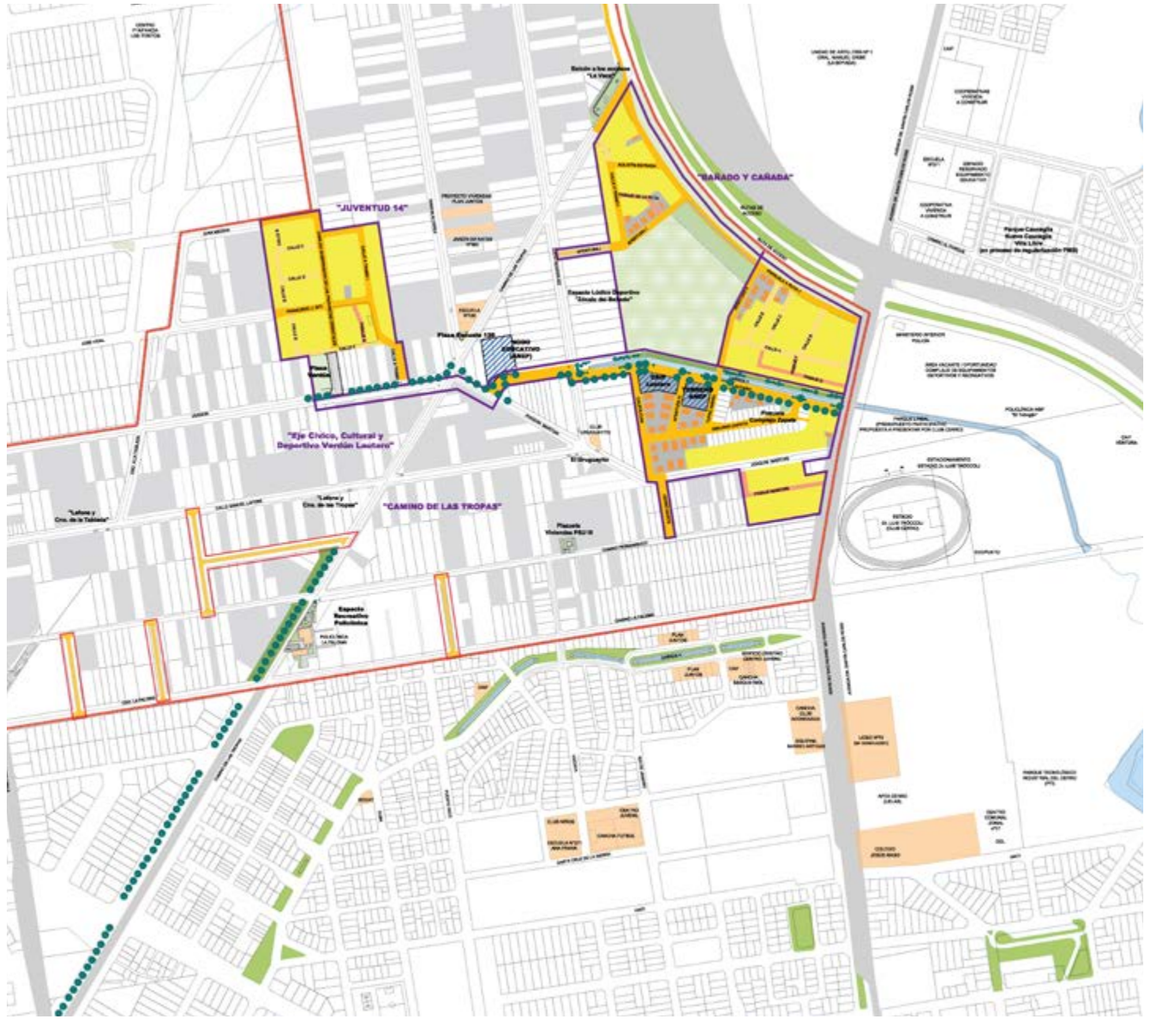
Fifty-six families choose to relocate to the new Mailhos housing. These homes include basic services like potable water, electricity, and sanitation. In addition, MVOTMA and the Municipio A worked closely with residents and iterated on the housing typologies and public space design. A Centro CAIF, or community center and park, near the Bellaca are included in the designs.

Connectivity was a concern for residents, so a walking trail was created to connect the new Mailhos housing with the old neighborhood. The trail passes over the Bellaca Cañada giving residents access to the Cañada and connecting them with the Patanoso system. The Bellaca Cañada at Mailhos stands apart from other tributaries of the Pantanoso, with clear flowing water and a natural embankment.

MVOTMA representatives and the Planning Department are pleased with the new project. They highlight the successes of participatory planning, flood risk reduction, and soft infrastructure but also stress areas for improvements. Density remains a key concern of the City yet residents hope to remain in single-family units. As a result, the new Mailhos housing is made of semi-detached and single unit homes.

Concrete embankment on tributary at La Paloma

Mindert de Vries (Deltares), Fernando Errandonea (Planning), Pablo Sierra (Planning) and Pablo Mederos (Urban Development) discussing neighborhood improvement project at La Paloma



La Paloma Plan

La Paloma

La Paloma is a neighborhood that sits to the west of the Pantanoso Stream; it falls under the jurisdiction of Municipio A. Montevideo and MVOTMA sought to incorporate wetland conservation into the design of neighborhood improvements under the Proyecto de Mejoramiento Integral del Área Precaria La Paloma. The City protected a small plot of wetlands (about 4.2 hectares) that is bordered by a road, an existing concrete channel, and fencing. The City sought to leave the land unmanaged and allow species to grow naturally.

Pablos Mederos, an architect and representative of MVOTMA, said the project has been helpful in absorbing rainwater but has provided little community benefit because residents do not have access to the wetlands. He noted that the existing concrete channel negatively impacts the wetlands, but due to a lack of data collection and monitoring, the biodiversity and health of wetlands remains unknown.

Kate Orff, director of the Center for Resilient Cities and Landscapes

Workshop Opening: Kate Orff, Soledad Mantero, Michelle Mueller

WORKSHOP APPROACH AND DOCUMENTATION

The workshop included a panel discussion with case study presentations from invited experts and two days of intensive design exercises. Participants were divided into two project tables—Tramo 6 and Tramo 7—based on local experience for each site. Subject matter experts floated between tables and each table was assigned a design and policy facilitator; participants presented findings, received feedback from experts, and iterated on project design.

DAY I: MONDAY, APRIL 8

WHERE ARE WE NOW?

SITE VISITS AND PLANNING

The City team, facilitators and subject matter experts visited the Pantanoso Basin in advance of the working sessions. Teams visited two pilot projects: La Paloma and Mailhos. Teams then visited the three neighborhoods: Maracaná, la Cachimba del Piojo, and Cantera del Zorro.

DAY II: TUESDAY, APRIL 9

WHERE DO WE WANT TO BE?

DESIGN FRAMEWORK AND CONSIDERATIONS

The workshop was opened by Soledad Mantero, the Deputy Director of the Executive Unity of Resilience. Pablo Sierra from the Unit of Land Use and Regional Plans gave participants an overview of the Pantanoso Plan and the two sites. Invited experts presented design principles and hosted a panel discussion.

At breakout tables, participants were asked to map the ecological and social systems of the Pantanoso basin. Participants focused on the ecological and social characteristics of their sites and identified challenges and opportunities.

DAY III: WEDNESDAY, APRIL 10

HOW DO WE GET THERE?

CONCEPTUAL DESIGN AND IMPLEMENTATION

Design leads presented findings from Day II of the workshop, focusing on the edge, fabric, and ground.

Workshop participants were asked to visualize designs in section, plan, and perspective. Tables naturally split between policy practitioners and designers.

Workshop teams presented their outcomes at the conclusion of the workshop.

PARTICIPANT OVERVIEW

Twenty-nine stakeholders participated in the workshop and each contributed a unique perspective. Participants were split into two breakout teams for the majority of the workshop sessions. Each team had a mix of City representatives, stakeholders, and subject matter experts.

GENERAL

Soledad Mantero
Office of Resilience IdeM
Workshop Facilitator

Guzman Robania
Office of Resilience IdeM
Workshop Facilitator

TABLE TRAMO 6 MARACANÁ

Gabriela Paz
Municipio A, Área Social CCZ 14

Hugo Gonzalez
ECCA, IdeM

Adriane Bentancur
Municipio A, Área ambiental y Áreas verdes

Claudia Torres
IMM POT

Virginia Pardo
BID

Martin Martinez
Equipo Consultor Pantanoso

Fernando Errandonea
Planificación - Ordenamiento Territorial IdeM

Fabiana Torres
Planificación - Ordenamiento Territorial IdeM

Gustavo Olveyra
NAP Ciudades MVOTMA

Adriana Piperno
Espacio Interdisciplinario Aguas Urbanas - Facultad Arquitectura

Jimena Risso
Desarrollo Ambiental- Evaluación de la Calidad y Control Ambiental - Unidad Calidad de Agua

Grga Basic
Center for Resilient Cities and Landscapes
Design Lead

Helena Monteiro
100 Resilient Cities
Facilitator

Cecilia Herzog
Pontifícia Universidade Católica de Rio de Janeiro
Subject Matter Expert

Michelle Mueller
100 Resilient Cities
Workshop Facilitator

All workshop participants

TABLE TRAMO 7 CANTERA DEL ZORRO & CACHIMBA DEL PIOJO

Lucía Fernández
Espacio Interdisciplinario Aguas Urbanas

Pablo Guido
Desarrollo Ambiental, Estudios y Proyectos de Saneamiento

Pablo Mederos
Desarrollo Urbano, Unidad Ejecutora de Atención al PIAI

Pablo Sierra
Planificación Ordenamiento Territorial, IdeM

Lauro Ayestarán
Consultor

Verónica De Bittencourt
Área social CCZ 14

Melisa Griego
Coordinadora del MIDES, en Municipio A

Norma Piazza
Espacio Interdisciplinario Aguas Urbanas

Juan Pablo Martínez
Dirección Nacional de Aguas, DINAGUA

Alicia Bisio
Planificación

Andres Gilmet
MIDES, Coordinador del Municipio G

Lorena Acoste
IdeM SECCA

Myra Campoleoni
NAP Ciudades MVOTMA

Alicia Rodriguez
DINOT MVOTMA

Linda Schilling
Center for Resilient Cities and Landscapes
Design Lead

Alvaro Soldevila
100 Resilient Cities
Facilitator

Kate Orff
Center for Resilient Cities and Landscapes
Subject Matter Expert

Mindert De Vries
Deltares
Subject Matter Expert

SUBJECT MATTER EXPERTS

Cecilia Herzog

Cecilia Herzog is the Coordinator of the Master Program on Ecological Landscape Planning and Design, at the Pontifical Catholic University of Rio de Janiero. Her work and research aims to educate and raise public awareness about green infrastructure and the role of biodiversity and ecosystem services in cities to build resilience and lower the ecological footprint. She researches how different cities in the world have transformed their landscapes to support biodiversity, providing a better quality of life to people in harmony with nature. In the last four years, she has been determined to bring an ecological culture to the Brazilian urban scene through various means, such as promoting monthly lectures in various fields in Rio de Janeiro, lecturing in different cities and writing in Portuguese about bringing nature back to the cities. She has been working to change the local current trend of globalized modernist landscapes and the elimination of native biodiversity and wetlands. Among other projects, Cecilia is collaborating with the Environmental City Department to develop and support the Ecological Corridors planning for the city of Rio de Janeiro (Mosaico Carioca).

Mindert de Vries

Prof. De Vries is a senior advisor specialized in environmental impact assessment and integrated coastal zone management at Deltares. He has extensive knowledge on ecological aspects, habitat suitability evaluation, nature restoration and impacts of water- and sediment pollution for species and ecosystems. Mr. De Vries is a senior project leader of many advisory and research studies within the Netherlands and abroad, particularly in the United States, Middle East and Southeast Asia. Mr. De Vries has a background in (marine) aquatic ecology, eco-toxicology and mathematical biology. He has been involved in many studies regarding model development and application for both fresh water and marine systems. For many years he was involved in organising and execution of environmental impact assessments, integrated coastal zone management studies.

Kate Orff

Kate Orff is the Faculty Director of the Center for Resilient Cities and Landscapes, an Associate Professor at the Columbia Graduate School of Architecture, Planning and Preservation, and Director of the Urban Design (MSAUD) Program. She coordinates complex, interdisciplinary studios centered on urban systems of the future with a focus on ecological infrastructure, global cities and climate adaptation. Kate is a registered landscape architect and a principal of SCAPE, an award winning, 30-person professional practice based in lower Manhattan. The firm has won national and local American Society of Landscape Architecture Awards for built projects, planning, and communications work. The work of the office has been featured on the cover of Landscape Architecture Magazine, Landscape Architecture Magazine China, and Topos, and in The New York Times, The New Yorker, and The Economist, among other publications.

Walter Baethgen

Walter E. Baethgen is the Director of the Regional and Sectorial Research Program and leader for Latin America and the Caribbean in the IRI at the Earth Institute, Columbia University. He acted as Director of the Agriculture and Food Security Center at Columbia University between September 2016 and June 2017. He has been establishing regional research and education programs that aim to improve climate risk assessment and risk management in agriculture, health, water resources, and natural ecosystems. Between August 2010 and April 2012, Baethgen acted as Distinguished Lead Scholar of the NEXUS program of the Fulbright Foundation, which aims to inform the elaboration of policy with scientific research. Before joining the IRI, Baethgen was a senior scientist in the Research and Development Division of IFDC, where he worked mainly in Information and Decision Support Systems for the Agricultural Sector (1987-2003). In that role he established and coordinated regional research programs in Latin America in collaboration with national and international organizations.

Pablo Mederos (Urban Development)

Kate Orff (Columbia University) and Mindert de Vries (Deltares)

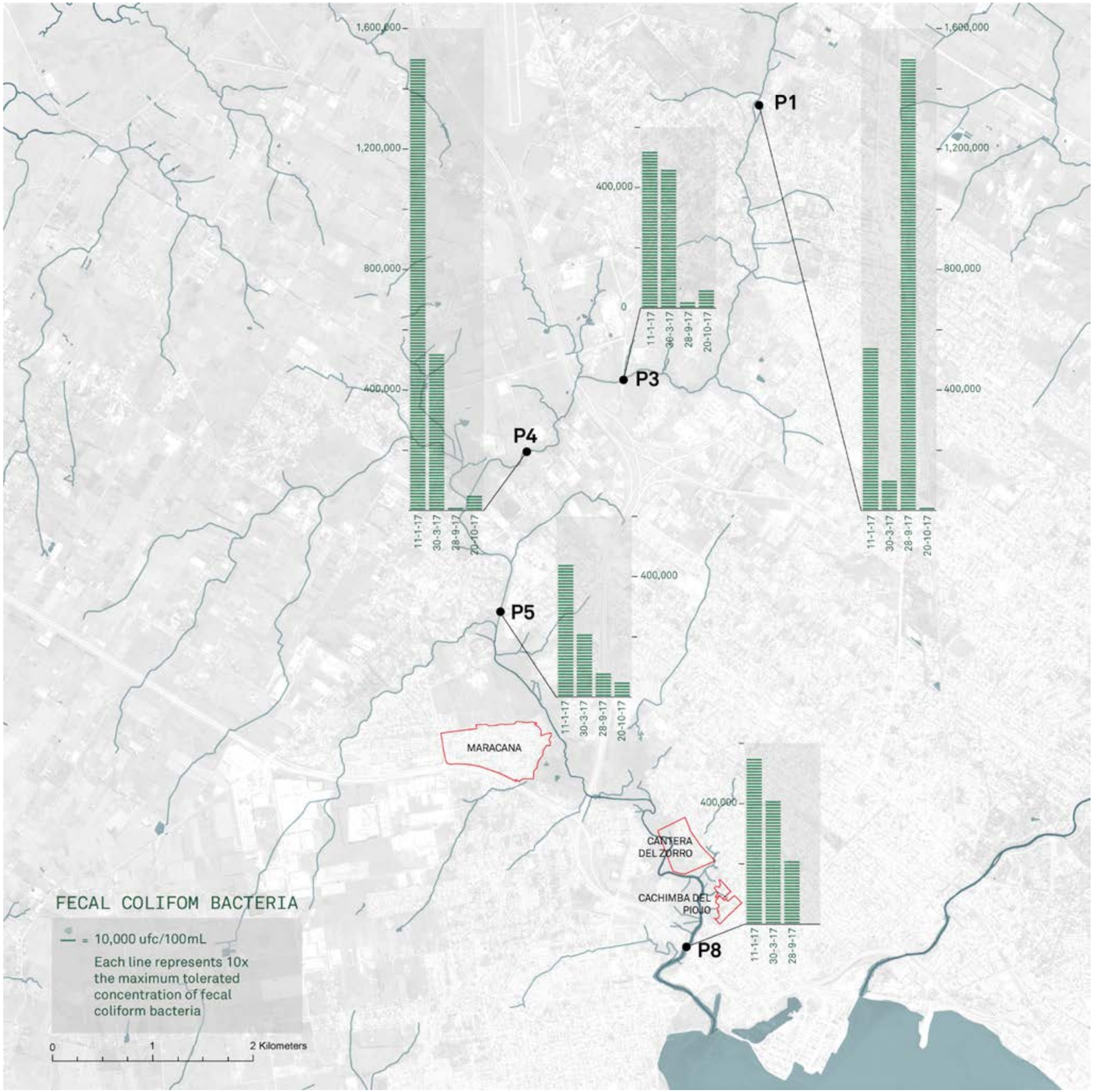
Fabiana Torres (City of Montevideo Department of City Planning)

Verónica de Bittencourt (Área Social CCZ 14)

WORKSHOP DESIGN FRAMING PANEL

A panel of subject matter experts opened the workshop and framed the design sessions with **10 principles** that drew on examples from their work experience. These principles were used throughout the design exercises.

Panel de apertura:
Izq. a der. Kate Orff, Walter E. Baethgen, Mindert de Vries, Cecilia Herzog, Fernando Errandonea



UNDERSTANDING THE SYSTEM AT SCALE

Design for the two sections should relate the larger scale of the Pantanoso and Montevideo, and consider climate resilience, biodiversity, connectivity, landscape, and awareness. We must understand how localized efforts relate to the larger ecological and social systems.

CCOMBINING SOLID WASTE AND SEWAGE INTO WATER-BASED PLANNING

The design and planning of both sections must address solid waste and sewage discharge.

- MINDERT DE VRIES, DELTARES

Canalization in the Paloma

UNDERSTANDING EDGES AS BOTH SEPARATORS AND CONNECTORS

Edges are traditionally designed to protect urban areas against flooding; edges create a physical border of urbanization and separate nature from culture. Edges can also provide a gradient from "wet" to "dry," provide habitat and encourage biodiversity, create connections, and allow nature and people to co-create. All designs should consider how the edge concept applies at the Pantanoso Basin.

- MINDERT DE VRIES, DELTARES

The Plan Pantanoso can learn about ecosystem health from the Santa Lucia Wetlands in west Montevideo where native species like the Capybara rodent and the Pijuí Común and Chiflón birds thrive. Source: City of Montevideo

VALUING ECOSYSTEM SERVICES IN THE PLANNING PROCESS

> Understanding the ecosystem services or benefits people receive from nature is a critical part of the Pantanoso planning process. By improving ecosystem health and promoting biodiversity, Montevideo will see enhanced air quality, reduction of erosion, improved water quality, reduced noise pollution, heat island mitigation, reduced flood risk, and other benefits. There are also social benefits such as reduced stress, creation of a stronger community identify, and improved public health.
>
> - CECILIA HERZOG

INTEGRATING NATURE-BASED SOLUTIONS INTO NEW DEVELOPMENT AND RELOCATION SITES

> *Housing and new developments in the Plan Pantanoso can include nature-based solutions, like green roofs or rain gardens. Design should look at how the built environment considers biodiversity, climate change, and flooding.*

- CECILIA HERZOG

Bogotá has taken a step towards creating an ecological and recreational corridor to protect the City's eastern mountains and promote social cohesion, public health, and ecological value.

In Colombia, new developments include features such as rooftop gardens to cool the city, and provide a food source and expanded habitat.

FOCUSING ON STREAMS AND TRIBUTARIES, BRIDGING THE REGIONAL WATER SYSTEM AND THE LOCAL NEIGHBORHOOD

At Alameda Creek in the California Bay Area, the firm SCAPE designed a process that placed tributaries at the center of the planning and design process.

> *Tributaries and small streams at the Pantanoso influence water quality and can be at the center of the planning process.*
>
> - KATE ORFF

Students involved in planting native species and shoreline cleanups in Jamaica Bay, New York City.

TRANSFORMING A SERIES OF PROJECTS INTO A LARGER MOVEMENT

A series of projects, like the edge design through social engagement will build up to a larger movement of social and physical transformation. Involving students and communities in these projects through organized wetlands plantings, educational programs, and community cleanups can bring people together to achieve collective goals along the Pantanoso Basin.

- KATE ORFF

ACCELERATOR WORKSHOP OUTCOMES

The findings described in this report represent a synthesis of ideas and discussions that emerged from stakeholders at the Resilience Accelerator workshop. The findings range from applied design approaches, design discussions for each site, and data and project phasing needs for the sites. The report summarizes findings at both tables under “Systems” and “Design Considerations” and are then applied to the two sections or *tramos*.

SYSTEMS

In order to understand the larger waste, sewage, and social systems related to the two sections, participants were asked to map the ecological and social systems at the Basin, City, and regional scales. A summary of their findings related to systems follows.

The team identified challenges and opportunities related to the **waste system** that contribute to large-scale dumping in the Pantanoso:

- The City of Montevideo’s main landfill, Felipe Cardoso, is to the east of the City. Consequently, contracted municipal waste workers often prefer to drive shorter distances and dump at the Pantanoso. Pickers sort through the waste and resell what is possible. A more distributed waste system has the potential to reduce the waste stream and transportation costs, and provide local jobs.

The team identified challenges and opportunities related to the **sewage system** that contribute to sewage pollution in the Pantanoso:

- The existing sewage system is poorly maintained and informal housing is not connected to the system. In addition, there is a perception that Rio de la Plata pollution sources begin upstream and are out of the City of Montevideo’s control.

The team identified challenges and opportunities related to the **social and ecological system** that contribute to challenges in the Pantanoso:

- Communities along the Pantanoso Basin lack access to quality public space. For example, there is no connectivity to the existing Rambla. The neighborhoods to the east of the City have public programming and public spaces along the Miguelete stream, but there are no corridors to connect these to the Pantanoso and the rich biodiversity of the Santa Lucia Wetlands.
- The Maracaná neighborhood has more public programming than neighborhoods to the east of the stream.

DESIGN CONSIDERATIONS

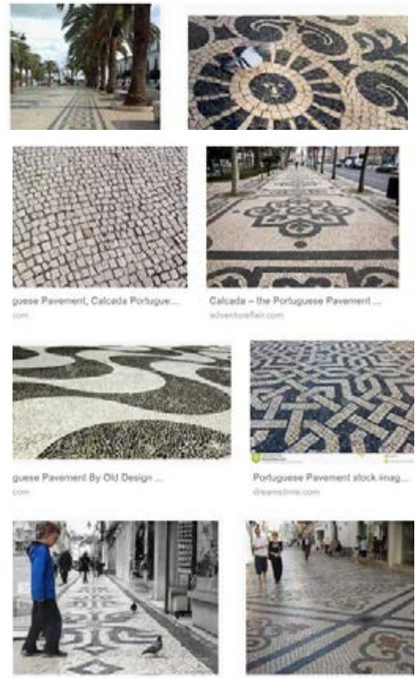
Design leads from both sections summarized exercise findings and table discussions into common design goals and considerations. They identified the following objectives that Montevideo could address through design:

- Establish a physical boundary between informal settlements and wetlands to restrain the encroachment and allow for wetland restoration and remediation;
- Identify areas and/or individual households for resettlement;
- Establish design principles for the new neighborhood(s) that will accommodate the resettled population;
- Legalize and improve existing neighborhoods for the remaining inhabitants.

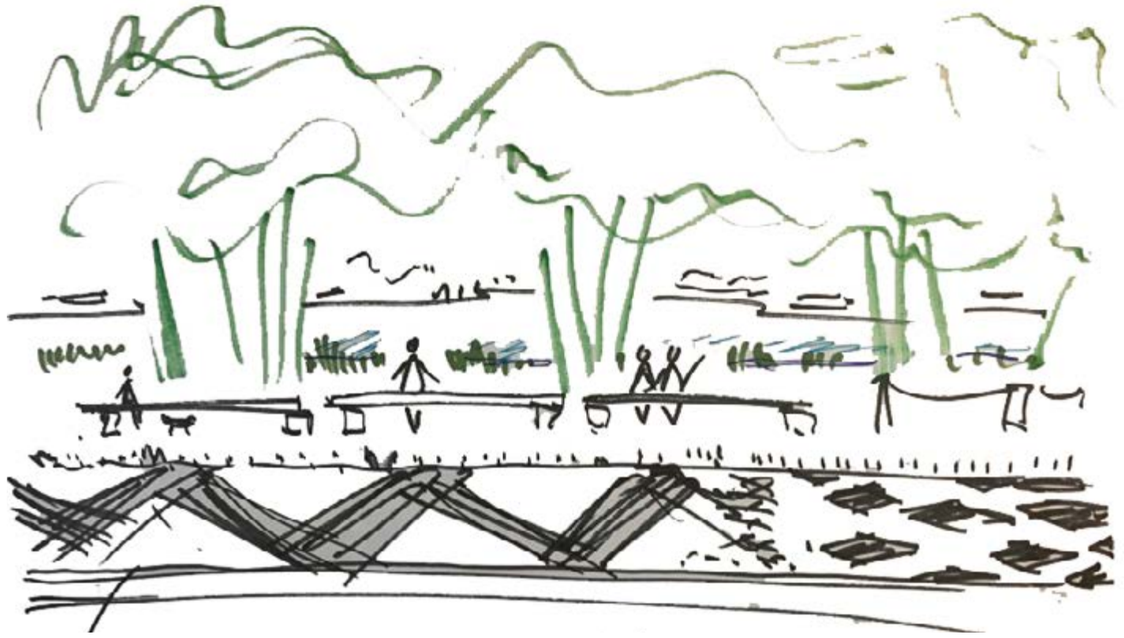
Each of the three neighborhoods––Maracaná, Cantera del Zorro, and Cachimba del Piojo––face unique challenges. The team identified three design approaches related to the treatment of the edge, the ground, and the urban fabric that could be applied to all three neighborhoods and serve as a starting point for design exercises. Below is a summary of key concepts and questions related to each design consideration.

Edge: *How do we design the edge between the settlements and wetland that is distinct and hard enough to prevent further encroachment, yet soft enough to offer unobstructed views and managed access to the wetlands?*

Using the Montevideo Rambla––the longest continuous sidewalk in the world––as an inspiration and a reference, the team came up with the concept of an Eco-Rambla, a longitudinal path system that would run along the edge of the settlements, and signal a shift in the landscape towards wetlands. The Eco-Rambla would connect neighborhoods in the Basin while serving as a natural continuation of the existing Rambla and featuring unique design elements adapted to the conditions in the Pantanoso Basin:



The Eco-Rambla protects nature, provides recreation for people and has managed vehicular access.



The Eco-Rambla concept

- Cobblestone driveways as an alternative to traditional pavers to slow traffic;
- A strip of lawn with vehicle barriers, such as boulders;
- A bicycle and pedestrian pathway with a pavement pattern unique to the neighborhood it passes through;
- Stone or wood slab benches;
- A sequence of traversing wetland access paths where suitable.

Ground: *How do we leverage existing landfills along the settlement edges? How do we make use of the resulting elevation changes between the settlements and the wetlands?*

The Eco-Rambla protects nature, provides recreation for people and has managed vehicular access

Many of the settlements in the Pantanoso Basin are built on landfills, some of which were created by Montevideo, and some by local communities. In most instances, the landfills that the City built are not contaminated and do not need to be removed. To leverage the elevation change generated by those landfills, the team proposed a Landfills as Opportunity strategy for the high ground and a Streams as Opportunity strategy for the low ground.

Landfills as Opportunity
Program the high ground with:

- Playgrounds;
- Courts/Recreation;
- Forests.

Streams as Opportunity
Unlock/open up streams to feed the Pantanoso Creek to:

- Enhance filtration and oxygenation;
- Enable phytoremediation;
- Welcome the flood!

Fabric: *How do we create a denser, vibrant, and resilient new resettlement neighborhood(s) that is well connected to the existing fabric and that serves and attracts neighboring communities?*

Diagram identifying the landfill area from the low ground areas of tributaries. The thickness between the virtual axis of the plan and the wetland allows for the edge to emerge.

Dense and connected new city fabric

Wetlands and landfill at Maracanã

Existing edge conditions at Maracanã

SITE OVERVIEW AND DESIGN PROPOSALS

SECTION 6 - MARACANÁ

Maracanã is a large neighborhood to the west of the Pantanoso. Homes on the west side of the neighborhood were built between the 1980s and 1990s and homes on the east side, backing into the Pantanoso Creek, were built between the late 1990s and early 2000s. The older units in the west are considered better quality than the homes to the east. Residents and municipal staff are concerned with inadequate access to the neighborhood; there are only two entry points into the neighborhood and there is poor circulation. High voltage electric lines run through the neighborhood, posing a risk to many households—some of which are directly underneath. In addition, the land in the east is a municipal landfill that residents live on and use to dump waste and keep livestock.

PANTANOSO PLAN SECTION 6 PRIORITIES AND ACTIONS

REBUILD AND PRESERVE WETLANDS AND FLOOD ZONES AS A NATURAL RESERVE WITH MANAGED PUBLIC ACCESS

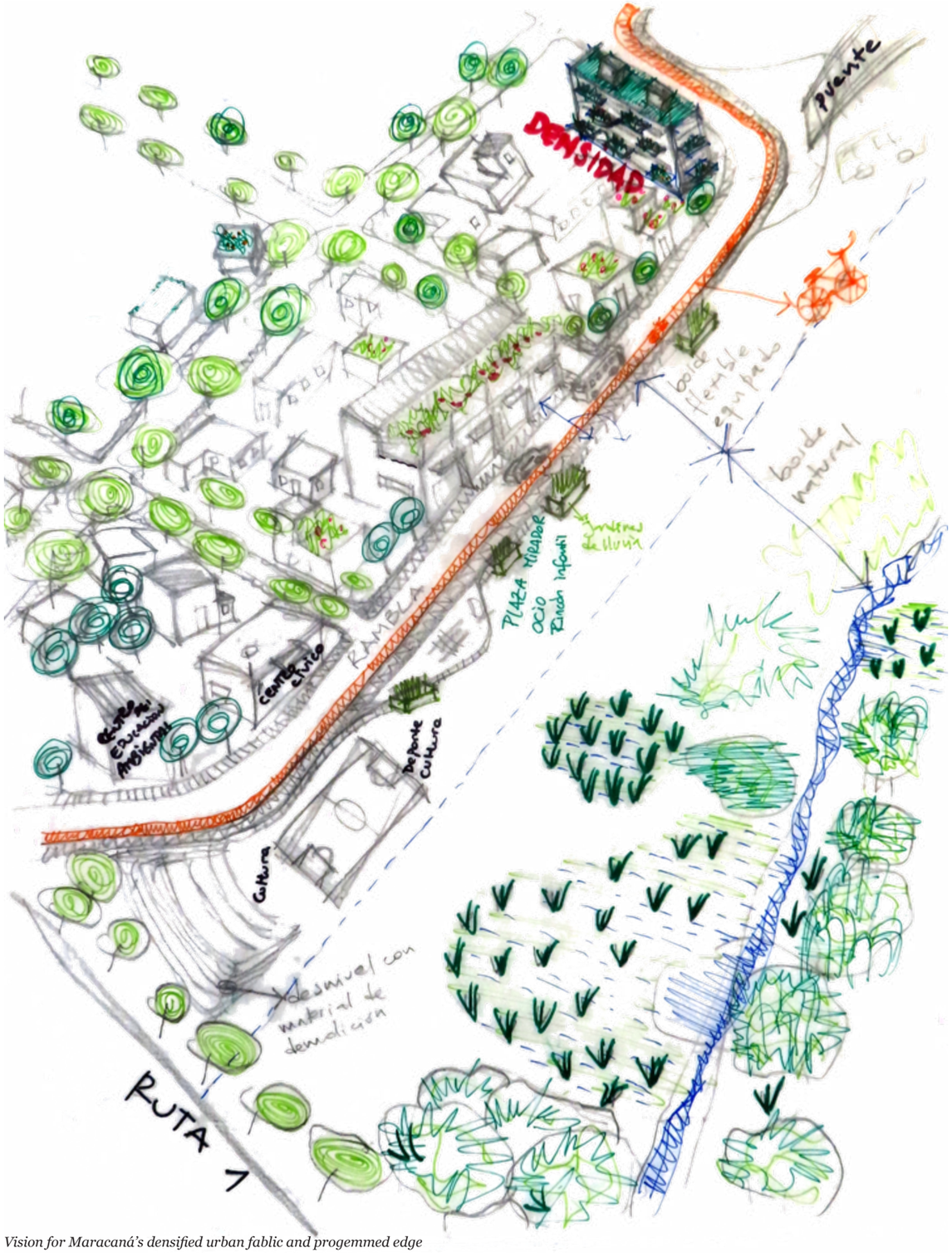
- **Relocate housing in the flood zone (120 homes)**
- **Design and build a park**

REMOVE CRITICAL INFILLS

- **Create public spaces and design new edges**

INTEGRATE THE URBAN FABRIC

- **Provide access routes and basic services to 1,400 homes**



Vision for Maracaná's densified urban fablic and progemmed edge

Workshop Findings

The empty lot north of Maracaná is currently a grassland that residents pass through on a daily basis to reach the supermarket, bank, and other services their neighborhood lacks. The area––measuring approximately 15 hectares––is suitable for new urbanization and development: It connects the existing neighborhoods of Maracaná and Mailhos, it's located outside the flood zone, and it could potentially accommodate around 170 households.

Workshop participants spent a significant amount of time discussing the street grid, density, and housing typology for the area and agreed on several design principles:

- The new development should seamlessly connect to the existing neighborhood—it's an extension of the neighborhood, not a new neighborhood.
- Instead of pursuing uniform density of new housing units across the entire area (like in Mailhos), the new development north of Maracaná should include a mix of multi-family and single-family units.
- There should be a central axis with higher density units and services on the ground floor that fosters vibrant street life.

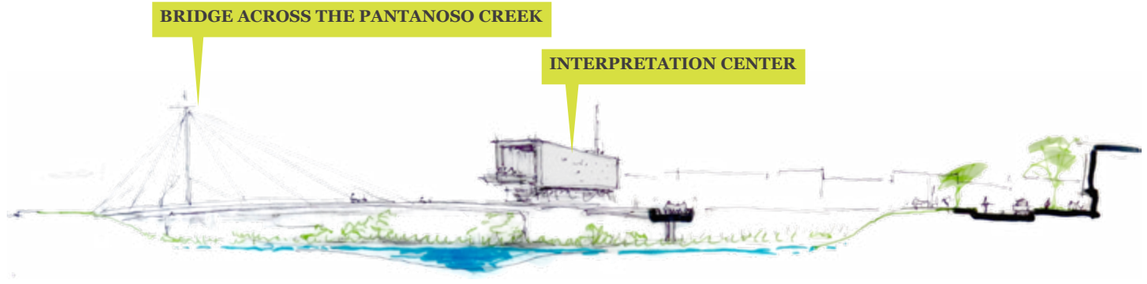
Participants visualized connectivity between the existing and proposed neighborhoods and created a site map. Participants sought to identify clear access routes between the two neighborhoods and explored the notion of a Rambla as a means to connect them. This Rambla would link the two neighborhoods as well as help create a connection between the community and the natural area of the Pantanoso.

The table explored a proposed interpretation center that would be on an elevated platform over wetlands, bridging the high ground with the low ground.

Participants created two design scenarios. In Scenario One or "Sponge," houses outside the Pantanoso Plan would be removed to create an urban edge. This would be less costly to the city and would move residents in critical condition. As part of Sponge, some houses behind the planning line would be removed for public plazas and green areas. In Scenario Two or "Removal," all houses in eastern Maracaná would be relocated. Participants were concerned that the landfill these homes are built on creates a bottleneck for the creek and should be removed. Relocation would be costlier but would provide needed homes and create room for the wetlands to be reintroduced.

There are two high voltage lines passing east-west through Maracaná. This presents a challenge for the City because 80 meters below the line must be cleared of all buildings and high vegetation, yet the participants agreed that east-west axes in the neighborhood should be strengthened. The team developed conceptual sections of the areas below the high voltage lines that adhered to the requirements, but still promoted urbanity and street life.

Scenario One, "Sponge"



Interpretation Center in Marcaná bridging the high and low ground

High voltage lines in Maracaná

Well at La Cachimba del Piojo; the neighborhood is named after the water source

Cachimba del Piojo neighborhood

SECTION 7 - CANTERA DEL ZORRO AND CACHIMBA DEL PIOJO

Cantera del Zorro and Cachimba del Piojo are two neighborhoods east of the Pantanoso. This area is less dense than Maracaná. Cachimba del Piojo is a working class neighborhood at the edge of the La Teja with many community facilities and strong community engagement. Cantera del Zorro is an informal settlement, run by organized crime that lacks municipal services.

PANTANOSO PLAN SECTION 7 PRIORITIES AND ACTIONS

REBUILD AND PRESERVE WETLANDS AND THE FLOOD ZONES AS A NATURAL RESERVE WITH MANAGED PUBLIC ACCESS

- **Relocate housing in the flood zone focusing on the Cantera del Zorro neighborhood (600 homes)**
- **Design and build a park**

REMOVE CRITICAL LANDFILLS

- **Create public space and design new edges**

INTEGRATE THE URBAN FABRIC

- **Provide access routes and basic services (250 homes)**

RESTORE CAÑADA VICTORIA

- **Create access routes along the tributary and new urban edges**

Workshop Findings

Participants agreed that waste in the neighborhood has become an alarming challenge because so much of it now fills the neighborhood streets. The table explored how to address the practices of illegal dumping and outlined the following approaches:

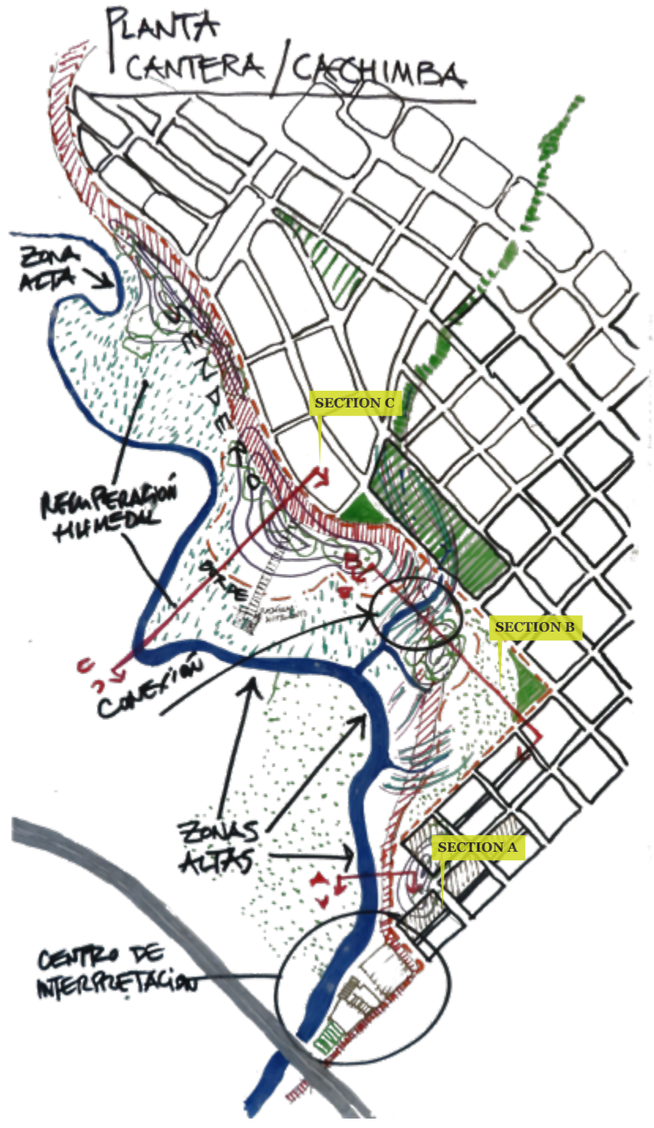
- Job training services are needed to create opportunities and to provide support for alternative sources of income to existing waste picking;
- Waste pickers could be trained to work at recycling facilities;
- Local schools and community facilities can become engaged in environmental campaigns and education.

Phase One of the neigborhood renewal

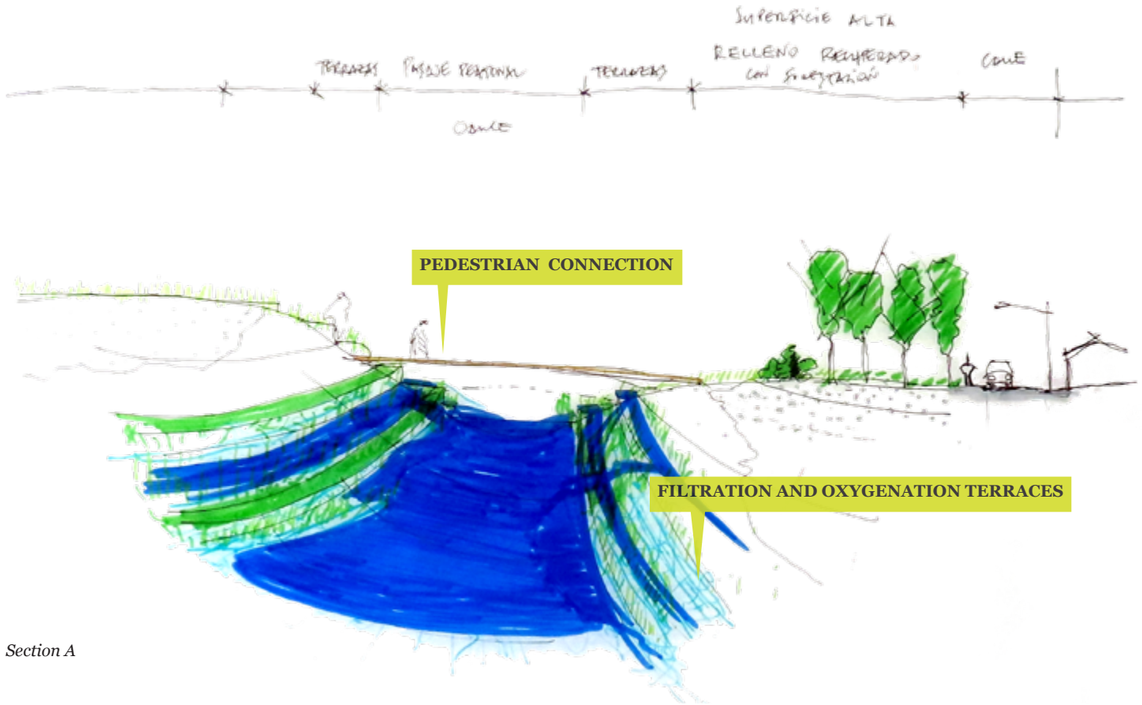
The Plan Parcial Pantanoso suggests relocations along the wetlands, but workshop participants focused the conversation on the concept of a new "edge" or Eco-Rambla, and how to make the existing community part of the new local economy this project would create.

Participants developed drawings to visualize the concept of the edge and ground conditions for both neighborhoods. Participants sought to create a continuous edge, bringing together both Cantera and Cachimba, with an appropriate width for bike paths and pedestrian walkways, a densely forested area to prevent further encroachment on wetlands, and an interpretation center. Participants proposed to construct an interpretation center out of a historic a meat processing factory in Cachimba, a cultural symbol of the working class neighborhood.

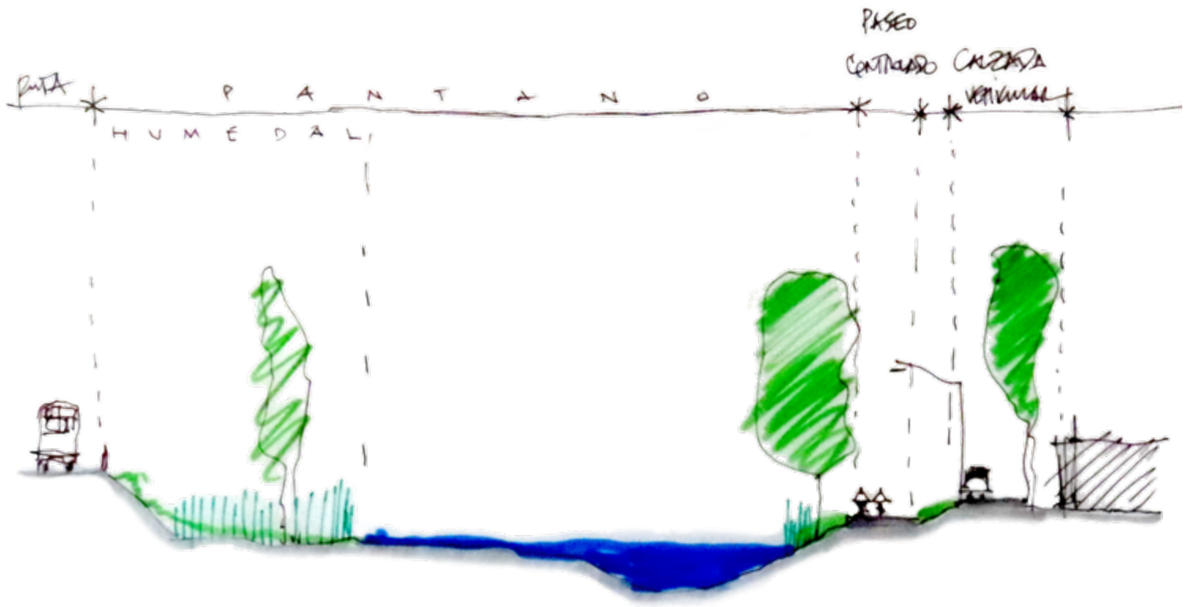
Participants focused on a tributary that runs between the neighborhoods as a starting place. The team preferred to utilize the existing landfill or high ground as recreational areas and program the low ground with public walking paths that can withstand flooding.



Cantera/Cachimba urban fabric concept sketch



Section A



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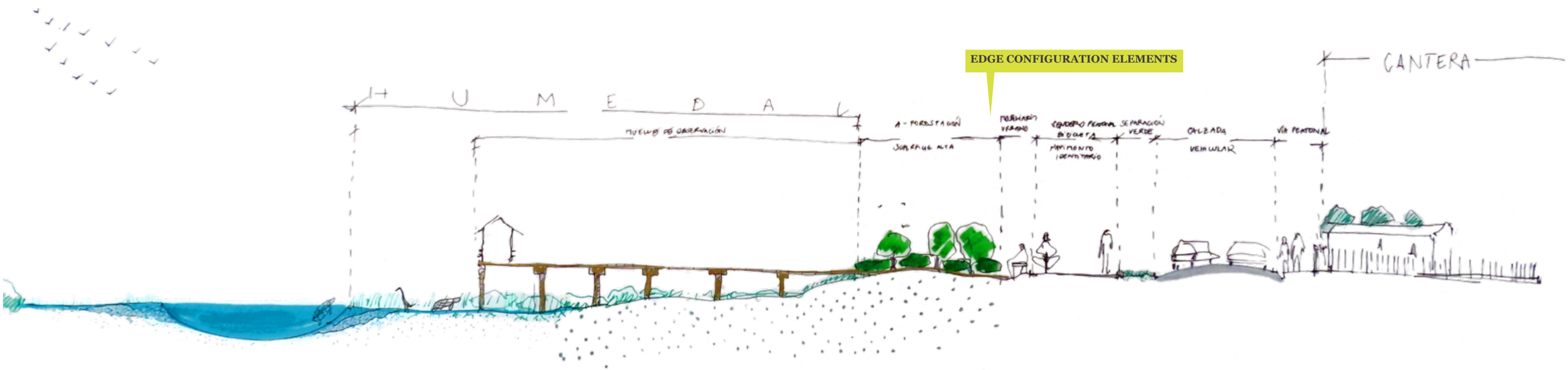

Section C

WETLANDS

Throughout the workshop, participants discussed the conditions of the wetlands and how to improve the quality of them. A combination of land use, illegal dumping, and dredging calls for an approach that looks at the entire system to reintroduce wetlands. A summary of an agreed plan follows:

- Remove large debris from the creek
- Stop dredging the creek and channelizing streams
- Build “beaver dams” to “de-channelize” and allow the wetlands to flood in a controlled way; participants identified Route 5 as a pilot site
- Plant and care for wetland native grasses
- Sembrar y cuidar de los pastos nativos del humedal
- Build an awareness campaign to stop the cultural tradition of cutting down trees for “asados”
- Identify organizations that can drive wetland stewardship efforts within the community.

Humedales de Santa Lucía. Fuente: http://www.montevideo.gub.uy/Áreas-tematicas/ambiente/un-ecosistema-clave-0

ADDITIONAL DATA AND STUDY REQUIREMENTS

Participants identified a series of data and studies required to realize the vision for the two sections and the Pantanoso at large. Participants agreed the municipality and communities need to embrace a culture of science and data to drive monitoring, iterate on project designs, and inform decision making. The data needed includes:

- Soil quality assessments and an understanding of landfill typologies along the Pantanoso and in designated neighborhoods
- A community census or socioeconomic study of communities along the Pantanoso
- An understanding and database of land available for relocations
- An ecological baseline study of species along the Pantanoso, including a map of flora and fauna,used to monitor change and inform landscape design
- A hydraulic study of water flow at the system and site scale
- Expanded water quality testing

PROJECT PHASING

The workshop focused on design and participants briefly discussed project phasing and implementation. They agreed that the projects pose phasing challenges. Residents have anticipated a transformation of their neighborhood but have lacked funding and a cohesive vision—the Plan Pantanoso—until now. Participants proposed an approach where the City begins working with the community on environmental stewardship practices and small interventions to improve local ecology. Participants believed involving neighborhood children in this process is essential. When funding for the relocations is secured, the City will lead a participatory process that gives ownership to active community groups. Participants called for a “landmark” structure residents can convene around and emphasized the importance of beginning the process with the proposed interpretation center.

Section 7 participants

Section 6 participants

CONCLUSION

Long-term planning and urban design for the Pantanoso Basin in Montevideo represents a microcosm of challenges faced by cities around the world. How can specific houses, directly in harm's way and threatened by repeat flooding, be equitably relocated? How can this sprawling wetland truly be reclaimed and managed so that it becomes a positive asset for the City—not a dumping ground? How can a focus on the Pantanoso Basin help build resilience across Montevideo, generate social understanding of ecosystem services, and link green-blue spaces?

The Pantanoso Basin water system has been channelized and modified over many years. It is threatened by encroachment, a change in the composition of the waste stream, and the introduction of non-biodegradable plastics, industrial pollutants, and a dumping industry that sprouted along its edges as people seek out livelihoods in the informal sector. In recent decades it has been more dramatically compromised by the growth of segregated neighborhoods along its edges, which create dead ends, segregate districts in the urban fabric, and lead to inconsistent services. At this juncture, the hydrology and habitats that once characterized the Basin have been compromised as waterways are blocked, while surrounding streets and homes are subsequently flooded. Climate change has brought more intense rainfall and heat.

The Pantanoso Basin has the potential to become a global model for equitable climate adaptation and neighborhood revitalization once a robust planning framework is in place along with a future-oriented design focus on the simultaneous processes of strategic relocations coupled with the urban design of new neighborhoods to accept new residents, and a new ecological design to stitch these communities together along the Basin's edge.