

# Urban Prototype - Cartagena, CO. Urbanization through Architecture. Peace in Process

Design Workshop | Winter 2019

**Educational Material**

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Urban  
ThinkTank

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# URBAN PROTOTYPE

Urbanization through Architecture

Peace in Process

CARTAGENA, COLOMBIA

Design Workshop | Winter 2019

**ETH Zurich | DARCH | NSL**  
**Chair of Architecture and Urban Design**  
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# **INTRODUCTION**

**Schedule**

**Colombia**

**Caribbean Region**

**Cartagena**

**Ciudad Bicentenario**

**U-TT Design Studio | Fall' 18**



# SCHEDULE





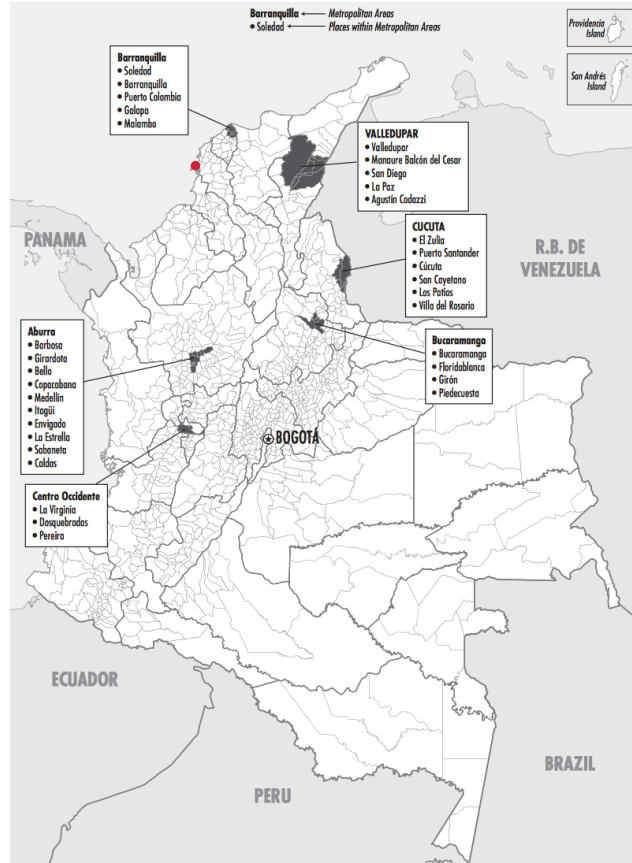
# COLOMBIA

## GEOGRAPHIC OVERVIEW

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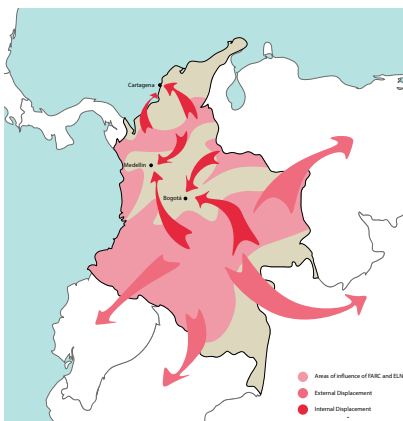
<b>Capital</b>	Bogotá
<b>Major Cities</b>	According to the 2005 census, the four cities with more than 1 million population are: Bogotá (4,300,000; Greater Bogotá, 6,776, 009), Medellín (2,223,078), Cali (2,068,386), and Barranquilla (1,380,437). These cities are also the four major industrial centers.
<b>Size</b>	The fourth-largest country in South America, Colombia measures 1,138,910 square kilometers.
<b>Principal Rivers</b>	Colombia has 20,000 kilometers of rivers. Its principal rivers are the Magdalena, 1,540 kilometers; the Putumayo, 1,500 kilometers; and the Cauca, 1,014 kilometers.
<b>Climate</b>	Climate: Mainly as a result of differences in elevation, Colombia has a striking variety in temperatures, with little seasonal variation. The habitable areas of the country are divided into three climatic zones: hot (tierra caliente; below 900 meters in elevation), temperate (tierra templada; 900–2,000 meters), and cold (tierra fría; 2,000 meters to about 3,500 meters).
<b>Natural Resources</b>	Colombia is well endowed with agricultural export products, energy resources, and minerals. These resources include coal, coffee, copper, emeralds, flowers, fruits, gas, gold, hydropower, iron ore, natural nickel (also known as Millerite, a compound that is a natural nickel sulphide), petroleum, platinum, and silver. Colombia ranks first in Latin America for its coal reserves, fourth for natural gas and sixth for oil. In addition, the country is second only to Brazil in hydroelectric potential.
<b>Land Use</b>	Colombia's arable land is located mostly in patches on the Andean mountainsides. In 2005 an estimated 2.01 percent of the total land area was arable (approximately 21,000–23,000 square kilometers). The amount of arable land has declined.
<b>Environmental Issues</b>	The 1991 constitution codifies new environmental protection legislation, including the creation of specially protected zones, of which Colombia had 443 in 2003, mostly in forest areas and national parks. Colombia has an extraordinarily high percentage of its total land area designated as a protected area (72.3 percent in 2003). As a result of soil erosion, 65 percent of the country's municipalities are facing water shortages. Only about one-third of Colombia's 1,098 municipalities have adequate Treatment systems for contaminated waters.

# MAJOR CITIES OF COLOMBIA



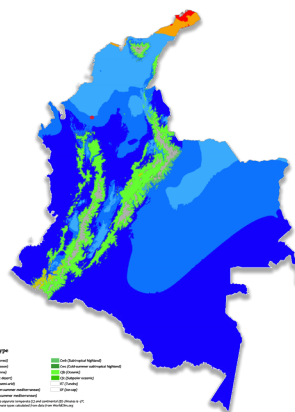
Map Source: Rodriguez Vitta 2011

## Internal and External Displacement



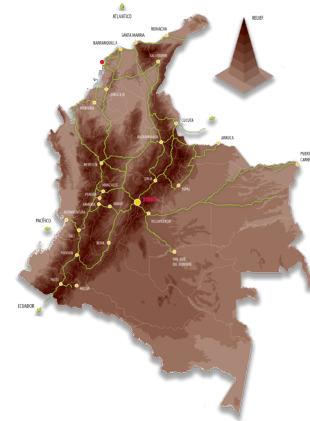
Map Source: ETH, U-TT

## Climatic Types



Map Source: Data sources: Köppen types calculated from data from WorldClim. org [https://commons.wikimedia.org/wiki/File:Colombia\\_koppen.svg](https://commons.wikimedia.org/wiki/File:Colombia_koppen.svg)

## Principal Commercial Corridors



Map Source: Sistema de las Ciudades, Una aproximación visual al caso colombiano- World Bank, DNP, 2012

# CARIBBEAN REGION

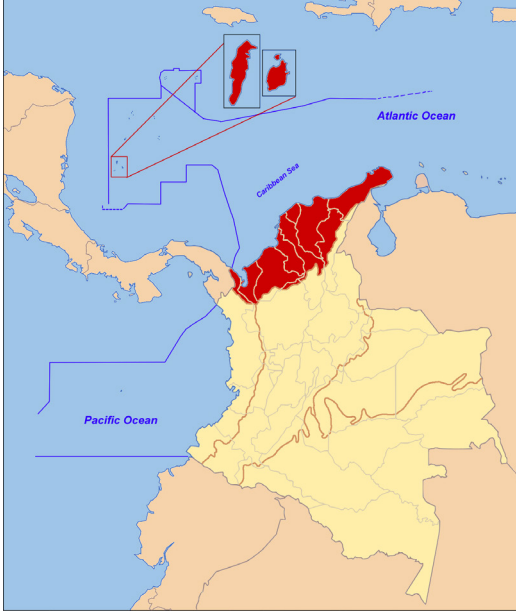
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<b>Overview</b>	The area covers a total land area of 132,288 km <sup>2</sup> (51,077 sq mi), including the San Andres Island Archipelago of San Andrés, Providencia and Santa Catalina in the Caribbean sea and corresponding to approximately 1/10 of the total territory of Colombia. The administration of the region is covered by eight department governments; Atlántico, Bolívar, Cesar, Sucre, Córdoba, Magdalena, La Guajira and San Andrés y Providencia.
<b>Demographics</b>	There are 9,746,886 inhabitants in the Caribbean Region of Colombia in 2010, with a population density of 73.71 inhabitants per square kilometer. According to Dane population projection, estimates reached 10,441,463 in 2015 and 11,142,852 in 2020. The principal metropolitan area is Barranquilla Metropolitan Area with 1,836,331 inhabitants.
<b>Population Density</b>	73.71 per sq.km
<b>Economy</b>	Colombias's economy is based mainly in the exploitation of natural resources, such as coal and natural gas, salt, agricultural products (mainly bananas, coffee and oil palm, cotton, tropical fruits), livestock raising which is practiced extensively in almost all the territory, in Córdoba, Sucre, Atlántico, Magdalena, Bolívar, Cesar and southern La Guajira. Another major part of the economy is tourism, which concentrates also in Cartagena and Santa Marta along with San Andres and Providencia Islands.
<b>Celebrations</b>	The most popular and known celebration in the Caribbean region is the Carnival of Barranquilla, which is celebrated every year in February or March. The Miss Colombia Pageant in Cartagena, the Vallenato Legend Festival in Valledupar, Feast of the Sea in Santa Marta and the Corralejas Festivities in Sincelejo are also amongst popular celebrations.
<b>Climate</b>	Climate of the Caribbean coast depends on the annual displacement of the Intertropical Convergence Zone and, for the Sierra Nevada de Santa Marta massif, on its particular orographic influences. There are generally two rainy periods (April-May and October-November) and two dry periods (December-April and July-September).

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Information Source: [en.wikipedia.org/wiki/Caribbean\\_region\\_of\\_Colombia](https://en.wikipedia.org/wiki/Caribbean_region_of_Colombia)

<https://coastal.er.usgs.gov/coasts-colombia/caribbean/caribbean-intro.html>



#	Department	Population (hab.)	Capital
1	Atlántico	2'314.447	Barranquilla
2	Bolívar	1'979.781	Cartagena de Indias
3	Cesar	966.420	Valledupar
4	Córdoba	1'582.187	Montería
5	La Guajira	818.695	Riohacha
6	Magdalena	1'201.386	Santa Marta
7	San Andrés & Providencia	73.320	San Andrés
8	Sucre	810.650	Sincelejo
9	Caribbean Region (Colombia)	9'750.364	

Map Source: [https://en.wikipedia.org/wiki/Caribbean\\_region\\_of\\_Colombia](https://en.wikipedia.org/wiki/Caribbean_region_of_Colombia)

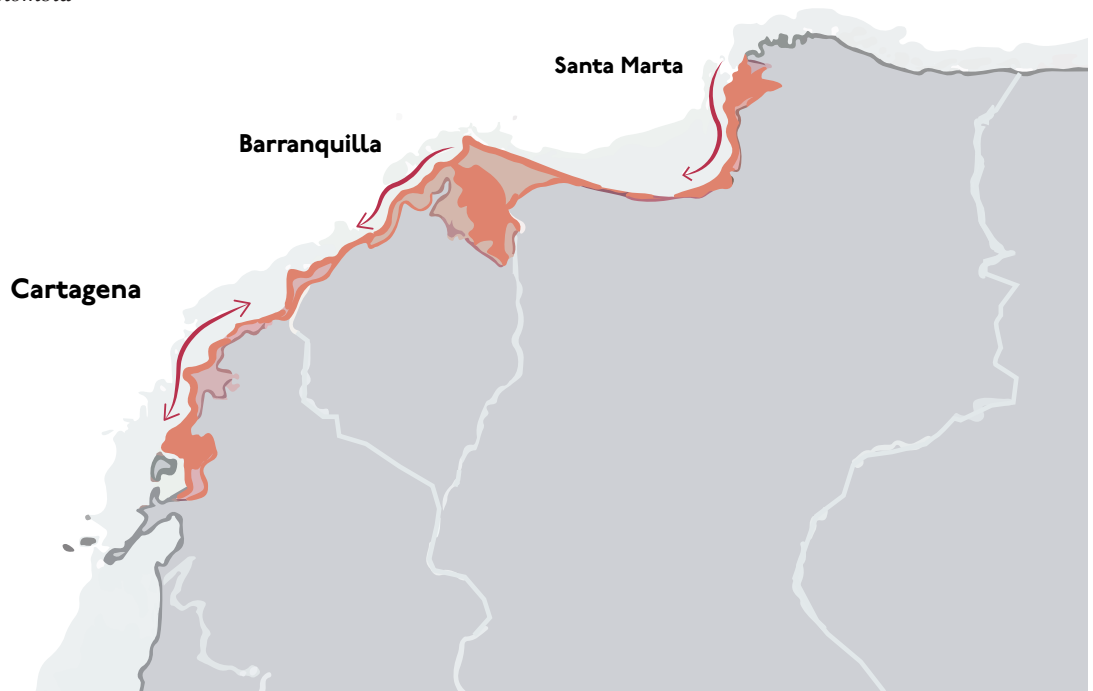


Fig 1. Trend of Urbanization in the Caribbean Region

Information and Fig 1 Source: Cartagena, 2040-Rethinking the role of tourism in a dynamic and growing city

# CARTAGENA

## MAIN OPPORTUNITIES

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### Triangulo Social

New Future Centrality

Relocation of the Public Market

### Economy & Development

**"PLAN 4C":** Caratgena Competitiva y Compatible con el Clima:  
Model Neighborhood Adapted to Climate Change

Canal Upgrading: Prioritized Canal for Intervention

### Mobility & Connectivity

Future Airport:Planned to be built at outskirts of Cartagena

New Railway line: Diamante Caribe y Santanderes (Findeter)

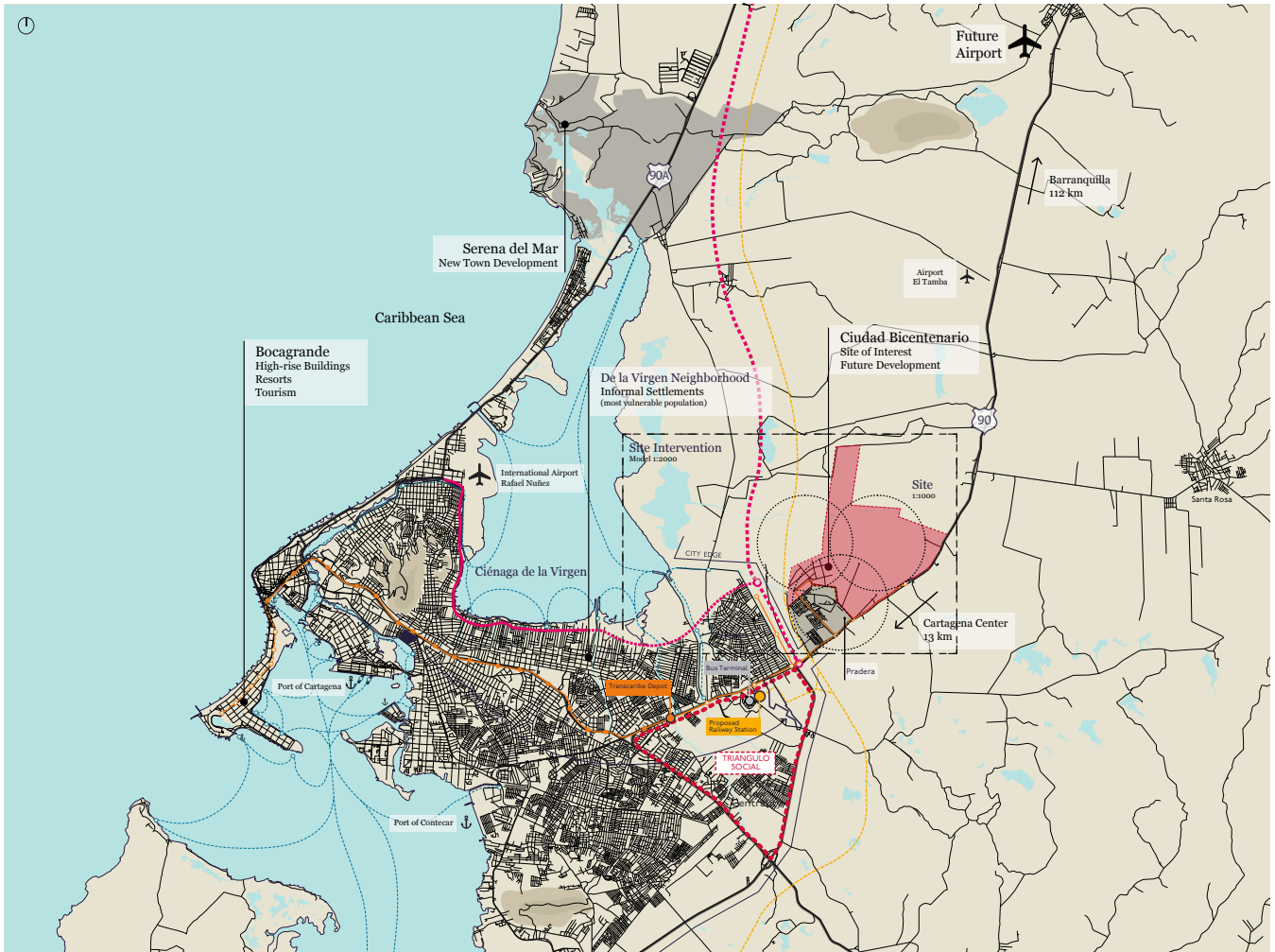
Bus: Transcaribe depot / Bus terminal at Triangulo Social

### Map Legend:

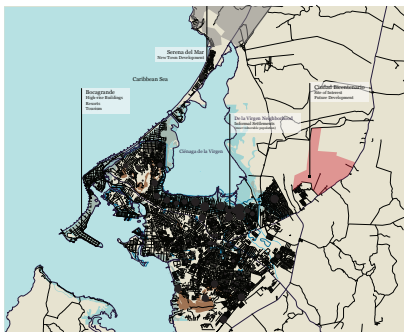
- Primary Road Network
- Secondary Road Network
- System of Canals
- Area of Interest  
'Ciudad Bicentenario'
- New waterways (Municipality)
- New Coastal Railways line (Findeter project)
- Transcaribe Bus Line
- Transcaribe Extension and HUB (Municipality)
- Via Perimetral
- Extension Via Perimetral (Municipality)
- 'Foundation Social' working area
- Priority Canals for 'Primer La Gente'  
Plan of Development

---

Information Source: ESC Emerging Sustainable Cities /  
ETH, D-Arch, U-TT / SECO / IDB / FINDETER



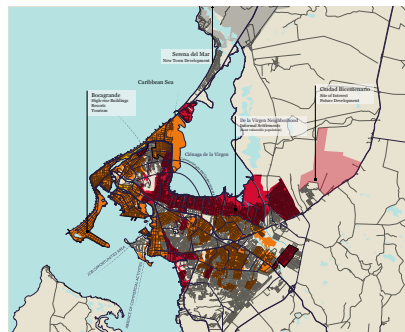
### Flooding Risk



Map Source: ETH, U-TT 2018  
 Based on: Documento de Trabajo Sobre Economía Regional: Cartagena Libre de Pobreza extrema 2013, Banco de la República

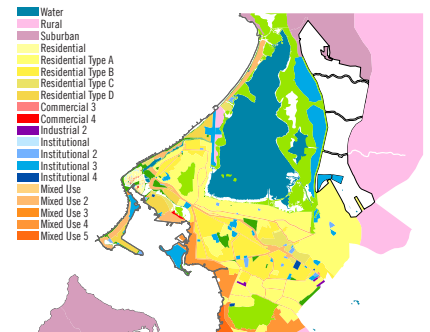
Top Map source: ETH, U-TT 2018  
 Based on: ESC Emerging Sustainable Cities/ ETH, D-Arch, U-TT / SECO / IDB / FINDETER

### Socio Economic Vulnerability



Map source: ETH, U-TT 2018  
 Based on: ESC Emerging Sustainable Cities/ ETH, D-Arch, U-TT / SECO / IDB / FINDETER

### Land Use



Map Source: Resilient Waterfronts Cartagena, Colombia, University of Pennsylvania

# CIUDAD BICENTENARIO

## SITE PERIMETER

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<b>Manager:</b>	Mario Santo Domingo Foundation
<b>Gross Area Adoption:</b>	388.04 hectares
<b>Potential Housing Solutions:</b>	65,138 Housing Units
<b>Urban Structure Solutions:</b>	6 Units of Execution
<b>Status:</b>	Urban planning completed for 4,219 housing solutions  Construction works completed for 4,169 homes and 9 homes under construction.  Delivered 3,771 homes. 1,283 assigned Family Housing Subsidies, linked to Macroprojects  MISN resources contributed by the Nation: \$ 29,000 Million Vigencias 2008-2009-2010.
<b>Other resources of the Nation:</b>	Of the 2010 period, \$ 2,664 million for the care of displaced population and \$ 17,336 million for the construction and provision of public facilities.  \$ 50,916.02 Million, allocating 1,235 SFV in the 2013-2014-2016 period under the PVG-1 Free Housing Program.
<b>People per km<sup>2</sup>:</b>	50.000
<b>Total People:</b>	200.000
<b>Goal:</b>	Set for Colombia a paradigm for an optimal-sized settlement based on prefabrication.

### Map Legend:

Area of Interest  
Ciudad Bicentenario

- Plan 2015
- Plan 2012

Road Network

- Primary Road Network
- Secondary Road Network

Existing Buildings

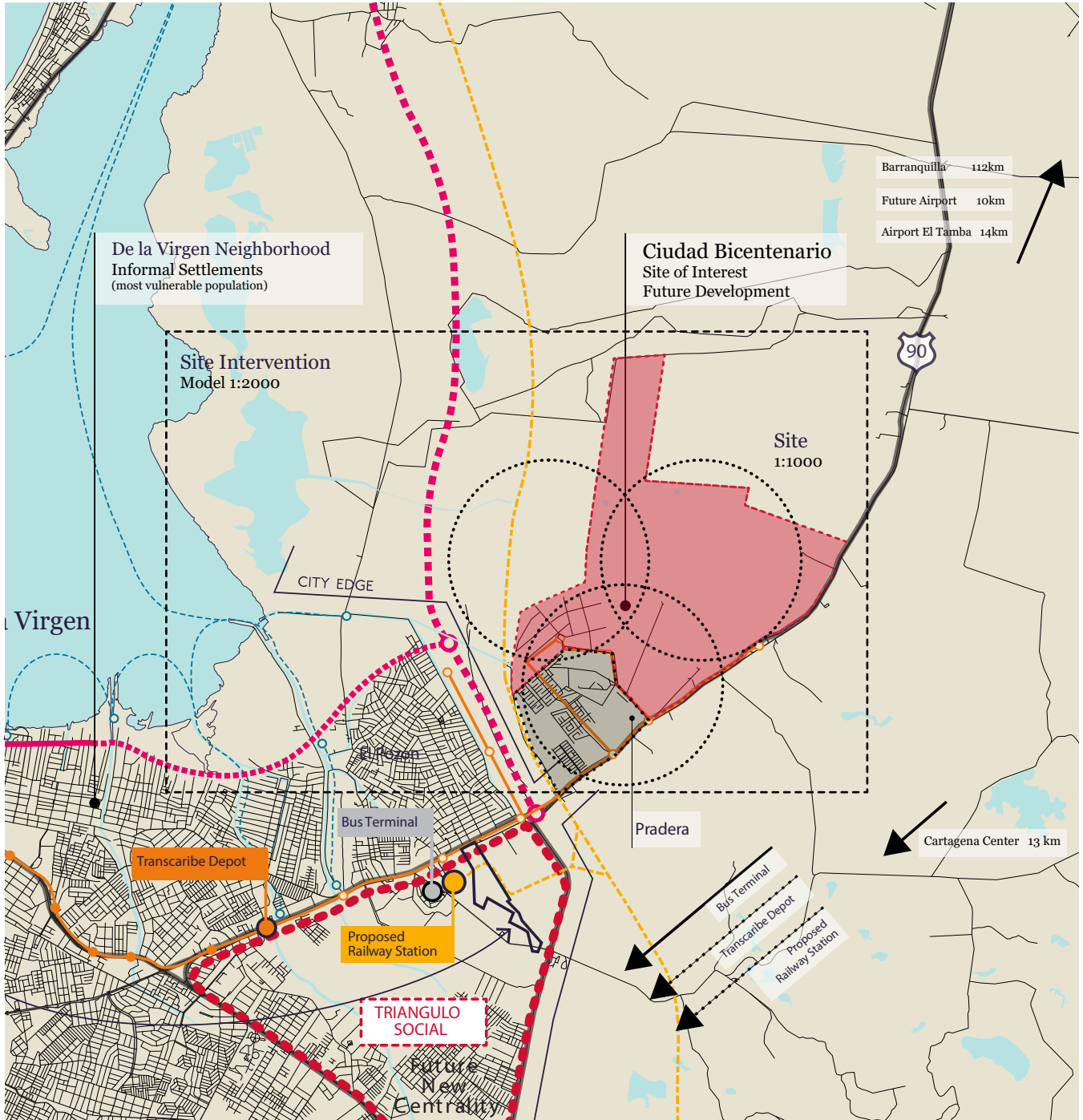
- Housing
- Services

Transport Systems

- New Coastal Railways line (Findeter project)
- Transcaribe Bus Line
- Transcaribe Extension and HUB (Municipality)
- Via Perimetral
- Extension Via Perimetral (Municipality)

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Information Source: ESC Emerging Sustainable Cities /  
ETH, D-Arch, U-TT / SECO / IDB / FINDETER



Top Map source: ETH, U-TT 2018  
 Based on: ESC Emerging Sustainable Cities/  
 ETH, D-Arch, U-TT / SECO / IDB / FINDETER



# U-TT DESIGN STUDIO | FALL' 18

## STUDENTS PROJECTS

---

<b>Landscape</b>	<b>Reclaiming the Land</b>	Diego Bazzotti
	<b>Territorial Transition</b> A spatial proposition in the Rural periphery	Larissa Strub
<b>Housing</b>	<b>Symbiosis</b> Growth and interdependence of formal and informal urbanization process	Fong Shi Yuan
	<b>Ciudad de los Cinco Parques</b> Living and Dwelling on 80 smq	Leonard Schaffner
<b>Culture</b>	<b>Public Centers</b>	Thobias Thurnheer
	<b>Park Towers</b> Horizontally and Vertically connected Urban living spaces	Valentin Wegner
	<b>Urban Arcades</b> Framing the future of public space and Cultural hot spots of Cartagena	Marherita Chiozzi
	<b>Bridging Differences, Shortening Distances</b> Train station & Hospitality school for a new development	Chiara Personeni
	<b>Socio Cultural Mobility Network</b> Centralities growing out from public transport	Sarah Stälhe
	<b>Flexible Centralities</b> School networks as Urban drivers	Miho Kogo
<b>Centralities</b>	<b>Disturbed Urban services</b> Development around security point	Nicholas Schenk
	<b>Mobility service Hubs</b> An adaptative incremental hub system	Jakob Werum
	<b>Network of Mercados</b> Market as urban catalyst for an interconnected city	Filippo Zocchi

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**RECLAIMING THE LAND**  
Diego Bazzotti

**URBAN ARCADE**  
Framing the Future Public Spaces and Cultural Hotspots of Cartagena  
Margherita Chiozzi

**SYMBIOSIS**  
Growth and Interdependence  
Shi Yuan Fong

**CENTRALITY WITH FLEXIBLE SCHOOLS**  
Mihoko Kogo

**BRIDGING DIFFERENCES, SHORTENING DISTANCES**  
Chiara Personeni

**CIUDAD DE LOS CINCO PARQUES**  
Living and Dwelling on 80 sqm  
Leonard Schaffner

**DISTRIBUTED URBAN SERVICES**  
Development Around a Security Point  
Nicholas Schenk

**SOCIO-CULTURAL MOBILITY NETWORK**  
Centralities Growing Out from Public Transport  
Sarah Stähle

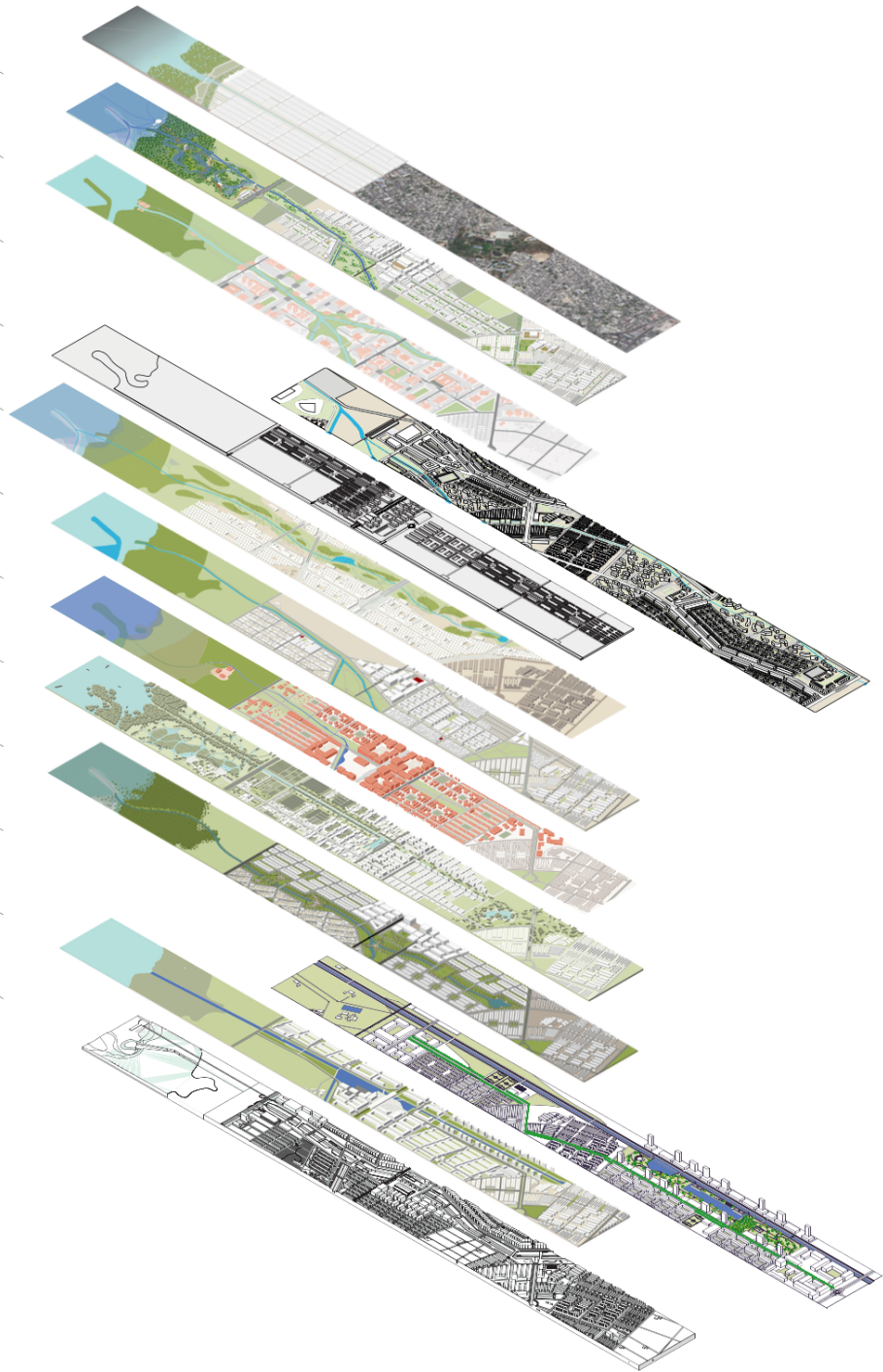
**TRANSITIONS IN THE BETWEEN**  
A Spatial Proposition in the Rural Periphery  
Larissa Strub

**GREEN TRANSITION**  
Creating Public Spaces as Transitions Between Urban Zones  
Tobias Thurnheer

**PARK TOWERS**  
Horizontally and Vertically Connected Urban Living Spaces  
Valentin Wenger

**MOBILITY AND SERVICE HUB**  
An Incremental and Adaptive Hub System for Cartagena  
Jakob Werum

**NETWORK OF MERCADOS**  
Markets as Urban Catalysts for an Interconnected City  
Filippo Zocchi





# **FRAMEWORK**

**Workshop Introduction**

**Ecology**

**Centrality & People**

**Connectivity**

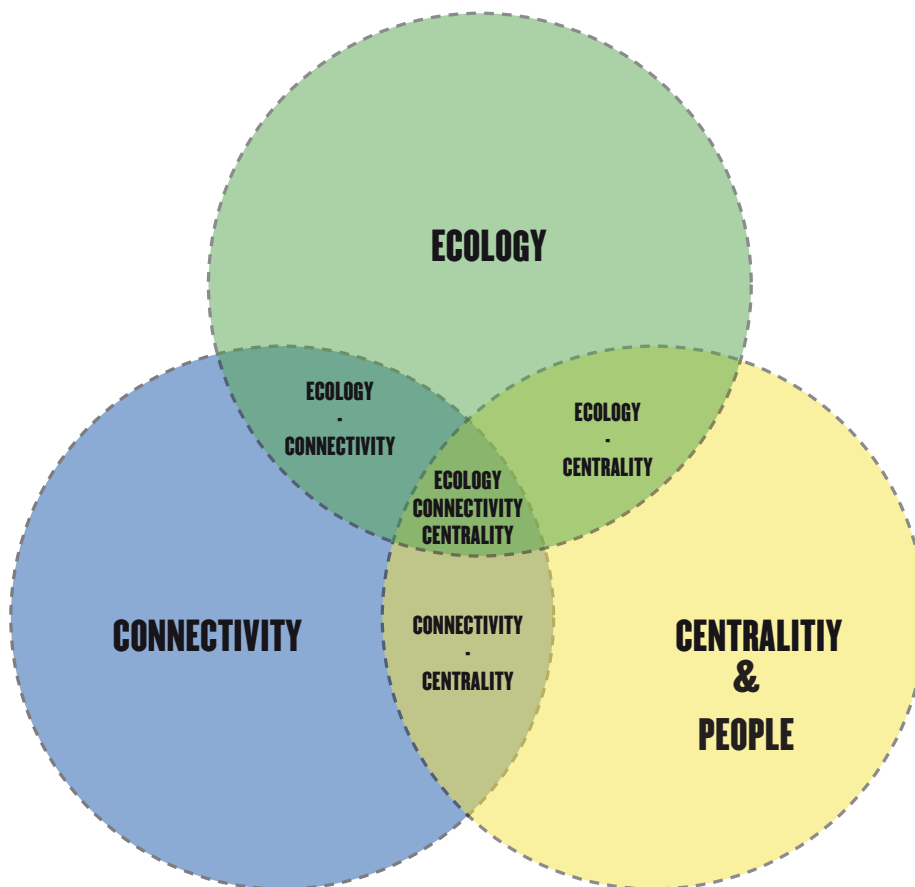
# FRAMEWORK

## WORKSHOP INTRODUCTION

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Alfredo Brillembourg & Hubert Klumpner  
Architecture/Urbanism Bi-City Biennale, Shenzhen, China

The city today is perhaps more radical than those operating within it. It computes unknown possibilities, conducts high-risk experimentation, and telegraphs previously unknowable futures more quickly and more completely than the raft of professionals tasked with its stewardship, analysis or design.



Map source: ETH, U-TT 2019

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## Objectives

A new settlement strategy and methodology for urbanization will be designed to grow a city. The design workshop will focus on developing design proposals that provides ecological responses, centralities, and inclusive connectivity.

## Main Challenges & Opportunities

### FLOODING RISK

Sea Level Rise  
Insufficient Rainwater Management

### SOLID WASTE MANAGMENT

Environmental Education  
Illegal Dumping  
Water Contamination, Disease and Pests

### SOCIO-ECO VULNERABILITY

Unemployment  
Poor Connectivity to Center

### LACK AND POOR QUALITY OF PUBLIC

Inexistent Policies and Investement

### INSECURITY

Affects all Income Sectors

### INSUFFICIENT HOUSING

Uncontrollable City Growth Due to Displacement in Rural Ar  
Majority of Housing is Informal

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# FRAMEWORK

## ECOLOGY

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Most of Cartagena is extremely susceptible to flooding. The city contains about 192km of canals, which are tasked with draining the rainwater to the sea but do not do so adequately. The canals become less effective with rising sea levels and are often blocked by refuse. Predictions indicate that, by 2040, there will be a severe increase in flooding along the coast- line. Currently, there are at least two large floods annually that inflict vast physical and economic damages to already vulnerable communities.

### + **Vegetation / landscape concept**

Find an appropriate form and expression of landscape based on the initial context research and best practice design references of the region.

### + **Territorial ecosystems**

Through maps and diagrams, illustrate how your interventions ties in to the greater territorial systems (water, typography, wind, vegetation, agriculture, population centers)

### + **Land Use Map and plot boundaries**

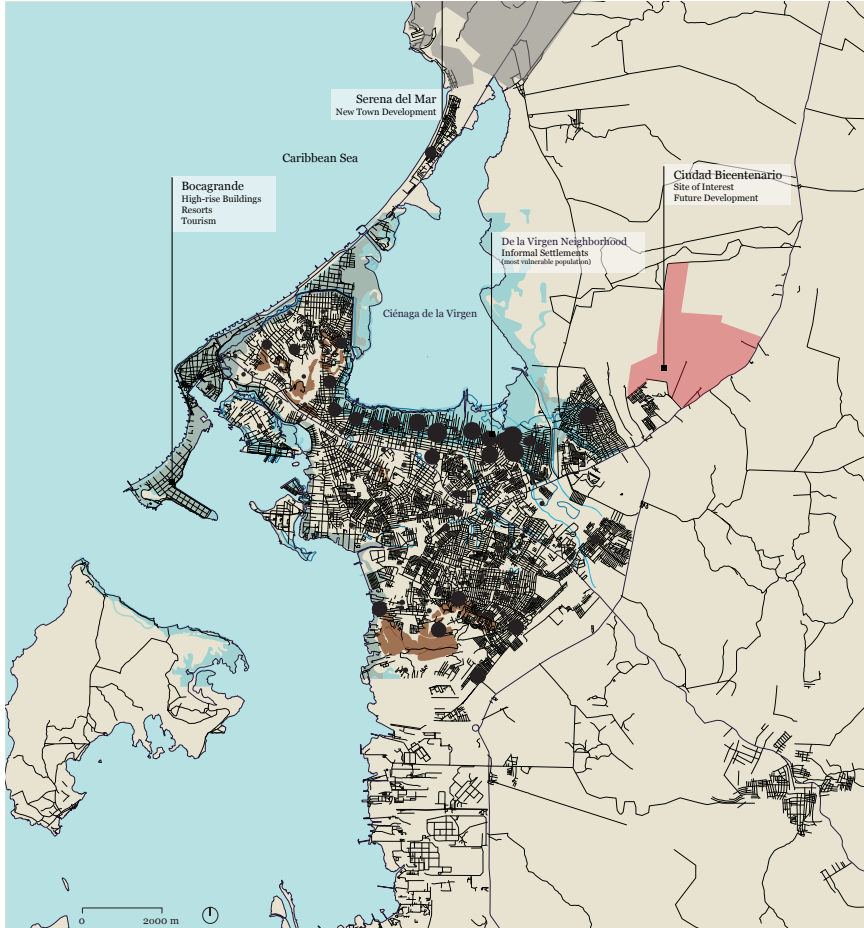
Using small diagrams, set the use of land of the intervention and the private-public land split so that the parameters are clear for your design

### + **Climate responsive**

Orientation of main spaces and sports fields (north-south) to use prevailing winds (N15E) and evolution of the climate over time (seasons, day-night, global warming)

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## Natural disaster risks and population in poverty

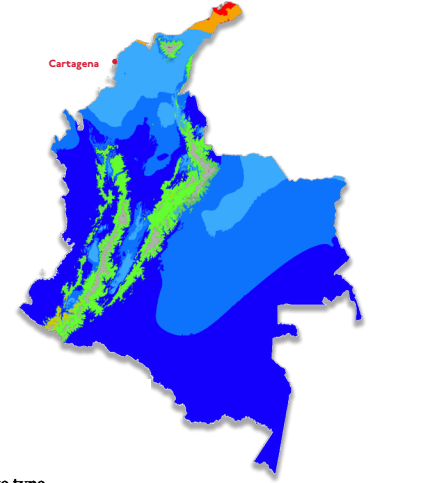


Map Legend:

- Primary Road Network
- Secondary Road Network
- Canals System
- Area of Interest 'Ciudad Bicentenario'
- Amount of People in Poverty
- Landslide
- Rain Flooding
- Sea Level Raising - Low
- Sea Level Raising - High

Map source: ETH, U-TT 2019

## Climat types

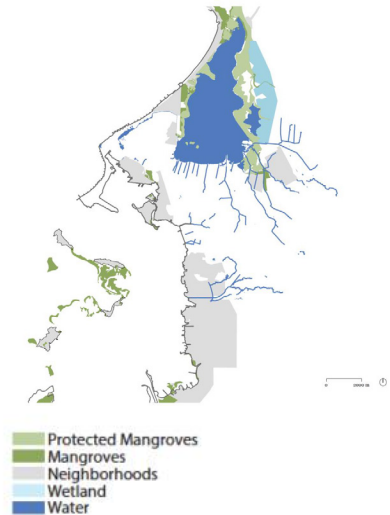


climate type

- Af (Rainforest)
- Am (Monsoon)
- Aw (Savanna)
- BWh (Hot desert)
- BSh (Hot semi-arid)
- Csb (Warm-summer mediterranean)
- Csc (Cold-summer mediterranean)
- Cwb (Subtropical highland)
- Cwc (Cold-summer subtropical highland)
- Cfb (Oceanic)
- Cfc (Subpolar oceanic)
- ET (Tundra)
- EF (Ice-cap)

\*Isotherm used to separate temperate (C) and continental (D) climates is -3°C  
Data source: Climate types calculated from data from WorldClim.org

## Main Ecosystems



- Protected Mangroves
- Mangroves
- Neighborhoods
- Wetland
- Water



# FRAMEWORK

## CENTRALITY & PEOPLE

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Poverty and social inequality are severe problems in Cartagena, with about 600.000 residents designated as poor. The population of Cartagena is also expected to grow to approximately to one and a half million by 2040, and most of this growth will happen in the poor and flood prone peripheral areas along the canals. Unstable housing, inadequate infrastructure, disaster risk management, and access to livelihood opportunities will become ever more very pressing.

### + **Incremental development**

Consider the process of incremental development by determining an appropriate scale for the start of the intervention and the likely form it will acquire over time.

### + **Public spaces**

The important role of public spaces, free spaces and social centres in such contexts makes it possible to activate places, influence urban development and reduce or increase present insecurity.

### + **Programs**

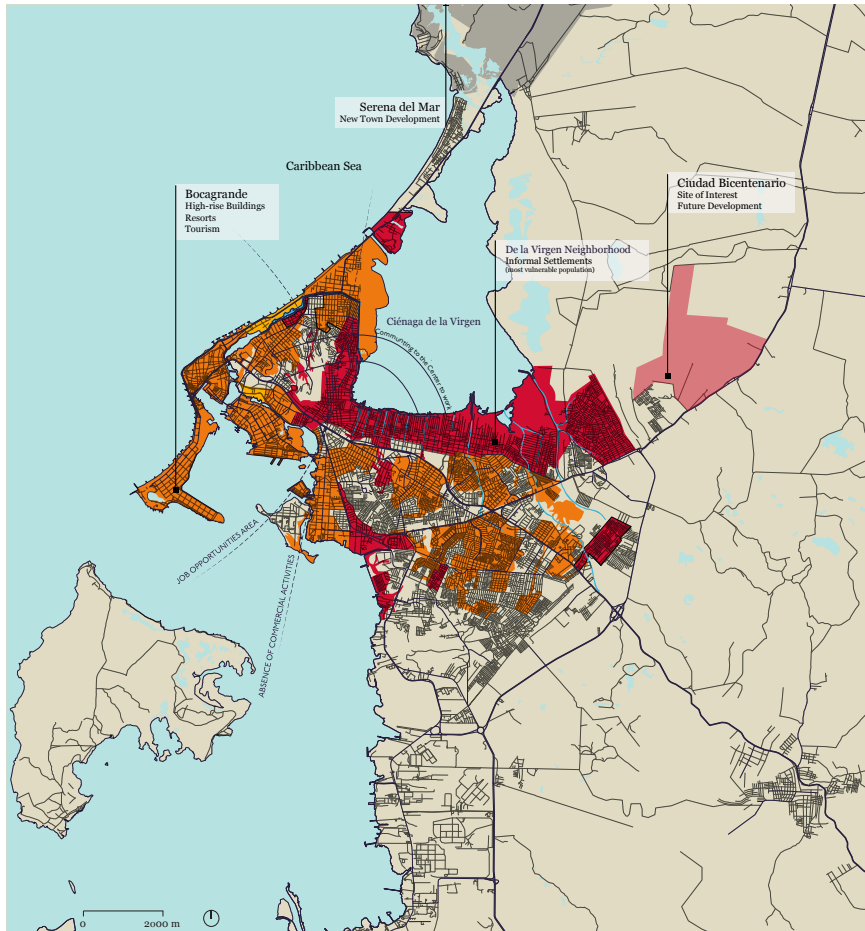
The definition and choice of specific program can establish on different temporality of interactions between different poles, whether educational, work or cultural.

### + **Radiating center / pole**

Take into consideration the notion of interaction or independence from the different centralities leading to the radiation of each of them and a possible independence or productive co-existence.

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## Socio-economic vulnerability

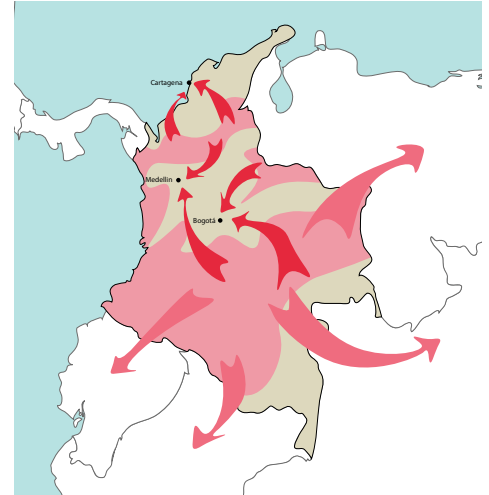


### Map Legend:

- Primary Road Network
- Secondary Road Network
- Canal System
- Area of Interest (Ciudad Bicentenario)
- Case Study (El Páramo)
- Area of Intervention (New Canal Cha María (Priority under construction 2019-2020))
- New waterways (Municipality)
- New Canal Railway line (Private project)
- Transcaribe Bus Line
- Transcaribe Extension (Municipality)
- Via Perimetral
- Extension Via Perimetral (Municipality)

Map source: ETH, U-TT 2019

## Population displacement



- Areas of influence of FARC and ELN
- External Displacement
- Internal Displacement

## Economic growth of Caribbean coast



# FRAMEWORK

## CONNECTIVITY

---

The poor connectivity between the *barrios* and the rest of Cartagena is further affecting the accessibility to job opportunities concentrated in the city's center. Although residents in Ciudad Bicentenario have access to all public utilities, they have to deal with frequent power cuts. People from the towers suffer from both power and water cuts, because the hydraulic system of the towers need water pumps to circulate the water. Food and transportation costs increases are related to the neighborhood's isolation from the city.

### + **Relation of transports to the site**

Establish an appropriate urban position in relation to the mobility infrastructure and the site. This may mean relocating mobility hubs to avoid use conflict but may also mean designing for mixed use.

### + **Circulation & scales**

Consider varying forms of mobility (walking, bike, car, moto-taxi, water-taxi,...) and plan appropriate circulation networks accordingly

### + **Road hierarchy / Canal**

Determine a two-system road hierarchy that included a trunk road and distribution roads. Look for best examples of designs that challenge the typical asphalt-sidewalk model. Set the circulation canal to 15m wide

### + **Integrated infrastructure**

An integrated infrastructure system can influence the development of centralities, access to the city & its services and strongly influence social and commercial dynamics.

### + **Energy & transition**

The energy grid is changing, it is crucial to consider the dependency and vulnerability of hierarchical system facing disruption. Alternative concepts can offer more resilience and gain resource production & storage in rural or peripheral villages.

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# **OUTPUT**

**Model Making & Graphic Representation**

# OUTPUT

## MODEL MAKING & GRAPHIC REPRESENTATION

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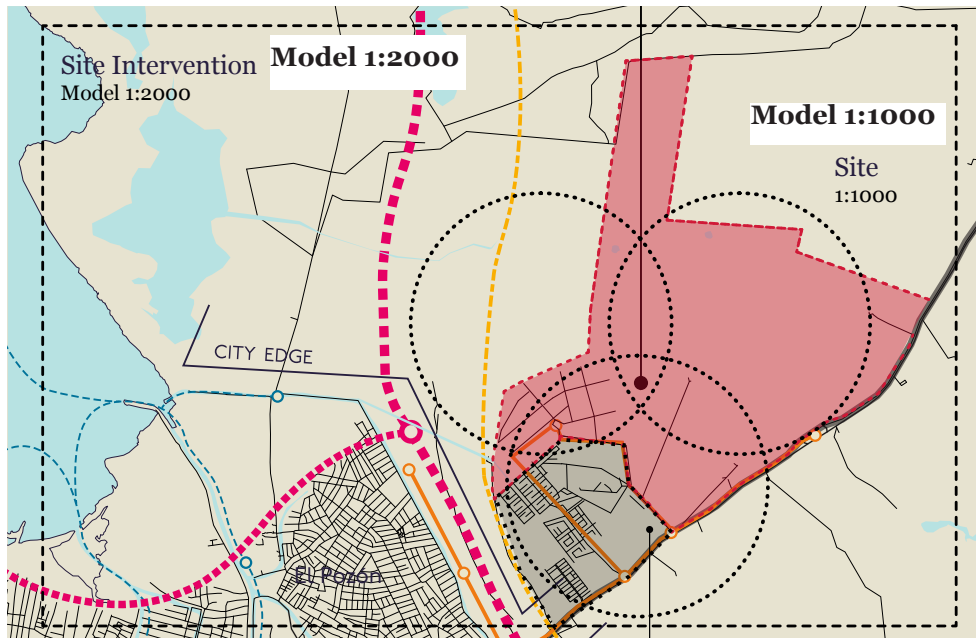


Cape town Community model, South Africa

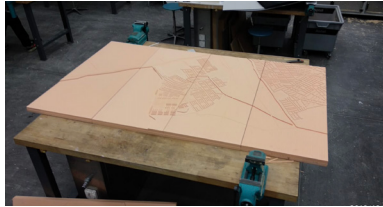


Maxxi , Parangolé, U-TT,  
Roma

### Models perimeters



**3D Physical Model**

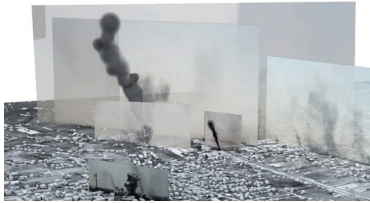


**1:2000**

**1:1000**



**Horizontal Landscape Drawing**

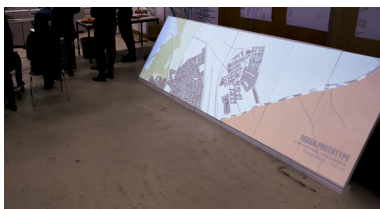


**1:1000**

**Digital 3D model**



**Digital Projection**



**1:2000**





# **INFORMATION**

**Server Access**

**Contacts**

**Bibliography**

# SERVER ACCESS

---

## Main server link

smb://classis2/brillembourg-klumpner-stud/35\_2019\_WS\_Cartagena/00\_Workshop Documents/00\_Workshop booklet

## Cad Files

smb://classis2/brillembourg-klumpner-stud/35\_2019\_WS\_Cartagena/02\_Site information/01 Plans

## Design Workshop Booklet

smb://classis2/brillembourg-klumpner-stud/35\_2019\_WS\_Cartagena/00\_Workshop Documents/00\_Workshop booklet

## Assignments

smb://classis2/brillembourg-klumpner-stud/35\_2019\_WS\_Cartagena/01\_Assignments

**All participant students have been added to Brillembourg - Klumpner Student server**

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# NOTES

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