C40 and Coastal Cities

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C40 Cities

July 2023

Who is C40?

12% of Global Population

1/3rd Global Economy

AFRICA: ABIDJAN – ACCRA – ADDIS ABABA – CAPE TOWN – DAKAR – DAR ES SALAAM – DURBAN (ETHEKWINI) – EKURHULENI – FREETOWN – JOHANNESBURG – LAGOS – NAIROBI – TSHWANE | **CENTRAL EAST ASIA:** BEIJING CHENGDU – DALIAN – FUZHOU – GUANGZHOU – HANGZHOU – HONG KONG – NANJING – SHANGHAI – SHENZEN – QINGDAO – WUHAN – ZHENJIANG | **EAST, SOUTHEAST ASIA & OCEANIA:** AUCKLAND – BANGKOK – HANOI HO CHI MINH CITY – JAKARTA – KUALA LUMPUR – MELBOURNE – QUEZON CITY – SEOUL – SINGAPORE – SYDNEY – TOKYO – YOKOHAMA | **EUROPE:** AMSTERDAM – ATHENS – BARCELONA – BERLIN – COPENHAGEN – HEIDELBERG ISTANBUL – LISBON – LONDON – MADRID – MILAN – MOSCOW – OSLO – PARIS – ROME – ROTTERDAM – STOCKHOLM – TEL AVIV – VENICE – WARSAW | **LATIN AMERICA:** BOGOTÁ – BUENOS AIRES – CURITIBA – GUADALAJARA – LIMA MEDELLÍN – MEXICO CITY – RIO DE JANEIRO – SALVADOR – SÃO PAULO – SANTIAGO – QUITO | **NORTH AMERICA:** AUSTIN – BOSTON – CHICAGO – HOUSTON – LOS ANGELES – MIAMI – MONTRÉAL – NEW ORLEANS – NEW YORK PHILADELPHIA – PHOENIX – PORTLAND – SAN FRANCISCO – SEATTLE – TORONTO – VANCOUVER – WASHINGTON DC | **SOUTH & WEST ASIA:** AMMAN – BENGALURU – CHENNAI – DELHI – DHAKA – DUBAI – KARACHI – KOLKATA – MUMBAI

C40 Resilience Networks & Accelerators (CSN)

Urban Flooding Network	37 cities
Water Security Network	21 cities
Urban Heat Network	38 cities
Urban Nature Accelerator	39 cities
Connecting Delta Cities Network	16 cities
Water Accelerator	Coming soon!

MAYORAL LEADS:

Vice chair lead for **adaptation**: Abidjan
Vice chair lead for **urban nature**: Montreal
Lead for **Water Accelerator**: Rotterdam

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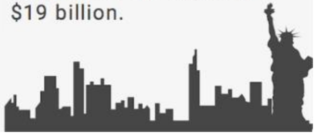
What we are facing

800 MILLION people will live in cities where sea levels could rise by more than half a metre.

$19 billion

90,000 buildings were damaged when Hurricane Sandy hit New York. The storm cost the city over $19 billion.



Globally, economic costs to cities from rising seas and flooding could amount to $1 trillion every year by mid-century.

$1 trillion

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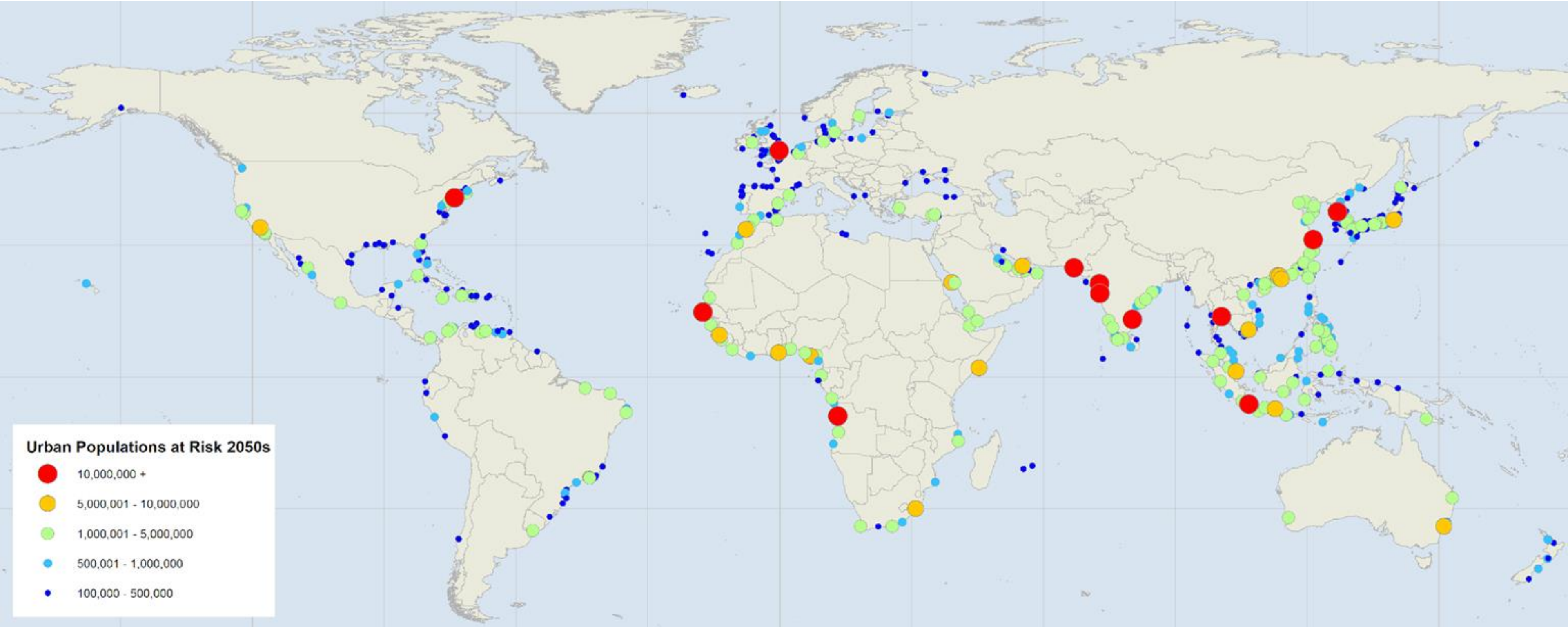
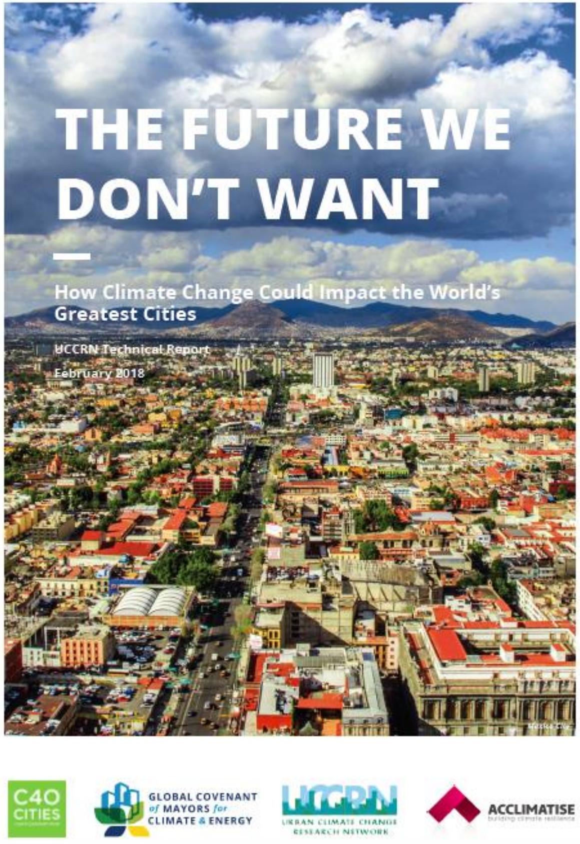


570 cities projected to receive at least 0.5 meters of sea level rise by the 2050s under RCP 8.5


THE FUTURE WE DON'T WANT
How Climate Change Could Impact the World's Greatest Cities
UCCRN Technical Report
February 2018
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GLOBAL COVENANT of MAYORS for CLIMATE & ENERGY
UCCRN
URBAN CLIMATE CHANGE RESEARCH NETWORK
ACCLIMATISE


Water Safe Cities
Narratives Report
June 2022
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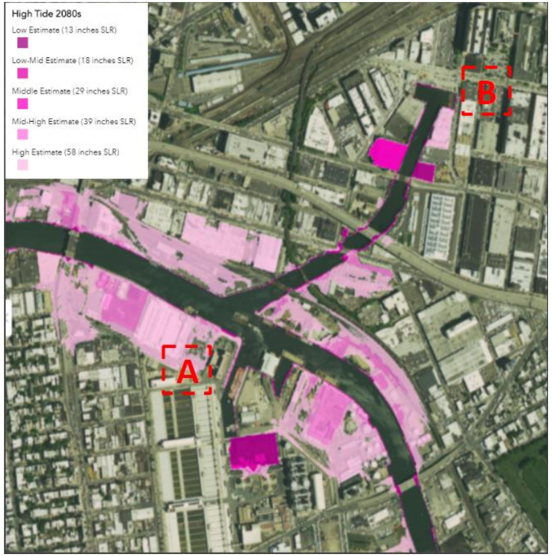
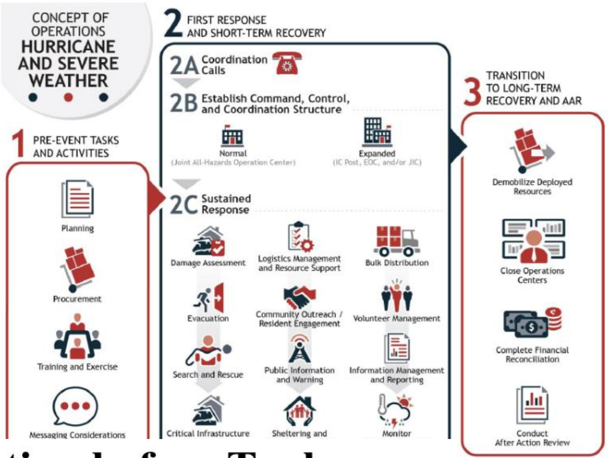
What cities are doing

City Actions

1. Preparedness and Warning
2. Municipal Operations
3. Buffers and Barriers
4. Design and Zoning





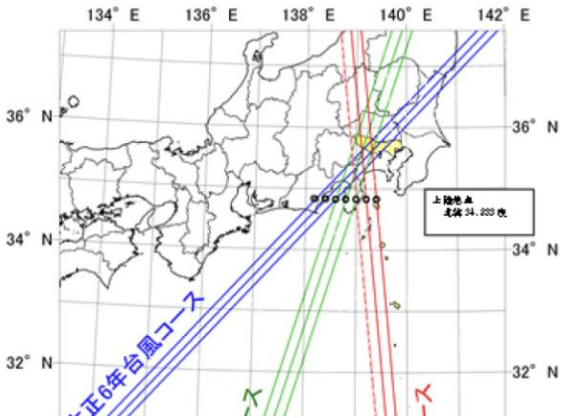
@DOEE_DC

Preparation before Typhoon

First-ever joint video conference of meteorology departments between national and pearl delta cities

- Cross Bureau & Departmental Meetings
- Preparedness and Emergency Services

Preparedness and Warning

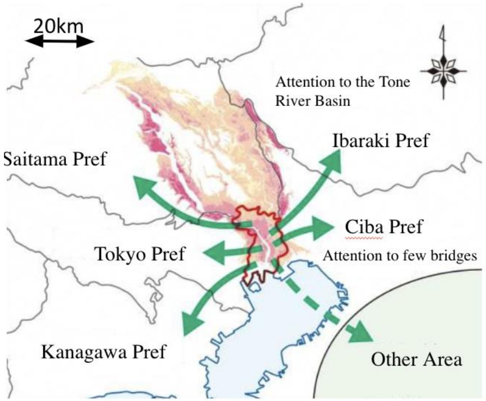


Typhoon A （1917.10）
Select a typhoon route that brought the largest tide deviation (2.1 - 2.3 m) in Tokyo Bay since 1968.

Typhoon B （1949.8）
Select a typhoon route that brought the largest tide deviation (1.4 m) in Tokyo Bay after second world war.

Typhoon C （1959.9）
As an intermediate course of typhoon A and typhoon B, 1959 Typhoon course translated and applied to Tokyo Bay

Image of Broad Area Evacuation



72 hours
Local governments start consideration of evacuation information.
930hpa Typhoon or 400mm/3days(Arakawa river basin)

72-24 hours
Announcement voluntary broad evacuation infomation

24-9 hours
Recommendation voluntary broad evacuation

9-0 hours
Direction vertical evacuation within the region

Source :Koto 5 Ward large-scale flood disaster broad evacuation plan

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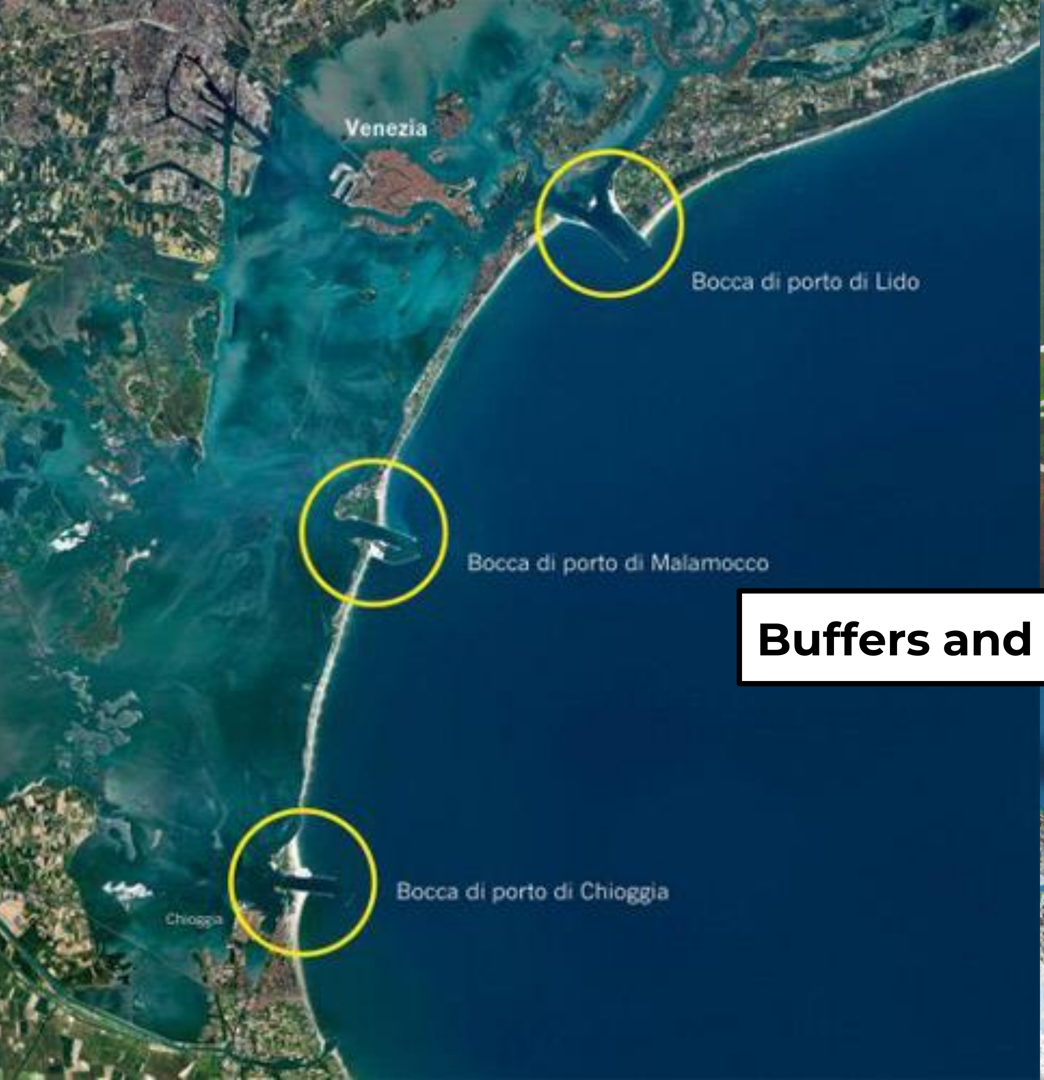
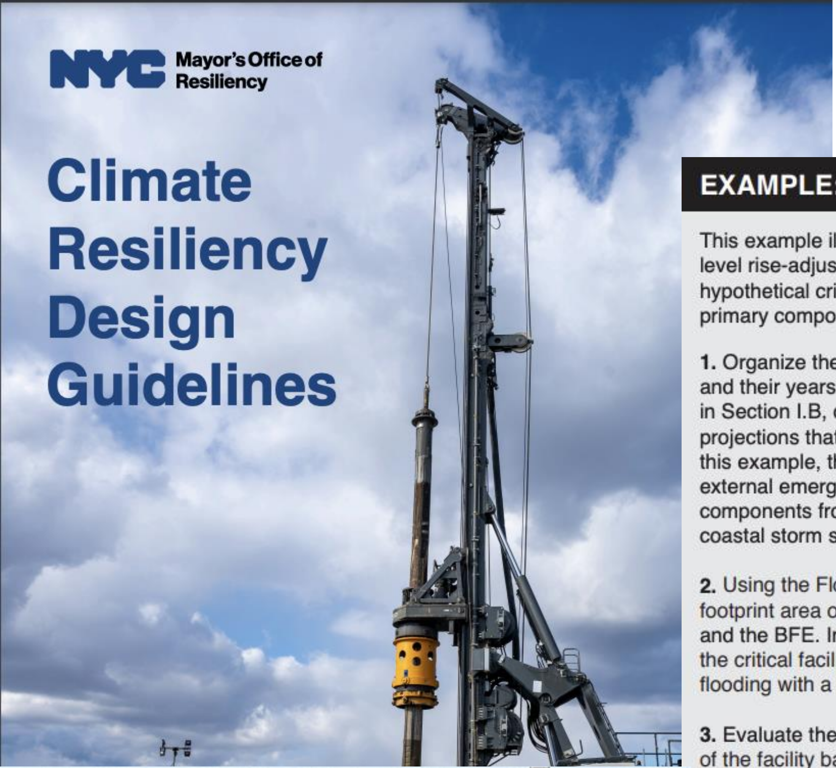
Municipal Operations:

- **Energy, Waste, Shipping, Tourism**

Buffers and Barriers





Design and Zoning

EXAMPLE: How to determine a sea level rise-adjusted DFE

This example illustrates how to calculate a sea level rise-adjusted DFE based on the useful life of a hypothetical critical services building and its primary components.

1. Organize the site by various primary components and their years of construction. Using Table 1 in Section I.B, determine the climate change projections that corresponds to useful life. In this example, the building structure and the external emergency generator are the most at-risk components from combined sea level rise and coastal storm surge.

2. Using the Flood Hazard Mapper, identify the site footprint area on the effective current floodplain map and the BFE. In this example, it was determined that the critical facility site has a 1% annual chance of flooding with a BFE of 13' NAVD.

3. Evaluate the criticality of each primary component of the facility based on the Guidelines' definition for critical infrastructure. This building and its emergency generator are both critical.

4. Table 5 demonstrates how to calculate freeboard requirements and the sea level rise adjustment for each component and calculate the sea level rise-adjusted DFE for each that corresponds to their useful lives.

5. Use the Guidelines' adjusted DFE for each component in the design of the facility.

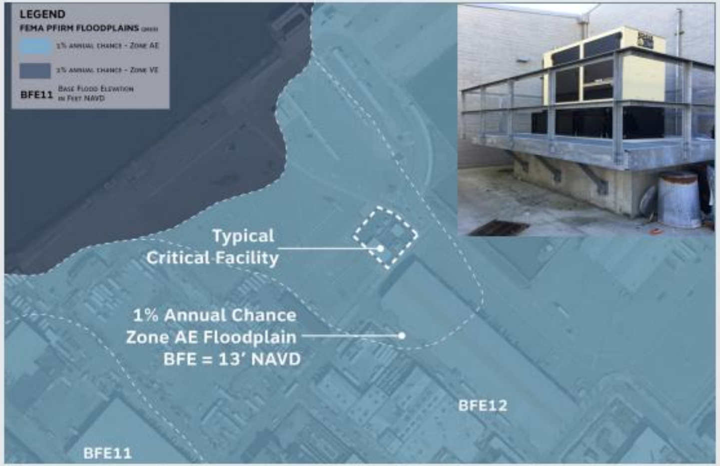


Figure 10 - Example of how to locate a facility within the current floodplain and determine the BFE. Inset: outdoor elevated emergency generator at the facility elevated to a sea level rise-adjusted DFE specific to its useful life.

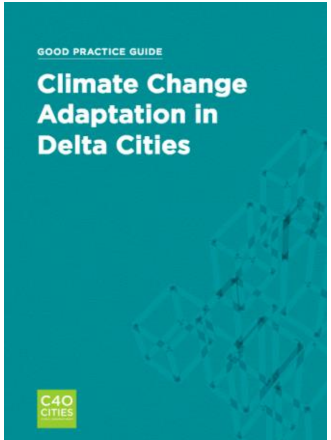
Table 5 – Example of a sea level rise-adjusted DFE for a new critical facility

Construction year	Components	Useful Life	Future Year Scenario [Useful Life + Const. Year]	BFE in NAVD 88 (feet)	Freeboard + Sea Level Rise Adjustment (feet)	Adjusted DFE in NAVD 88 (feet)
2010	Building Structure	70 years	2080s	13.0'	2' + 2'4"	17'4"
2010	Outdoor Emergency Generator	25 years	2020s	13.0'	2' + 6"	15'6"

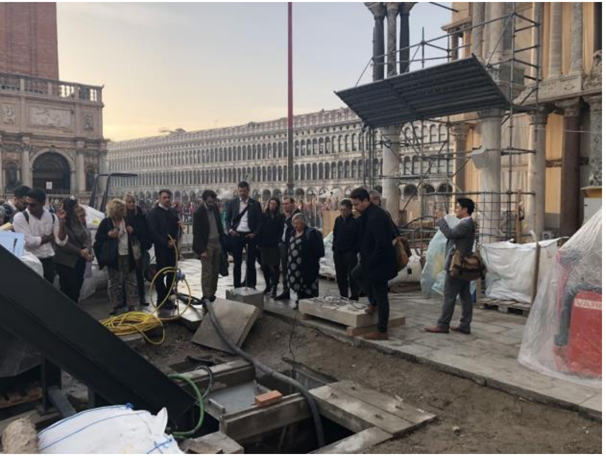
How we are working together

THE CONNECTING DELTA CITIES NETWORK

CDC RESOURCES



CONNECTING DELTA CITIES WORKSHOP, VENICE 2018



“It is hard to imagine a better city and timing to hold a Connecting Delta Cities Workshop than late October in Venice. We could see the city’s long experience in dealing with extreme sea level being put to test, and also learn about further actions that are being implemented and planned to enhance the island’s resilience to an already observed increase in frequency and intensity of flooding.”– Felipe Mandarino, Rio de Janeiro

“The visit of delegates from 10 cities coming from all over the world was an amazing opportunity to discuss climate change adaptation of coastal cities and we are very happy to be able to showcase the actions Venice is putting into practice to limit the impact of flooding, cloudbursts, heavy rainfall and tide surge. We have realized that from a technical point of view every city has its specializations but that the difficulties in delivering comprehensive climate change adaptation are the same at all latitudes. This encourages us and strengthens even more in the action, especially as we draw inspiration as we begin to draft the Venice Climate Action Plan to ensure that Venice is prepared for the future.”
– Massimiliano de Martin, Venice Deputy Mayor

“Engaging with other global delta cities on the increasing risk of coastal flooding due to rising sea levels brought home to us the very real threats and challenges we face together,” said Phetmano Phannavong, DC Floodplain Manager at the District of Columbia Department of Energy and Environment. “Our continued cooperation will help Washington, DC adapt to climate change in innovative and vital ways.”

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Learning with Venice

What Coastal Cities Learned from Venice

- Design limitations of large tidal gates
- Restoring local ecosystems (salt flats)
- Sub-marine infrastructure (preparing for water resilience)
- Public awareness systems

What Venice learned from other Coastal Cities

- Governance leadership on long-term planning
- Inter-agency mainstreaming to prepare for climate risk
- Climate resiliency design guidelines
- Nuances of managed retreat
- Using maps and citizen science in community engagement
- Reducing sediment loss in lagoon to offset sea-level rise

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Thank you!

www.c40.org