Workshop
Safe and attractive waterproof cities

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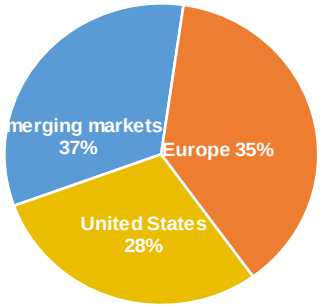
Content

- General presentation Arcadis
- Concepts and best practices for a safe and attractive waterproof city

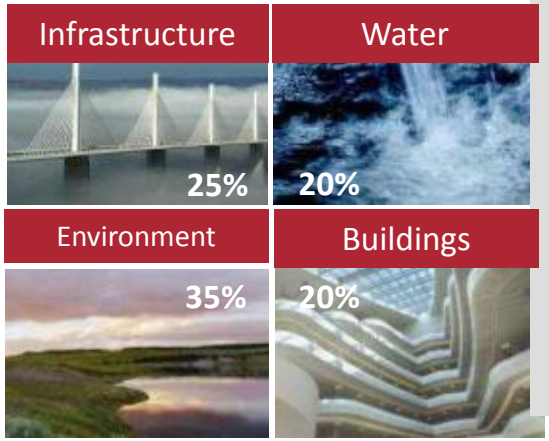
Profile of Arcadis

ARCADIS Design & Consultancy for natural and built assets

Geography



Business lines



Arcadis

Main statistics

- Income € 3,2 bilion
- 28.000 employees allover the world
- Engineering and Consulting Company
- Europe #1
- World #5

Services

- Coordination of Proyects and Programs
- Consulting
- Urban Planning and Arquitecture
- Design and Engineering
- Implementation

Where does Arcadis work?

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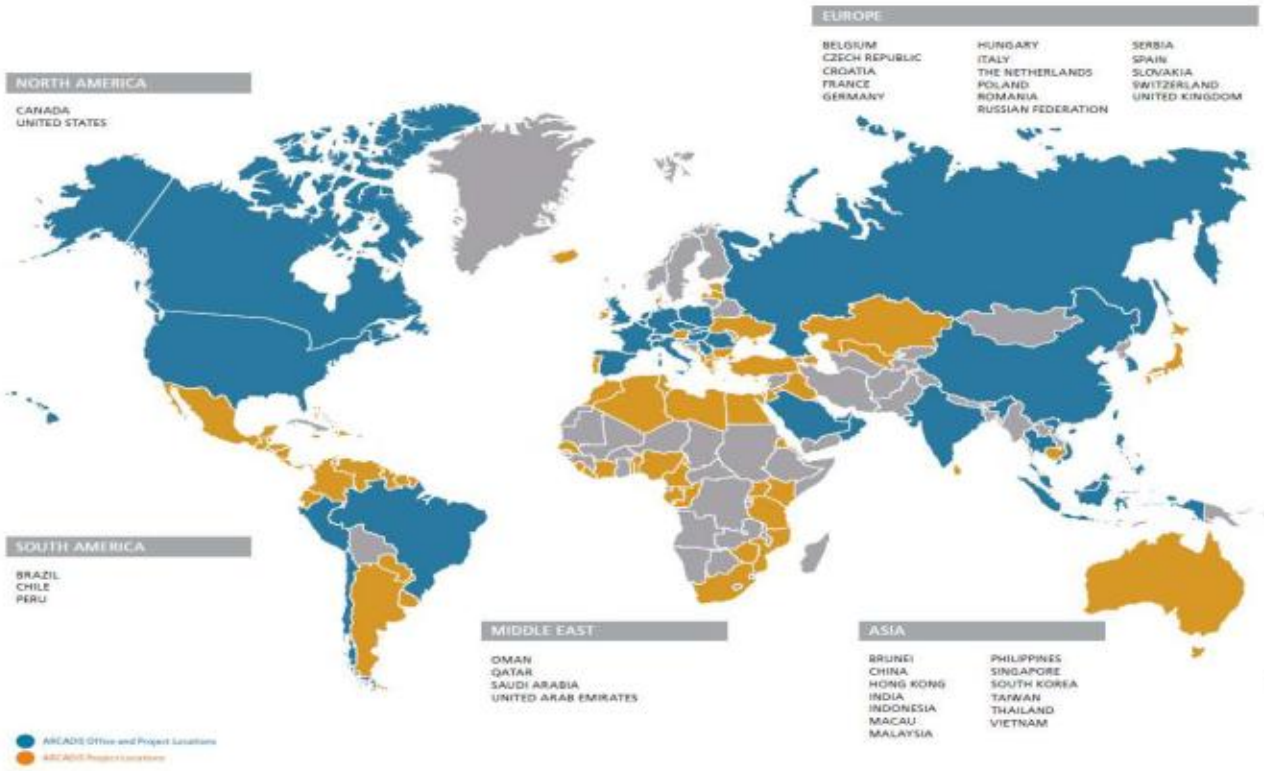


GLOBAL REACH

Our clients want the assurance that they can operate safely, professionally and consistently around the world. ARCADIS offers world class knowledge, expertise and capabilities in the places where you need them.

WHAT WE OFFER:

- Unprecedented depth and breadth of capabilities
- Unparalleled global reach
- Agile culture that mobilizes quickly and seamlessly

MORE FOR LESS

In a tough economy, operating efficiency and reducing waste is essential. Our focus is always on getting you the best value for your investments and delivering positive outcomes reliably and consistently.

WHAT WE OFFER:

- Focus on business performance metrics relevant to you
- Strong management and consultancy culture dedicated to solving problems and streamlining processes
- Integrated solutions that maximize your return on asset investments

Best Practices

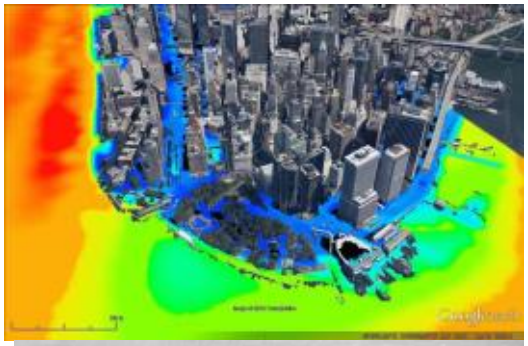
- Resilient critical infrastructure
- Multi purpose flood protection
- Rainproof, sponge cities
- Room for the River
- Building with Nature

New York, Amsterdam, Rotterdam, Wuhan, Sao Paulo

Resilient critical infrastructure

New York City Resilience after Sandy: Translating Risk to Resiliency

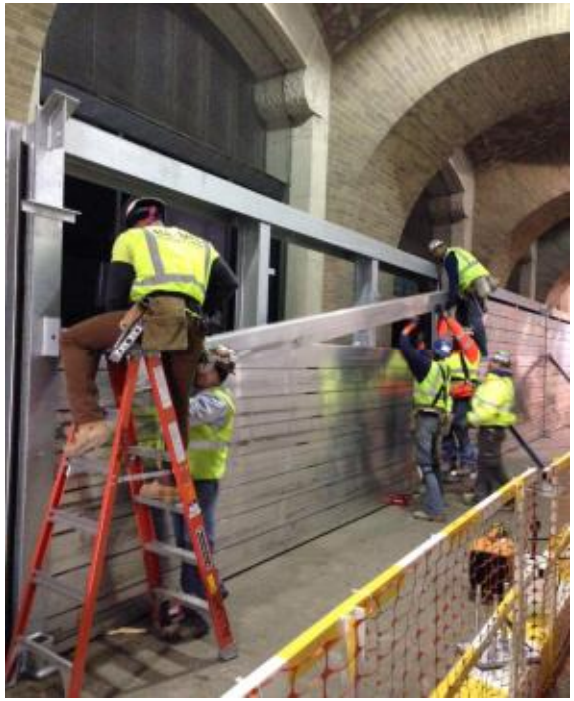
- In between Dutch prevention and US reactive approach, based on experiences in NY, combining basic public flood protection with:



- Protection for critical infrastructure: public transport, telecom, electricity, water, hospitals
- Tailor made resiliency measures for businesses, buildings, communities
- Non-structural: building codes, spatial planning, insurance, acceptance, awareness, education

NY temporary flood resiliency proofing

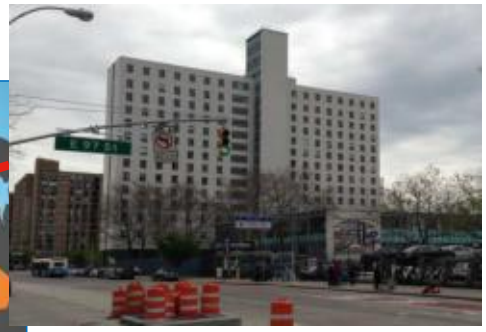
- NYC Telecom client downtown buildings temporary flood walls



Critical Facilities: flood proofing NYC Health and Hospitals Corporation

Coler Hospital – Roosevelt Island

Bellevue Hospital



Metropolitan Hospital

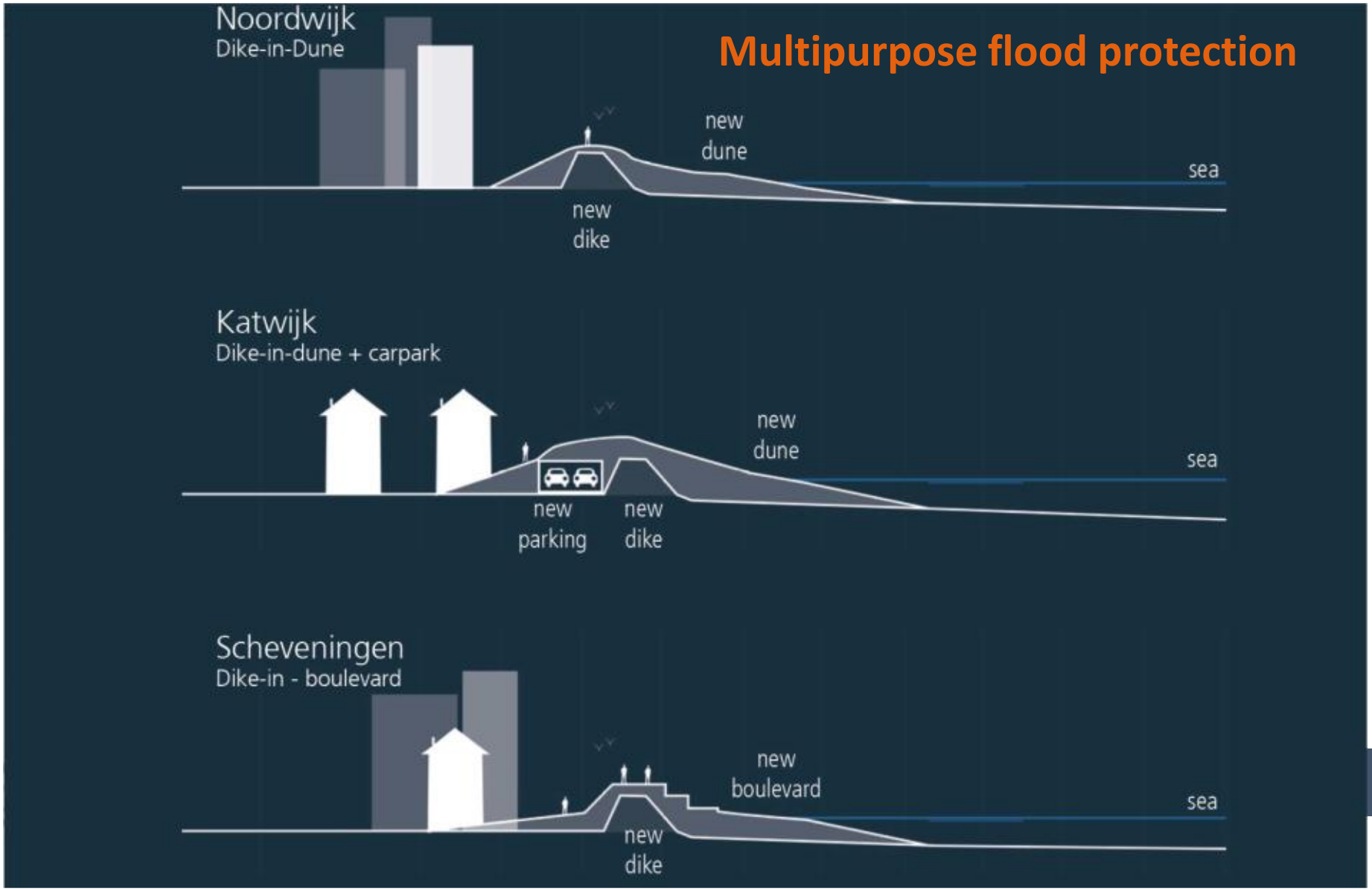
Coney Island Hospital

Bellevue Hospital emergency department

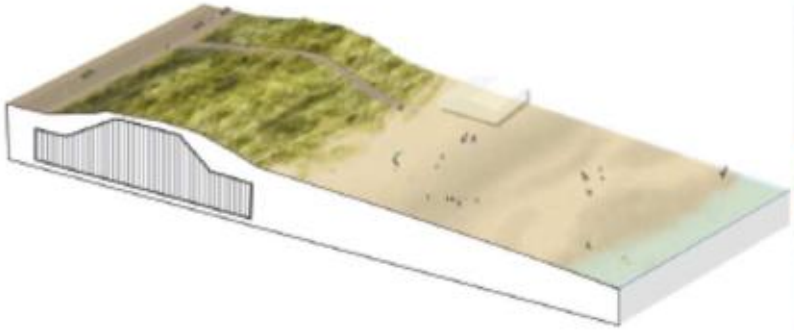
- Elevated emergency department & critical infrastructure $280 million

Multi purpose flood protection

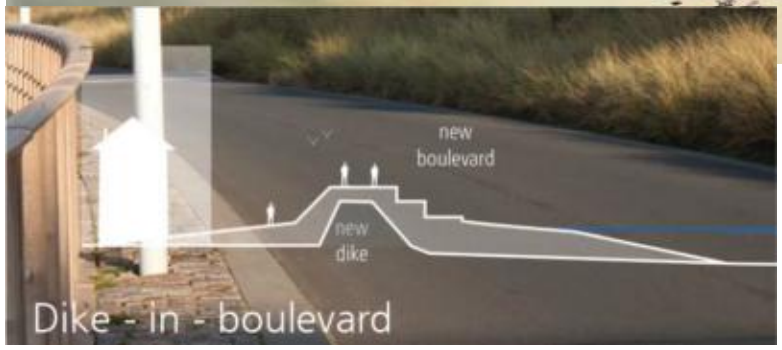
Multipurpose flood protection



Beach resort Noordwijk: dike-in-dune



Beach resort Scheveningen: dike-under-boulevard



Beach resort Katwijk: parking and dike in dune

- Federal flood protection program
- Parking garage, improved boulevard and tourism opportunities
- Public Private Partnership
- National-Regional-Local collaboration

Katwijk impressions after completion

Rainproof, sponge cities

Amsterdam Rainproof

Amsterdam Rainproof

elke druppel telt

Amsterdam Rainproof

- Amsterdam Roof top Solutions

Amsterdam Rainproof

- Amsterdam Roof top Solutions

UNDERGROUND WATER STORAGE

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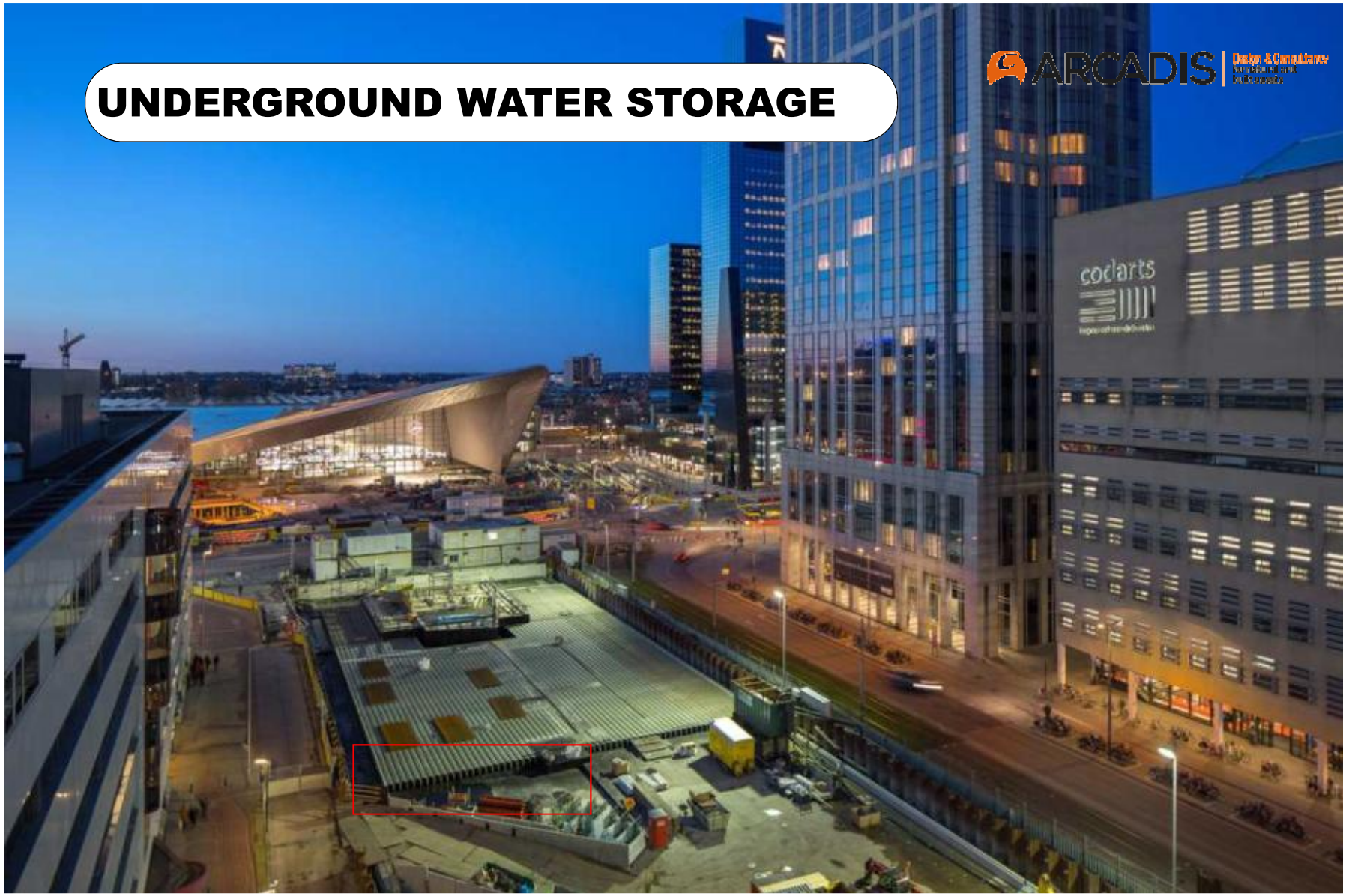
UNDERGROUND WATER STORAGE



Water plaza

Water plaza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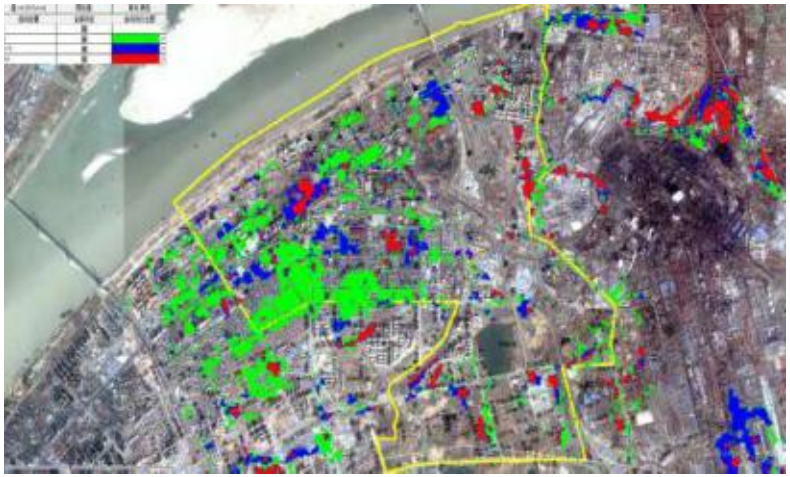
武汉海绵市 Sponge City Wuhan
National & Local Climate Adaptation Program
Protect 12 million inhabitants subject to flooding and intense rainfall
Innovations to create more green public spaces to absorb storm water
More attractive and livable, managing 60 % of the rainwater
ARCADIS

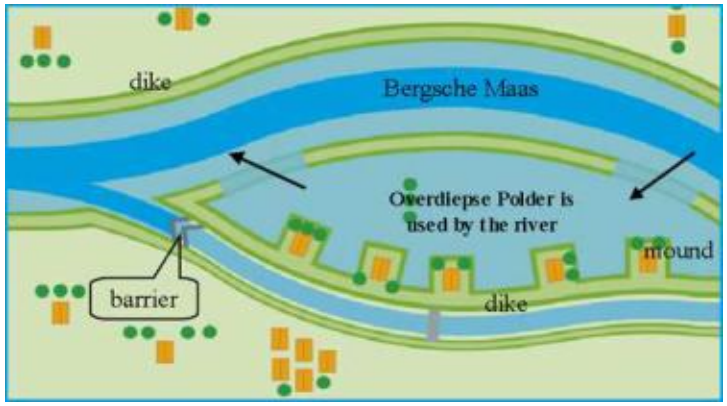
Wuhan Sponge City



Room for the River

Netherlands Room for the River Program

Room for the River Overdiepse Polder



Rio Tiete Linear Parks Sao Paulo

Building with Nature

Building with Nature

- Working with, in stead of against the forces of Nature
- Strengthening the beaches & dunes with enhanced natural sedimentation
- Coastal ecosystem restoration, wetlands
- Part of hybrid multifunctional flood protection
- Cost effective + attractive
- Flexible: monitoring & adaptation

Sand Engine 2011 July

Sand Engine 2015 May

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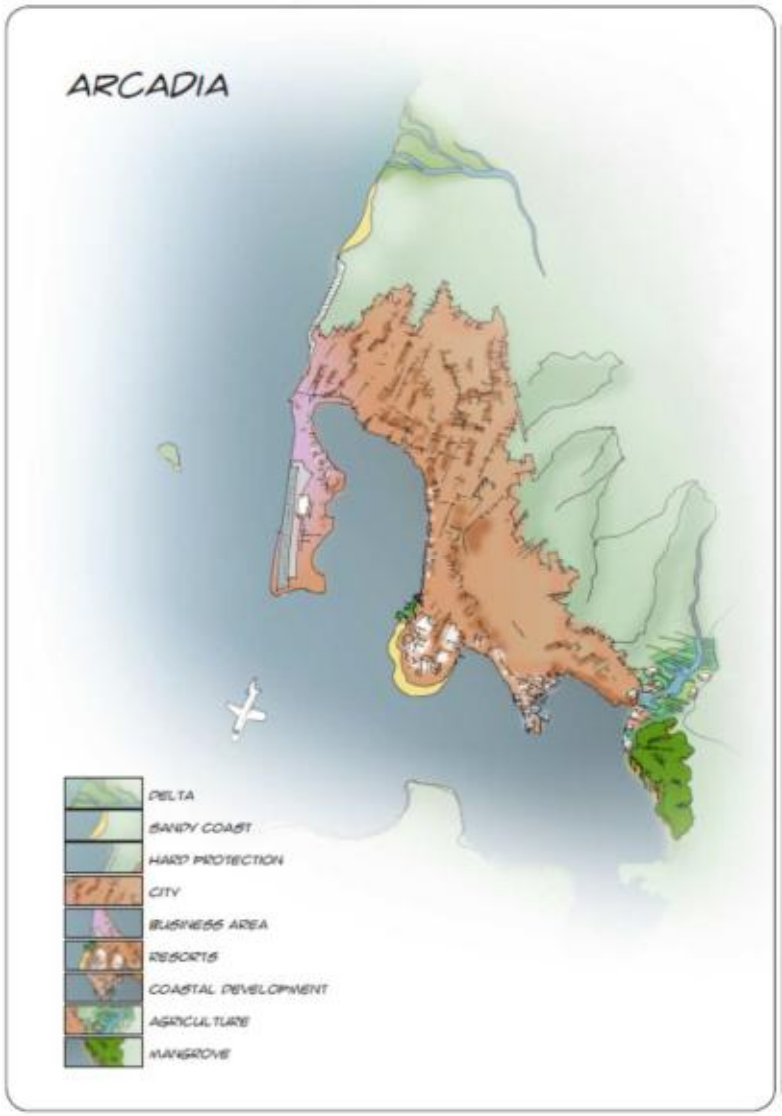
Questions?

Interactive workshop

Case model city “Arcadia”

Arcadia City

- Flood prone area
- More then 20 typhoons per year
- Extreme storm in Nov 2016
- Washed away residential areas
- Over 320 casualties



Goals

- Personal Goals:
  - Learn different concepts for a sustainable, waterproof city
  - Develop the best coastal protection strategy
- General Goals:
  - Make the City of Arcadia an attractive and safe waterproof City

Location and different areas of Arcadia

- The North river Delta supplies sediments. Sea currents are mainly north to south. Has a diverse and resilient vegetation.
- People have indicated the coastline between the city and the North river suffers from erosion; 100-200m of land has been lost in 40 years time. It is a sandy coastline with no protection.
- The Business district and airport are located on the north-west peninsula, for now protected by sea walls and groins. However they have been damaged at a number of locations and need to be repaired.
- Port area: the port is sheltered behind the peninsula, but needs regular dredging because of heavy sediment inflow.
- Arcadia Central is an important tourist hub that acts like a basis to enjoy the surrounding area. However after the disastrous typhoon, tourism is low.
- Most of the settlements are located along the coast line at terrains at levels above the high watermark, experiencing no flooding other than during the typhoon.
- In general people don't want to relocate since alternative housing is not available for everyone or is not providing livelihood alternatives.
- Mangroves and seagrass areas and beach forest provides valuable environmental, but ecologically sensitive areas, that are important production and nursery areas for valuable fish species and non-vertebrate species (crustaceans, bi-valves etc) and thereby contributing to the livelihood of the local fishing communities Most of the mangroves are insufficiently managed and in a less than optimal condition. A condition that calls for improved protection.

Workshop Planning

10.00 – 10.40	**Round 1:** - Physical solutions (30 min.) - Plenary presentations of main conclusions (10 min.)
10.40 – 10.55	Break
10.55 – 11.35	**Round 2:** - Stakeholder identification, stakeholder involvement and value creation (30 min.) - Plenary presentations of main conclusions (10 min.)
11.35 – 12.15	**Round 3:** - Capacity building (30 min.) - Plenary presentations of main conclusions (10 min.)
12.15 – 12.30	Feedback

Round 1: Physical solutions

Drawing the map: 30 min.
Presentation of the main conclusions (by using the map): 5 min.

- Draw a map with physical solutions for the city of Arcadia
- Please use the concepts for a sustainable and waterproof city
- Indicate where and how you would use those concepts
- Use the map of Arcadia

Round 2: Stakeholder identification, stakeholder involvement and value creation

The second round is divided into two parts: Round 2A and Round 2B.

Rounds 2A and 2B each 15 min.
Presentation of the main conclusions: 5 min.

Round 2A

- Identify the main stakeholders at a national, regional and local level
- Discuss what and how their involvement should

Round 2B

- Identify opportunities to increase value and attract financial resources
- Look at the identified stakeholders

Round 3: Capacity Building

Round 3: 30 min.
Presentation of the main conclusions: 5 min.

- Develop a capacity building program for the short, medium and long term. Please think of which capacities are needed for whom and how these can be developed.