SF 81: Flood protection

Fr	B	C	NY	S	T	Total
0	2	3	9	8	6	28

Example:
New York City: When Sandy hit New York City on October 29, 2012, recently made investments paid out: restored wetlands helped to soak up floodwaters, those areas with elevated buildings suffered significantly less damage and much of the sewer system continued to operate and was restored within five days. However, the floods of Sandy also caused massive damage to flooded roads, subway stations, electrical facilities, they paralyzed transportation networks and caused extensive power outages. Although many lessons were learned from Sandy, the City has also come to the conclusion that an up-date of the existing FEMA flood maps for New York State and City will help citizens and businesses to better understand the flood risks, however new flood maps will not help provide information about the changes in flood that are likely to occur in New York since the flood maps can only be based on historic data. To address flood mitigation in the future, New York City has launched the following initiatives[1]:
- Work with FEMA to improve the flood-mapping process
- Work with FEMA to improve the communication of current flood risks
- Explore improved approaches for mapping future flood risks, incorporating sea level rise

Singapore: With 710 km2 and much of its land below 15 m above sea level, Singapore has to cope with coastal erosion as well as significant inundation events not only due to rising sea levels but also due to its specific climate and strong weather variability. The Singapore government has issued several topographical surveys and is analysing 'soft' coastal protection strategies – for example the use of plants – as well as the use of hard walls and stone embankments to prevent coastal erosion. Currently 70 % to 80 % of Singapore's coastline is protected by these constructions. Furthermore, the Public Utility Board (PUB) has a flood management strategy to manage floods which includes providing adequate drainage systems for new developments such as deepening and widening of drains and canals or road level rising. PUB closely collaborates with other government agencies such as the Urban Redevelopment Agency (URA) or the Land Transport Authority (LTA).

Copenhagen: Specifically the past three years, Copenhagen has suffered a number of extreme torrential rains resulting in massive economic damage. In order to improve the city's resilience to better withstand the effects of such disastrious events, the administration has launched a specific Cloudburst Management Plan in 2012, allocating a total of 3.8 bn DKK over the forthcoming 20 years, which includes a multitude of technological efforts to improve the overall flood protection. Hence, there is a tremendous field of business opportunity within this area.

1 See also application field No. 37 Coastal Protection Strategies.

1. Differentiated description of the key field

Generally, coastal protection and sea defense stand for defending against flooding and coastal erosion. According to EUROSION, the European initiative for sustainable coastal erosion management, there are five generic strategies for coastal protection: 1. inaction leading to eventual abandonment; 2. managed retreat or realignment, which plans for retreat and adopts engineering solutions that recognise natural processes of adjustment, and identifies a new line of defense where to construct new defenses; 3. hold the line, shoreline protection, whereby seawalls are constructed around the coastlines; 4. move seawards, this happens by constructing new defenses seaward the original ones; 5. limited intervention, accommodation, by which adjustments are made to be able to cope with inundation, raising coastal land and buildings vertically. Furthermore, coastal protection includes the monitoring of coastal zones through event warning systems, shoreline mapping, beach profiling surveys or video analysis.

2. Reference to sustainability:

Coastal protection strategies for urban coastal areas are a crucial part of a city's resilience framework. Coastal areas are strongly affected by the consequences of climate change such as sea level rising or an increase in storm and flood events. Measures to increase coastal protection contribute significantly to a city's sustainability as they help prevent major ecological and economical losses by facilitating a quick recovery after disastrous events.

Risks in case of not complying: The full and un-attenuated consequences of storm surges or other climate-related natural disasters pose significant systemic threats for people, infrastructures and the overall functioning of urban systems.

3. Relevance to industrial sectors?

Mobility:	High
Energy:	High
Production & logistics:	High
Security:	High
ICT:	Low
Water infrastructure:	High
Buildings:	High

Governance: Middle

Brief description of the high level of importance:
Due to the increasing interconnectivity of literally all physical urban infrastructures (supply lines, traffic nodes, ICT networks), the destruction of one is likely going to cascade onto others. In addition, floods always affect larger areas, hence always inhere the potential of damaging numerous urban areas.

4. Impact (positive & negative)

- Infrastructural and economic losses can be mitigated and most importantly citizens can be protected.
- The functioning of the urban system can be sustained.

5. Implementation measures:

The most common methods of flood control and coastal protection are:
- Self-closing flood barriers (protection against inland waterway floods caused by heavy rainfall or rapid melting snow)
- River defenses (levees, bunds, reservoirs, weirs, dams)
- Coastal defenses (sea walls, beach nourishment, barrier islands, tide gates, dykes, culverts, floodwalls, levees, and local storm surge barriers dams)
- Monitoring of sea level rise
- Minimize upland wave zones: attenuation of waves as to knock down waves or diminish their velocity both on and offshore.
- Improve coastal design and governance: how can natural areas and open space be used to protect adjacent neighborhoods and maintain neighborhood quality of life; how can waterfront assets be managed more effectively?

6. Actors: Who can shape things?

City governments, construction companies, building owners (public, private), utility companies (private and public)

7. Prerequisites:

no prerequisites necessary

8. Obstacles/barriers:

Natural preservation areas, buildings under heritage protection, soft vs. hard measures: rigid floodwalls vs. natural beach nourishment etc., varying responsibilities of federal, state or communal governments.

9. Indicators:

- Historical data on flood occurrence.
- Scenario-based simulation data to identify highly vulnerable flood areas of cities which already include projections of estimated raises in sea-levels as well as potentially expected cloudbursts

10. Special features/remarks: