Infrastructure and Water Management in The Netherlands

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TRB Annual Meeting – Session 503 (ADC60)
P14-5570
January 14, 2013
Geography
Historic Challenges – Oceans & Rivers

- 1953 – Inundation, 2,000 deaths
- 1986 – River pollution backspills
- 1993 – Mass evacuation (250,000)
- 1995 – Mass evacuation
- 2002 – Massive Flooding
- 2013 - (Dec 6) Higher levels than 1953: Surge Barrier Closed – No Inundation
Building with Water – Then and Now

THEN: LARGE-SCALE SINGLE PURPOSE DEFENSES

- Systems of Large Levees
- Movable Barriers
- Reclamation
Hard Response – Deltaworks System
Hard Response – Maeslantkering
Building with Water – Then and Now

THEN: LARGE-SCALE SINGLE PURPOSE DEFENSES

NOW: INTEGRATED RESILIENCY & ENGAGEMENT

- Geography: Coastal as well as inland areas (shores & rivers)
- Temporal: Near-term and long-term measures
- Multifunctional Interests: Economic, Environmental, Open Space, Transportation, Security
- Integration with daily activities and policies (sustainability)
- Scale Diversity: Both Large infrastructures and Small measures
- Layered Defenses: Risk lowering measures; redundancy
- Adaptive: Change by event; willingness to shift priorities
- Ensure Lasting Funding
Engaged Response and Framework

River Flooding: Room for the River

Coastal Flooding: National Coastal Strategy
Engaged Response – Room for the River
Engaged Response – Room for the River
New Coastal Approach
“Resiliency Engine”

ADAPTIVE MANAGEMENT OF THE COASTAL SYSTEM
• Continuous adaptation of soft and hard sea defense to balance sea level rise

ECONOMIC REVITALIZATION OF THE COASTAL ZONE
• Improvement in quality of space for development

FLOOD DEFENSES WITH MULTIFUNCTIONAL SOLUTIONS FOR SAFETY AND LAND USE
• Integration of safety, attractiveness and economic development
ADAPTIVE MANAGEMENT OF THE COASTAL SYSTEM:
Increased nourishment – Safety as Basic Premise
New Coastal Economics

ECONOMIC REVITALIZATION OF THE COASTAL ZONE
"FINANCING SAFETY"
ECONOMIC REVITALIZATION
Coastline:
• Losing its attraction for leisure and tourism due to a lack of investment
• Outdated resort housing
• Nature reserves declining in quality due to lack of natural dynamics

Reinvent the coast as a “Gold Lining”: Places of special economic, ecological or cultural potential and opportunities”.

INTEGRATION:
• COASTAL COMMUNITY
• PROGRAMMING
• FUNDING: Delta Fund + Market

Local authorities
Sectoral Integrated Solutions Along the Coast: Safety, Economics, Transportation
Dealing with Uncertainty: Economic Cycles and Climate Dynamics
Preserve Adaptive Response Options
Thinking about the Future: Consecutive spatial development and safety interventions
Local Adaptation to Uncertainty = Opportunity
Engaged Response – Ecoshaping: Delfland Sand Engine
Multifunctional Solutions – Storm Barrier - Rotterdam
Multifunctional Solutions – The Hague
Storm Barrier
Multifunctional Solutions – The Hague
Storm Barrier
Multifunctional Solutions – Katwijk Dunes
Building with Water – Then and Now

THEN: LARGE-SCALE SINGLE PURPOSE DEFENSES

NOW: INTEGRATED RESILIENCY & ENGAGEMENT

• Geography: Coastal as well as inland areas (shores & rivers)
• Temporal: Near-term and long-term measures
• Multifunctional interests:, Economic, Environmental, Mobility, Security
• Maintain complex, interdependent essential systems (power, telcom)
• Integration with daily activities and policies (sustainability)
• Scale Diversity: Both Large infrastructures and Small measures
• Layered Defenses: Risk-lowering measures; redundancy
• Adaptive: Change by event; willingness to shift priorities
• Life cycle approach: Platform for future modification
• Economics: Public-Private Financing and Operation
Building with Water – Then and Now
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