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Designing For Extremes: Heritage Strategies for Rising Sea Level Adaptation in The Hague

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Abstract
This article presents insights gained from an international research-by-design workshop on the future of the historic harbor of Scheveningen, its heritage and the districts surrounding it in The Hague. The workshop – part of long-standing cooperation between Brazil and the Netherlands on heritage management – explored how and to what extent historic features can accommodate adaptation to rising sea levels. The results of the workshop provide insights for coastal cities worldwide and show that historic features can support nature-based and adaptive strategies for climate resilience and that it is possible to integrate heritage into spatial planning for sustainable urban futures.

Policy Recommendations

- Heritage conservation is important for addressing societal needs through climate adaptation. It should be relocated from the cultural domain, where it has traditionally emphasized history, identity and aesthetics, to the spatial planning domain.
- The Municipality of The Hague should continue taking a "research-by-design" approach while taking sea level rise into account regarding long-term maintenance projects along the coast and in the harbor, including landscape design projects, maintenance of the harbor quays as well as redevelopment projects such as the pier and heritage buildings.
- Local stakeholders should collaborate with local museums, events and outreach programs to disseminate innovative proposals and raise awareness.

KEYWORDS

Sea level rise
Urban resilience
Coastal protection
Heritage management
Designing for extremes

WATER ICONS

CLIMATE

Cfb: Oceanic climate

< Fig. 1 Spatialization of the design principles applied to the city and port scales (Source: NXR, 2024).

Introduction

Heritage holds significant potential as an asset in sustainable development and climate adaptation, as demonstrated globally by numerous urban revitalization efforts. However, this asset is often underutilized and neglected in discussions of development and the climate crisis. Heritage is often considered a vulnerable element in need of protection. For instance, UN SDG 11.4 focuses on the need to "protect the world's cultural and natural heritage" rather than on its ability to contribute to urgently required resilience (Van Oers and Pereira Roders 2014). The New Urban Agenda (Habitat III) takes a more practical approach to heritage, but it has not routinely included heritage in planning (United Nations Conference on Housing and Sustainable Urban Development Quito, Ecuador 2016). The Intergovernmental Panel on Climate Chance (IPCC), in a new report, Climate Change and Cities, also leaves little room to recognize the potential of (and threats to) the historic urban landscape (Special Report on Climate Change and Cities — IPCC). The n x r 2024 | Designing for Extremes research-by-design workshop held 17–21 June 2024, part of a long-standing collaboration between the city of Recife in Brazil and the Netherlands, explored this issue, focusing on the Dutch case of Scheveningen.

The Hague and Scheveningen Harbor

The Hague, the biggest Dutch coastal city in the densest river delta of northwestern Europe, provides an important case study regarding the impact of climate change and sea level rise on coastal cities – and the need for long-term adaptation and mitigation strategies (Kopp et al. 2017; Meulen et al. 2020). The sea has played an important role in shaping The Hague's identity. The sea, beach, dunes, port and boulevard

^ Fig. 2 Urban evolution (1665–1975) and contemporary spatial exploration of Scheveningen (Source: Gemeente Den Haag, DSO and Haagse Kaart (Gemeente Den Haag and Haags Historisch Museum).

offer both residents and visitors to Scheveningen opportunities for rest, recreation, sports, entrepreneurship and a lively environment (Morris et al. 2018; Harris et al. 2014).

Scheveningen is The Hague's seabound city quarter. Although administratively bound to the city since its origins, Scheveningen only merged gradually with The Hague's urban conglomerate in the twentieth century (fig. 3). Originally a small fishing village that began in the fourteenth century, Scheveningen saw its harbor formally constructed in 1894 after a heavy storm wrecked many fishing boats; subsequent expansions in the twentieth century took place to accommodate fishing, transshipment, and later, yachting, shaping its current maritime character.

^ Fig. 3 What if? In the unlikely event of a 2–5 meter sea level rise in the long term, this image visualizes an extreme scenario of flooding for Scheveningen (Source: NXR, 2024).

The Challenge of Sea Level Rise

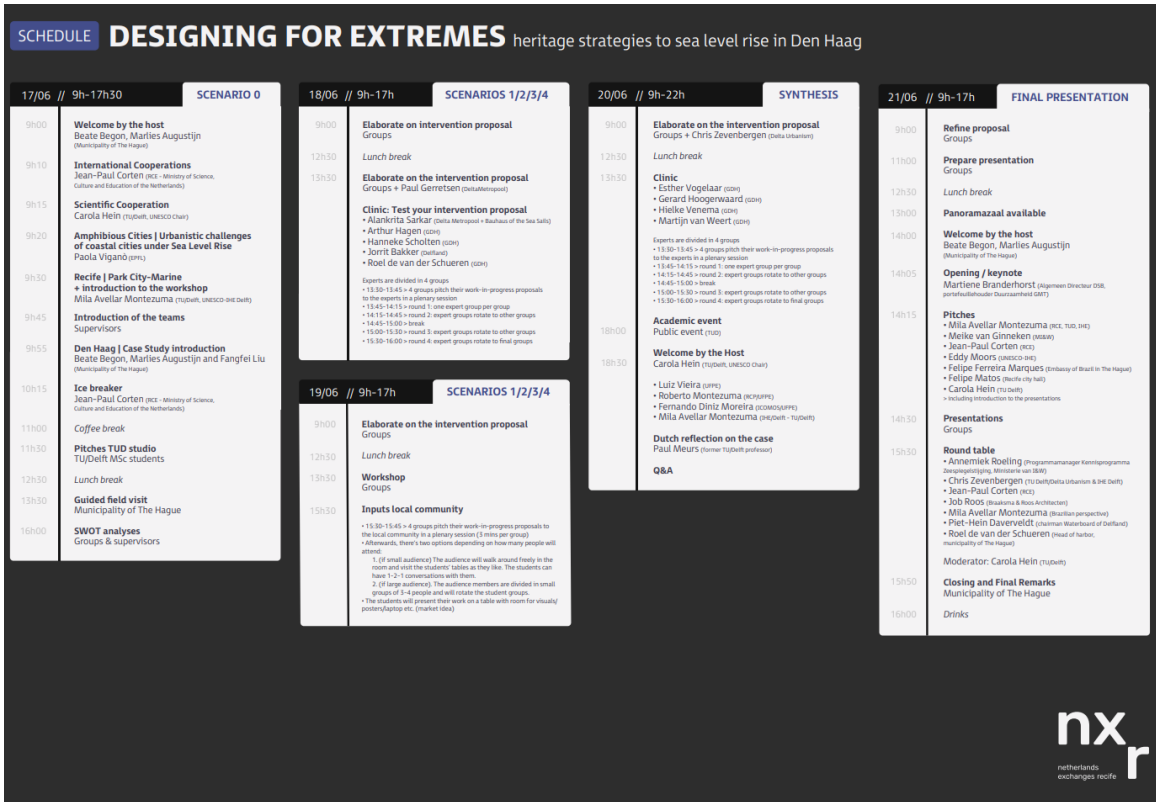
Scheveningen's seaside location makes it especially vulnerable to sea level rise. The latest projections from the Royal Netherlands Meteorological Institute (KNMI) estimate a sea level rise of up to 0.4 m in 2050, up to 1.2 m in 2100 and up to as much as 2 m in 2150. If the Antarctic ice sheet melts at an accelerated speed and greater intensity – which has been the case – sea level rise may be much higher (Kopp et al. 2017; Taherkhani et al. 2020). This poses challenges for Scheveningen's 11-kilometer-long coastline, which can be intensified by compound extreme events (fig. 3). Eight kilometers of this coastline consist of sandy dunes and three kilometers of hard protection measures. The dunes offer solid coastal protection and grow with the rising sea. However, the solidified coastline in front of Scheveningen Bad and Scheveningen Dorp is vulnerable. Here, coastal protection consists of a hard barrier, which cannot adapt to the rising sea without technical interventions. There is no space in the urban landscape for raising and widening the barrier in the long term. Moreover, there is a coastal squeeze in Scheveningen: the beach here is the narrowest one in the Netherlands and the sea is already extremely close to existing infrastructure and buildings. Finally, part of the coastline falls outside the inner-dike protection area and is therefore not protected by the flood defense barrier. This includes Scheveningen Harbor, the Havenkwartier, Norfolk and parts of Scheveningen Bad, which feature important heritage sites.

The national government has developed long-term scenarios for adapting to sea level rise through the Deltaprogramma/Kennisprogramma Zeespiegelstijging, each providing a different perspective of coastal adaptation. These strategies are respectively characterized by "protection," "moving along" and "seaward expansion." The protection strategy continues and optimizes current Dutch water management relying primarily on hydraulic engineering measures such as dike improvements, sand replenishments, sluices and pumping stations. The "moving along" strategy envisions living more with the water and adapting to expanding water bodies. However, it is explicitly stated that fully adopting this approach in the Randstad (the western part of the country, including the city of The Hague and Scheveningen) is unfeasible due to the economic importance of the Randstad area for the whole country. The "seaward expansion" strategy proposes creating a large storage lake along the southwestern coast of the Netherlands (from the head of Walcheren to the head of the Maasvlakte) to accommodate fluvial flooding from the rivers.

All the national strategies impact coastal cities and frame the site-specific interventions for the plans in Scheveningen:

1. The "City by the Sea" scenario aligns primarily with the protection strategy. The city will undertake local prevention and adaptation measures. As a preventive measure, weaker spots in the primary barrier would be strengthened through small-scale interventions such as retaining walls and floodproof buildings. To limit the consequences of flooding, adaptive measures could be undertaken, such as the designation of flood zones.

2. The "City Behind the Dunes" scenario complements both the protection and seaward expansion strategies. In this scenario, the city will focus on creating sandy dunes along the coast along the entire coastline of The Hague. This new row of dunes along the coast can be built in phases over a period of decades and may eventually con-



^ Fig. 4 Overview of the workshop process: Day 1 focused on immersion in land-sea interactions and urban vulnerabilities. Day 2 involved analysis and ideation, with teams proposing adaptation interventions. Day 3 tested these proposals through expert and community feedback. Days 4 and 5 refined strategies, culminating in public debates with authorities (Source: NXR, 2024).

nect the dune areas to the west and east (Westduinpark and the Oostduinpark). The row of dunes would be placed in front of the boulevard and harbor. The beach will then shift seaward.

Ultimately, a combination of these scenarios can be a solution. So far, the national strategies and local solutions have not explicitly considered the historic features of Scheveningen Harbor. For that reason, The Hague municipal government supported the workshop n x r 2024 | Designing for Extremes, which aimed to refine the urgently needed strategies and solutions The Hague is preparing and help to include heritage perspectives.

The Workshop n x r 2024 | Designing for Extremes

The Scheveningen Harbor in The Hague is a historic port and city, but what is the future of its historic features in light of expected climate change? How can these historic features be protected or adapted? How and to what extent can they accommodate Scheveningen's future water challenges? These were the key questions addressed during the workshop, which employed research-by-design as a tool to develop and test adaptive and protective strategies.

The n x r 2024 methodology is rooted in a long-term and fruitful collaboration between Reci-

fe and the Netherlands on heritage management. Students from the MSc 2 course Building Green, taught at TU Delft, developed a detailed analysis of the challenges faced by The Hague, setting the stage for the intense, hands-on workshop that provided the foundation for the creation of a shared database. Together, the Municipality of The Hague, the Cultural Heritage Agency of the Netherlands, the Chair History of Architecture and Urban Planning (TU Delft), the PortCityFutures Center, the Federal University of Pernambuco and professionals from the Netherlands and Brazil then hosted a workshop that involved diverse governmental, academic and non-profit organizations and approximately 100 participants representing 6 out of 7 continents. The outcomes have since been presented as policy advice to the Municipality of The Hague on formulating a long-term strategic vision for Scheveningen's future.

The five-day workshop adopted a hybrid methodology, on site with practitioners, specialists and local community decision-makers co-designing and debating large-scale printed maps – spanning the Netherlands' continental and maritime territory, its delta, Zuid-Holland, The Hague and the port of Scheveningen – with computational drawing software for digital modeling and visualization and an online Miro platform to share the database and to record and receive feedback on daily progress. These tools facilitated a multi-scalar approach, integrating spatial analysis with existing and proposed regulatory frameworks, historical features, biodiversity assessments and floodplain mapping.

Participants engaged with diverse urban and coastal settings, including key local sites and institutions, ranging from Scheveningen's coastline to institutional sites such as the JachtClub, TU Delft and Muzee, facilitating context-driven analyses (fig. 4). The group studied the two scenarios of "protection" and "moving along" as complementary pathways for the port and the larger urban and coastal areas, respectively developing an amphibious infrastructure, and reimagining the city as a resilient "archipelago territory," embracing water as part of the urban fabric and dynamics, with the second approach potentially complementing the first in case of system failure.

Outcomes of the Workshop

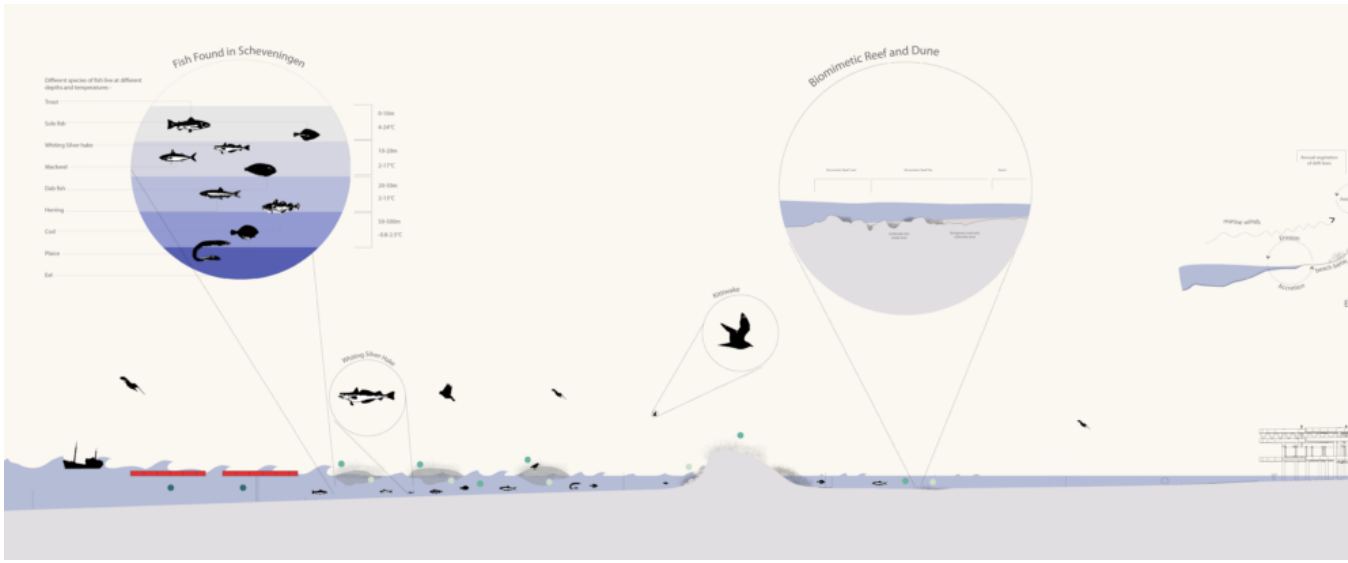
The workshop findings were presented at Muzee — Scheveningen's local museum, rooted in its sea-born culture — to a diverse audience that included local, national and international authorities, involved stakeholders and committed residents (fig. 5), leading to a lively discussion with a panel of experts.

The main conclusion drawn from the workshop was that necessary measures anticipating sea level rise and extreme floods and droughts may be accommodated by Scheveningen's historic features. The workshop distinguished between protective strategies and adaptive strategies, which are not mutually exclusive (fig. 6).

The protective strategy, aimed at keeping the water at bay from the coastal "city behind the dunes," is predominantly nature-based. Expanding the dune landscape westward into the North Sea, along with blue-green network buffers inland and amphibious infrastructure, will provide protection by using existing features. This represents a continuation of a long-standing Dutch struggle against an intruding sea. Historic coastal features such as coastal and marine ecosystems, the open sea, tidal dynamics, extensive beaches and hilly dunes, along with related flora and fauna, will be enhanced

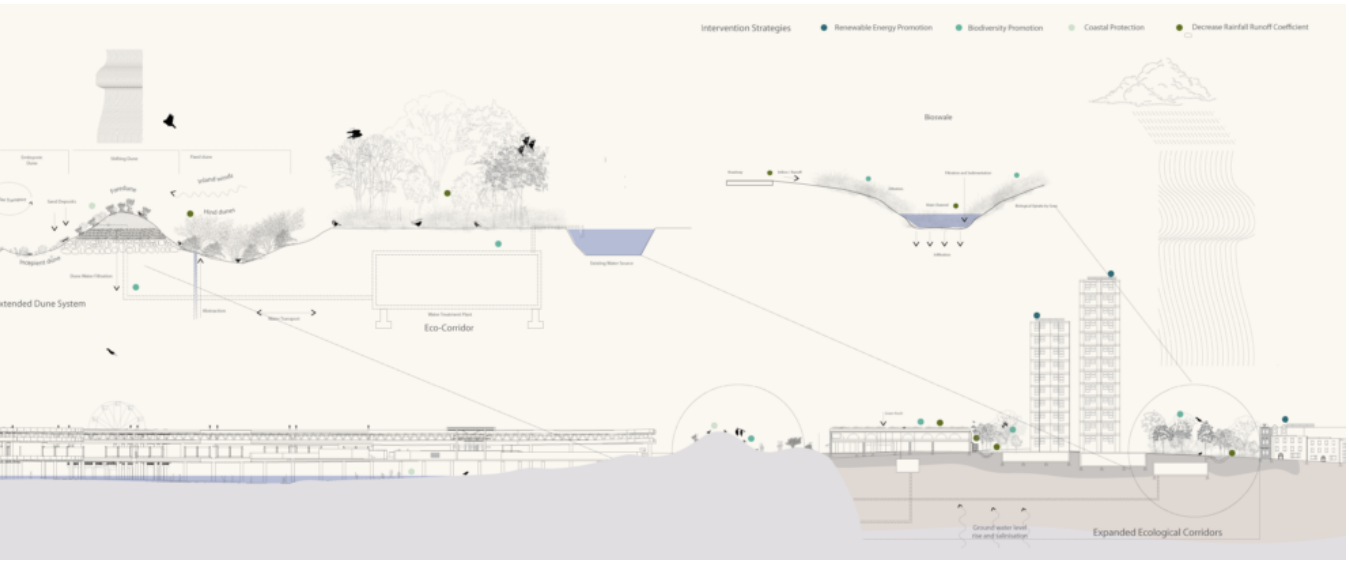
^ Fig. 5 The participatory methodology of research-by-design: technical visits, co-design sessions, testing with multiple stakeholders and public debates (Source: NXR, 2024).

and deployed as protection. Proposed interventions include the restoration of seagrass meadows and biomimicry reefs and the creation of artificial islands to absorb the energy of waves to protect the coastline from erosion. Thus, use of these historic features will restore biodiversity, creating a more resilient coastal ecosystem, while also generating new opportunities for leisure, recreation and sport activities. In pursuing this strategy, we should also anticipate that some species may disappear and others arrive as a result of climate change.



^ Fig. 6 Spatialization of the design principles applied to the city and port scales (Source: NXR, 2024).

The adaptive strategy, on the other hand, focusing on "living with water," largely concerns the urban context. It requires reimagining urban spaces by integrating water-based solutions into existing features. The workshop concluded that the historic urban spaces offer opportunities to accommodate blue-green networks, sponge territories and (semi-) wetland zones. Meanwhile, urban infrastructure requires adaptation to fluctuating water levels with flexible and modular constructions. These include floating platforms, movable bridges and modular building materials that can adapt to changing water conditions. The future use



of the port for the fishing industry will be a challenge, as vessels need access, raising the question of a possible fourth port-basin. Rather than viewing the port as a fixed structure, the participants imagined it as a dynamic space, where different uses and structures could evolve alongside the changing environment. Such adaptive solutions not only support the port's economic functions but also transform it into a resilient, future-ready urban space.

To further develop these strategies, the workshop proposed establishing a living lab, a real-world environment where researchers, users (including citizens and other community members), businesses and public authorities can collaboratively develop, test and refine new solutions, services and policies. This lab would serve as a center for responding to sea level rise, researching future needs, leveraging heritage assets to address these needs and fostering public awareness. For The Hague, such a lab could ensure climate adaptation measures remain flexible, responsive and tailored to Scheveningen's unique context.

Takeaways and Next Steps

The workshop revealed that Scheveningen's historic features, as a dimension of the city and coastal territory, can substantially accommodate much needed climate measures across multiple spatial scales through dual strategies: a nature-based protective approach that involves expanding the historic dune landscape seaward, and an adaptive approach reimagining historic urban spaces through blue-green networks and flexible infrastructure. The workshop outcomes demonstrate that heritage-sensitive climate adaptation can enhance rather than compromise historic coastal landscapes, contributing to multiple SDGs: protecting cultural heritage (11.4) and advancing climate action, while using blue-green infrastructure for adaptive urbanism, scaling up nature-based protective strategies (13) and water management with innovative sponge territories and wetland zones (6) and developing resilient infrastructure using amphibious and modular solutions (9). The decade-long Netherlands-Brazil collaboration, uniting diverse academic, governmental and local stake-

holders, exemplifies the power of international partnerships (SDG 17) in fostering knowledge exchange, capacity building and the generation of new insights and creative ways of meeting global challenges. The findings also highlight the potential value of establishing a permanent living lab, an idea supported by project participants, to foster continuous innovation in heritage-based climate solutions. The n x r 2024 workshop demonstrates that heritage conservation is no longer solely a cultural pursuit but has become a spatial endeavor that is important for addressing societal needs through climate adaptation. It should be relocated from the cultural domain, where it has traditionally emphasized history, identity and aesthetics, to the spatial planning domain – where it can actively contribute to resilient and sustainable urban development. Furthermore, the workshop's findings and takeaways are relevant to port city territories worldwide, including partner city Recife.

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Finally, thank you to everyone behind the scenes, from coordinators to facilitators, who made this event a meaningful step toward resilient futures for coastal cities.

The full list of participants, experts and support team members is available here: https://recifeexchanges.com/netherlands/.

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Beate Begon is an urban designer who has been working in the Netherlands since obtaining her degree in architecture at RWTH Aachen University in Germany. She leads the urbanism division of the BDP Rotterdam studio as an urbanism associate. Fascinated by urban transformations, she has worked on projects in the Netherlands and Germany. In her role as a policy advisor on urban development for the Municipality of The Hague she is involved in the ongoing developments along the Scheveningen Coast - from Scheveningen Harbor to the revitalization of the pier. Together with Marlies Augustijn, she is developing a long-term strategy for The Hague regarding coastal protection and sea level rise, aiming to provide an integrated design approach taking into account the spatial qualities, historical value and natural habitats of the Scheveningen coast.

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