Designing Resilient Public Spaces in Het Hogeland: Adaptive approaches for Urban Water Cycle

Planification spatiale pour des espaces publics résilients à Het Hogeland : Approches adaptatives pour le cycle urbain de l'eau

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RÉSUMÉ

Cet article présente une méthodologie intégrée pour la conception des espaces publics dans la commune de Het Hogeland, combinant l'adaptation climatique, le patrimoine culturel et le bien-être social. L'approche s'articule autour du cadre « Analyse – Ambition – Action » et intègre quatre niveaux d'ambition : maintenir, optimiser, renforcer et transformer. Les principes de conception sont guidés par une boussole de valeurs équilibrant six dimensions : qualité spatiale, santé et bien-être, mobilité, économie, climat et environnement. Des profils représentatifs de typologies spatiales — telles que rues, places, parcs, routes et ports — incluent des stratégies par phases (« Maintenant, Bientôt, Plus tard ») pour soutenir une mise en œuvre adaptative. Une attention particulière est portée à la chaîne de l'eau (cycle urbain de l'eau) lors de la phase Analyse, où les scénarios de risques futurs, les cadres juridiques et les mesures d'adaptation ont été évalués et catégorisés par niveau d'ambition afin d'informer les principes de conception intégrée. La méthodologie est liée au Programme des Espaces Publics, qui offre au conseil municipal une perspective prospective à travers des profils conçus intégrant des mesures issues de plusieurs disciplines. Ce programme vise à inspirer les concepteurs futurs en alignant la qualité spatiale avec la résilience climatique et les besoins de la communauté. Les résultats mettent en évidence l'intégration systémique et les processus participatifs comme clés pour des espaces publics résilients et inclusifs. L'approche propose un modèle évolutif favorisant l'échange international de connaissances en matière de planification urbaine et de gouvernance, avec un accent sur l'adaptation climatique face à l'augmentation des risques climatiques et des événements météorologiques extrêmes (IPCC, 2023).

ABSTRACT

This paper introduces an integrated methodology for public space design in Het Hogeland municipality, combining climate adaptation, cultural heritage, and social well-being. The approach is structured around the "Analyse – Ambition – Action" framework and incorporates four ambition levels: maintain, optimize, strengthen, and transform. Design principles are guided by a value compass balancing six dimensions: spatial quality, health and well-being, mobility, economy, climate, and environment. Representative profiles of spatial typologies—such as streets, squares, parks, roads, and harbors—include phased strategies ("Now, Soon, Later") to support adaptive implementation. A dedicated focus is placed on the water chain (*waterketen*) during the Analyse phase, where future hazard scenarios, legal frameworks, and adaptation measures were assessed and categorized per ambition level to inform integrated design principles. The methodology is linked to the Public Space Program, which provides the municipal council with a forward-looking perspective through designed profiles that integrate measures from multiple disciplines. This program aims to inspire future designers in this program by aligning spatial quality with climate resilience and community needs. Findings emphasize systemic integration and participatory processes as key to resilient and inclusive public spaces. The approach offers a scalable model for international knowledge exchange on urban planning and governance, with a focus on climate adaptation in response to increasing climate risks and extreme weather events (IPCC, 2023).

KEYWORDS

climate adaptation, Het Hogeland, multidisciplinary approach, public space design, resilience, spatial quality, adaptation climatique, Het Hogeland, approche multidisciplinaire, conception des espaces publics, résilience, qualité spatiale

1 INTRODUCTION

Het Hogeland is confronted with interconnected challenges, including climate change, demographic shifts, and the preservation of cultural heritage. Public space design must integrate essential domains such as water management, biodiversity, and social and recreational functions, while also accommodating critical infrastructure like underground utilities (cables and pipelines), mobility systems, greenery, lighting, and civil structures to create resilient environments. The municipality has initiated a comprehensive guideline to align spatial quality with sustainability and community needs. To address these challenges, the municipality initiated the *Public Space Program*, a comprehensive guideline that aligns spatial quality with sustainability and community needs while offering a forward-looking perspective to the municipal council. Designed profiles within this program integrate promising measures from multiple disciplines, aiming to inspire future public space designers and support evidence-based decision-making.

2 METHODOLOGY

The guideline was developed through a combination of workshops, stakeholder interviews, and spatial analysis. The "Analyse – Ambition – Action" framework guided ambition setting, while the value compass ensured balanced decision-making across spatial, ecological, social, and economic dimensions. Four ambition levels—Maintain, Optimize, Strengthen, Transform—provide decision-makers with insight into future scenarios and enable phased implementation. During the Analyse phase, existing green infrastructure was mapped alongside more than 100 climate adaptation measures addressing flooding, drought, and heat (Delta Programme, 2024), as well as biodiversity and human well-being. Urban small-scale solutions such as bioswales, permeable pavement, and green roofs were identified and evaluated. Compared to the neighboring dense city of Groningen, Het Hogeland exhibits fewer projects and a distinct "bar code" or DNA (Boogaard & Kondratenko, 2024) of adaptation measures (Figure 1), relying primarily on surface water retention ponds and grass-filled pavers as permeable pavement. Measures such as floating urbanization, subsurface storage, infiltration systems, and rain gardens are found only in the city, not in the rural areas of Het Hogeland.

In this paper, a dedicated focus is placed on the water chain (*waterketen*) during the Analyse phase to map systemic interdependencies with other domains such as mobility, underground infrastructure, and ecological networks. The methodology here integrates future hazard scenarios into design principles to ensure long-term resilience. Legal frameworks and regulatory obligations were considered to align measures with national and municipal standards. Measures were categorized per ambition level to support adaptive planning. A case study on the water chain illustrates systemic interdependencies and responsibilities across disciplines, reinforcing the need for integrated governance and cross-sector collaboration.

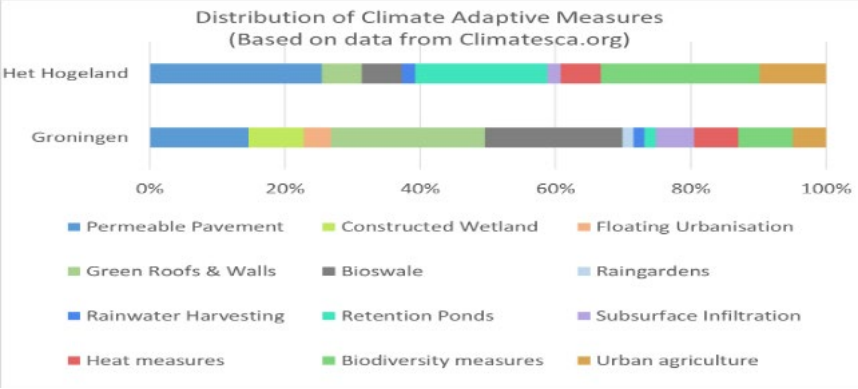

Figure 1 the climate adaptation DNA of Het Hogeland compared to the city Groningen

3 KEY FINDINGS

Profiles of various public space types—streets, squares, parks, and harbors—integrate adaptive measures for water retention, shading, and accessibility. Cultural heritage and future challenges related to climate and biodiversity jointly shape the identity of public spaces and inform design decisions. The phased approach ("Then, Now, Soon, Later") ensures flexibility and long-term sustainability. In workshops, existing climate adaptation measures were reviewed, and additional opportunities were identified within current infrastructure guidelines

(CROW, 2023), with attention to cost-effectiveness and asset management for long-term efficiency (IWA, 2024). The findings also demonstrate how the Public Space Program can serve as an inspirational tool for designers, offering visual profiles and interdisciplinary strategies that combine technical, ecological, and social objectives. The water chain case study illustrates the importance of cross-sector collaboration and systemic integration for resilient public space planning.

4 CONCLUSION

Integrated design for public spaces strengthens resilience and enhances livability. Its success depends on collaboration among planners, engineers, and communities, supported by clear guidelines and phased strategies. The "Het Hogeland strategy" demonstrates how systemic frameworks can bridge technical, cultural, and social objectives. In the future, this guideline will be incorporated into a "Public Space Program," providing detailed domain-specific information and forming the foundation for the municipal environment plan (Omgevingsplan). Additionally, the program will offer decision-makers inspirational visual designs (Gemeente Het Hogeland, 2025) and evidence-based measures to guide adaptive public space development. This approach provides a scalable model for international knowledge exchange on urban planning and governance, with a strong focus on climate adaptation and interdisciplinary integration.

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