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Towards Improved Flood Resilience: Integrating Flood Protection And Spatial Planning In Urbanized Deltas.

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In urbanized deltas around the world, flood resilience is under pressure due to climate change, urbanization, and other societal developments. Especially in the Netherlands, flood risk management (FRM) has long relied solely on flood protection through the construction of engineered structures to prevent floods from happening (Verweij et al., 2021). However, focusing on flood protection only is not sufficient in the future due to climate change and increasing urbanization (van Buuren et al., 2016). In light of these challenges, the multi-layered safety approach was introduced in the Netherlands in 2009, which complements the prevalent first layer in the Netherlands, 1) flood protection, with two additional layers: 2) resilient spatial planning, and 3) emergency management (Oukes et al., 2022). The addition of these two layers exemplifies the shift from traditional FRM towards integrated FRM. This is also referred to as the diversification of FRM strategies, which has the potential to enhance flood resilience (Hegger et al., 2016). However, despite its potential, the integration of flood protection and spatial planning has proven challenging and remains underutilized. The flood resilient landscapes approach is seen as a promising concept that tries to address that gap by integrating flood protection and spatial planning as a means to enhance flood resilience. Unlike traditional FRM methodologies, which mainly focus on hydrological scales, the flood resilient landscapes approach applies to a landscape scale and aims to create additional public value through the realization of co-benefits and synergies. Besides that, it explicitly takes the future into account in spatial developments. However, the implementation of flood resilient landscapes does not fit the status quo in FRM in the Netherlands.

This research takes the urbanized deltaic region of Zwolle in the Netherlands as geographical scope and focuses on three main directions that currently hamper the implementation of a flood resilient landscapes approach. First, we see that in integrated FRM a governance context that facilitates cross-sectoral collaboration is necessary to enhance resilience. However, in the prevailing governance context a multitude of actors are present that are mainly working in their own sector only, which indicates that integration is currently hampered. Therefore, we try to identify if actors have the capacity to work on interconnected societal and climatic issues by conducting a social network analysis of actors and policy issues present in the governance context. Second, drawing boundaries and identifying which internal and external factors to include in processes leading toward flood resilience is challenging due to the complexity of the social-ecological systems they are implemented in. Through literature review and qualitative research methods we try to demarcate this system and identify which goods and services to include, or not, in integrated FRM approaches. Lastly, we notice that assessment frameworks are mainly costs centered, focusing on short-term process values such as efficiency and effectiveness. However, considering both climatic and societal uncertainties, flood resilient landscape alternatives should be forward-looking by actively taking into account the future. Through qualitative research methods we develop a forward-looking assessment frameworks that support decision-makers in making future-proof decisions that facilitate the implementation of flood resilient landscapes. Based on the abovementioned three main study directions this research aims to identify opportunities, bottlenecks, building blocks, and pathways for the implementation of a flood resilient landscapes approach that contributes to improved flood resilience of urbanized deltas.

Keywords : Flood resilience, Spatial planning, Forward-looking, Climate adaptation, Integration