A Digital Twin-Based **Framework** for Climate-Resilient Flood Management in the Netherlands

Research Overview

Background: The South-Holland Delta is flood-prone to rising seas and storms. The Dutch Delta Programme aims for resilience by 2050, but static models limit understanding.

Problem: Inefficient integration of real-time data, simulations, and climate scenarios hinders decision-making, slowing adaptation and hydraulic design.

Solution: A Digital Twin (DT) combines data, models, and 3D visuals for dynamic flood analysis, adaptation testing, and accessible insights, boosting resilience, reducing risks, and aligning with EU/Dutch goals.

Approach: A phased methodology to build and deploy the DT

1. Identify Key Data & Risks

GIS data (DEM, land use), sensor data (water levels, rainfall), and climate projections. Focus on high-risk areas like dikes and urban zones.

2. Analyze impacts

using life-cycle assessment and hydraulic modeling to simulate floods, calibrated with historical data.

3. Develop Resilient DT Model

modular architecture, real-time monitoring, eco-friendly decisions, and continuous improvements. Integrate 3D visuals for interactive scenarios.

4. Sustainable Implementation

Transparent model promotes resource efficiency and circular adaptation. Assess governance impacts to promote low-impact practices.

Call to Action for Stakeholders

Sustainable Leadership

Align water boards, planners, and communities to adopt DT for evidence-based decisions.

Standardized Data Prioritization

Focus on high-impact areas to identify pressing risks and pressing DT issues.

Phased Approach

Structured timeline ensures each stakeholder (engineers, policy-makers, public) has a clear role in fostering resilient flood management, advancing climate goals and social wellbeing beyond the Delta.

Assess Environmental Governance

Transparent model promotes resource efficiency and circular adaptation. Assess governance impacts to promote low-impact practices.

Join us: Demo the prototype, collaborate on real-time integrations, and scale for Dutch/EU adaptation.

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Keywords: Digital Twin, Flood Management, Climate Adaptation, Hydraulic Modeling, GIS, Netherlands
Acknowledgments: Inspired by Deltares, CLIMATE-IMPETUS, and Dutch Delta Programme.