



Redesigning Deltas: Student perspectives unveiled





Fahira Gearahmani Gatot

Governance Gaps behind the Construction and Dredging in Poso 1 Hydrodam (Central Sulawesi)

The Poso Hydrodam project, initiated in Central Sulawesi, Indonesia, demonstrates significant governance challenges in delta environments. The project that is positioned as a key component in Indonesia's transition to sustainable energy, drastically altered the socio-ecological landscape of the Poso River basin, highlighting major governance lapses. Student Fahira Gearahmani Gatot analysed these issues through the lens of OECD's 12 Principles of Water Governance and the Multi-Level Governance Gaps framework.

Historically, the Poso River and Lake ecosystem, rich in biodiversity and crucial for local livelihoods, maintained a natural water height cycle facilitating agriculture and fishing. The dam's construction, commencing without a mandatory Environmental Impact Assessment, disrupted this balance, causing ecological damage and socio-economic upheaval. The governance structure, involving Poso Energy – the operator of the dam – and government bodies, failed to effectively manage operational responsibilities, leading to environmental and social impacts.

Analysing the governance issues, the project violated several OECD's Water Governance principles, notably in stakeholder engagement, transparency, and policy coherence. The case is an excellent example for the need for multi-level governance reforms, emphasizing stakeholder participation, transparent processes, and stringent environmental compliance in the construction of delta infrastructures.

Matthijs Verdaasdonk

Water scarcity - How policy developments can be bolstered to align with the arising changes until 2050

During my research I looked into possible additions to the recent policy, with regard to water scarcity, to ensure that this national policy is in line with the changes that are coming. On the one hand, I analysed the developments in policy documents on this topic. On the other hand, a model study has been carried out to get an overview of the changes the Dutch water balance will experience in the next thirty years. Bringing these two aspects together gave a great view of additions that can benefit the way water scarcity policy is prepared for the future.

The initial reason for this research was an opportunity at the Ministry of Infrastructure and Water Management, where the Department of General Strategic Advice was interested to know how policy on water had developed and how these developments are in line with the challenges the Netherlands faces. I come from Zeeland in the southwest of the Netherlands, where dry summer has more and more impact on how freshwater is utilized. This experience, and the eagerness to know how this situation will develop, led to the choice to use the opportunity given by the Ministry to research this topic for my master thesis.

During my research two aspects stood out, being agriculture in low-lying polders and nature areas. The agricultural sector in low-lying polders is supposed to convert to more salt-tolerant crops, but to redesign the delta, the Dutch policy would benefit from a much clearer roadmap than the case currently is.

The second aspect, natural areas, are likely to experience more and more water shortages as they are the first to be cut off based on the water distribution priority sequence. These shortages will increase because it has become clear that the precipitation deficit during the summer will increase, combined with a decrease in the river discharge from the Rhine. To prevent unrecoverable damage to those areas, policy documents should contain considerations about when this water supply should be restored, so that nature areas don't deprive further than they already have in the last decades.



Vince Deelman, Kjell Albers, Siebe van der Burg, Max Verberne

DISASTER RESILIENT GALVESTON - A multidisciplinary project on the design of sustainable measures to counteract coastal and pluvial flooding issues in Galveston

The report tackles Galveston's flooding challenges, which are currently in development with the US Army Corps of Engineers (USACE) ring barrier. This design is vital, since the South of Texas has experienced catastrophic hurricane events over the past years, which are only getting worse in the face of climate change. However, the current design, predominantly addressing coastal flooding, falls short in dealing with pluvial flooding, relying heavily on pumps. This top-down approach neglects environmental and stakeholder considerations, resulting in a decoupled response to compound flooding, lacking adaptability, and overlooking the impact of chronic flooding on local businesses. The central research question revolves around reshaping the Galveston ring barrier in The Strand area for enhanced functionality against both coastal and pluvial flooding, sustainable management of catastrophic and chronic flooding, and improved public space value.

The methodology consist of a literature review, fieldwork in 'The Strand,' stakeholder engagement in Texas, the design of multiple alternatives that deal with the issue at hand and evaluation through a Multi-Criteria Analysis. Two alternative designs, sensitive to identified issues, are presented for the Strand area. The outcome emphasizes an interdisciplinary approach incorporating the knowledge of the different academic backgrounds of the team, with designs adaptable for broader implementation in Galveston.

The design alternatives centres on measures to counteract flooding, specifically cloudburst roads, retention areas, and a promenade. The project area, focusing on a 1 km stretch, offers local adaptation measures, with potential extension to larger areas to explore system behaviour on a larger scale. Not only do the implemented measures protect against coastal- and pluvial flooding events, but they also add significant spatial value to the surrounding by including multifunctionality.

The study notes the uncommon implementation of sustainable drainage systems in the United States, highlighting the importance of addressing common failure causes such as incomplete knowledge and poor communication.



Nicole Chang

(Re)introducing co-existence: Unfolding the urban-water-soil metabolism on the coast of Paramaribo

The coast of Paramaribo is predicted to undergo urban expansion due to the growing population of Paramaribo. However, the coast has to do with several challenges; tidal- and urban flooding and coastal erosion. This does not make the coast the most habitable place for urban expansion. The urban, water and soil systems are not functioning in harmony on the coast. Hence, a spatial transition to a dynamic co-existence between the urban-water-soil metabolism is necessary.

With this information, the following research question is formulated “How can an insight into the urban-water-soil metabolism develop a more socially and environmentally resilient coast in Paramaribo?”.

In order to answer this question an analysis was done on the three systems; urban, water and soil. The analysis was concluded with a site visit, which lead to the potential for a general strategy to achieve a resilient coast. As the urban-water-soil metabolism presents itself differently in several areas on the coast, 3 locations were chosen for which a strategy was designed with the help of the pattern deck, which was developed for this project.

The systemic change of the urban, water and soil systems will lead to a resilient coast of Paramaribo. The existing housing and urban expansion will be transformed/designed to be resilient, the urban expansion will be a mixed living and working environment. Tidal flooding will be addressed by strengthening the coast with a green belt and clay dykes. The water management system will be properly maintained and upgraded and the coast will be strengthened and protected from coastal erosion by rehabilitating the depleted mangrove forests. This in turn will also boost biodiversity.

In conclusion, the coast of Paramaribo can become resilient by (re)introducing co-existence of the urban-water-soil metabolism.

Gerdus van der Laarse

Towards climate just nature-based solutions: A social vulnerability framework for mapping ecosystem service demand

Climate change is increasingly disrupting water cycles worldwide, with drought and flood events becoming more frequent and intense. In the Global South, high urbanisation rates and context-specific social dynamics overlap with climate-related challenges, raising concerns about climate justice. At the same time, nature-based solutions (NbS) are promoted as a way to increase urban resilience, with a clear potential to mitigate climate risks. However, from a climate justice perspective, there are two challenges that still need to be considered to prevent maladaptation and inadvertent lock-ins related to the implementation of NbS: (1) lack of understanding of the interplay between NbS and social vulnerability to climate change, and (2) lack of resources for decision-makers to incorporate social vulnerability considerations into NbS planning.

In this work, a social vulnerability framework is developed to determine ecosystem service demand for NbS, which is used to define suitable NbS options and locations to be prioritised in a city. The proposed framework leverages openly available spatial and demographic data sets and incorporates different risk factors (e.g., pluvial, fluvial and coastal flood risk, and heat stress). This is applied to a case study of Cape Town, South Africa. Cape Town, significantly affected by recent droughts, is an excellent case where water-based NbS are being implemented to address climate risk. A wide range of NbS is considered and assessed through expert interviews, including water-based solutions (i.e., wetlands, river projects, coastal defence), and other green infrastructure such as urban agriculture. This analysis shows that among all NbS solutions, river projects and urban green spaces are the most important in addressing heat stress and flood risk in socially vulnerable areas, such as areas in the city bordering the Kuilsriver.

The results yielded three potential policy considerations and recommendations for the city of Cape Town to facilitate the implementation of NbS from a climate justice perspective: (1) cooperation with conservation given the local and global significance of the region's biodiversity, (2) the potential for climate adaptation and justice as a means of reducing climate risk in socially vulnerable populations, and (3) the importance of community involvement in ensuring successful implementation and purpose-fit solutions. Using this framework, decision-makers of the city of Cape Town can incorporate climate justice into the spatial planning for NbS.



Ryan Tan

Mapping the system underlying inertia in the (storm)water transition in cities in the Netherlands through a financing perspective

With the increasing frequencies of extreme climate events like intense storms and urban flooding, a transformative shift is imperative in cities to the approach to urban stormwater management. While the Netherlands has made strides in technology and political commitment to climate change, persistent barriers hamper progress, prompting an exploration of the governance system that led to the success and failures of the implementation of adaptation measures.

This research focuses on the financing of urban stormwater measures in Amsterdam where funding is a necessary means to execute plans. Adopting an inducting approach, the study analyses interviews and institutional structures which facilitates theory building to explain system interactions that influence implementation.

In the findings, two types of decision-making processes emerged: a bottom-up process, involving actors on the implementation level who are tasked with proposing and executing plans, and a top-down process, where municipal authorities approve and advise these plans based on the context of laws, legislation, and politics.

Interviews further emphasized the significance of the bottom-up decision-making processes in implementation, especially in critical negotiations of co-financing that are very much determined by informal relations with other sectors and parties. Additionally, these bottom-up processes can enable the higher-level strategies to be more proactive – where implementers can signal important needs to municipal authorities, to influence rules that can foster a more efficient and smoother project implementation.

This research advocates a realist view of policy implementation, spotlighting both formal and informal interactions in water governance. It highlights the pivotal role of bottom-up decision-making in pursuing adaptation measures, suggesting the need for capacity-building interventions at this level. The study calls for a more nuanced understanding of implementation processes, and future research could explore targeted interventions to stimulate desired behaviours in water governance.



Ludwig Branzk

Beyond Lignite: The Future of Spreewald in Lusatia's Post-Lignite Landscape

Germany's energy transition, aiming for a coal-free energy sector by 2038, often overlooks the complex challenges regions will face in managing their heavily modified natural water systems. This oversight significantly impacts regions like the Spreewald, a UNESCO-listed inland delta, expected to face tremendous ecological challenges due to the impending coal phase-out and the consequent alterations of its water balance.

The presentation will outline the Spreewald's situation within the broader context of Lusatia's coal phase-out and analyze its current water governance regime using the OECD's 12 Principles of Water Governance and the Multi-level Governance Gaps Framework. This analysis aims to inform a redesign of the water governance regime for an effective, sustainable, and ecologically sound coal phase-out.

Findings reveal that Lusatia's water governance, deeply influenced by mining and conservation values, is ill-prepared for the post-lignite era. Though central to past water issues, mining practices like artificial groundwater extraction are still seen as solutions to preserve the Spreewald, leading to a paradox in water governance - where groundwater extraction is seen both as the cause of and a potential solution to the region's water challenges. Moreover, the influence of mining authorities in water management decisions is inherited in the governance structure, creating administrative and objective gaps in water governance.

Spreewald's case underscores the necessity of transforming the water governance regime in regions affected by mining operations to address the challenges in water systems altered by mining. This transformation requires policy changes and a fundamental shift in longstanding values and decision-making processes essential for the ecological preservation and sustainable management of these environments post-mining.