

Executive summary for the attention of the SNIS Scientific Committee

Taking the example of sanitation, the U-STASIS project addressed the interaction of basic service arrangements with urban equality. In the face of rapid and unplanned urbanization, one of the main challenges for public actors is to ensure that the expansion of basic services keeps pace to achieve a minimum level of services across the entire urban population. If basic services are delivered through extensive infrastructure networks, they tend to be capital and planning intensive and therefore lag significantly behind urban growth, especially where urbanization is informal. A main promise of decentralized basic service provision lies in increasing flexibility through decreasing investment volumes and shortening planning horizons. Yet, by unbundling and decentralization, basic services are increasingly provided by different technological solutions, operating models, and actors and the conditions under which citizens gain access to basic services, particularly eligibility and cost, can vary greatly. In short, the processes for delivering the same basic service are becoming more diverse or fragmented, which makes the issue of equality more central. **That** said U-STASIS took the example of urban sanitation infrastructure to address how different arrangements of basic service provisioning interact with processes that shape urban inequality. Building on international political economy theory, U-STASIS introduced the territorial political economy (TPE) framework, a synoptic approach to structural power. To gain a situated understanding of how structural power interacts with policy processes, U-STASIS built upon the power cube framework. **The** U-STASIS research project was based on three work packages, which each resulted in a scientific publication. The first article introduces the territorial political economy framework (TPE) to analyse the variety of sanitation systems that exist in cities. It distinguishes three dimensions—security, production, and finance—to explore specific sanitation systems' distribution of structural power and their local-global interaction. This article also presents a typology of sanitation bargains comprising household, municipality, utility, city works, and enterprise, and a generic matrix highlighting how various organizational arrangements can be combined at the city level to achieve citywide inclusive sanitation. **The** second article focuses on the finance structure and studies Multilateral Development Banks' (MDBs) investment projects. The article introduces a comprehensive compilation of all water and sanitation investments between 1960 and 2020 by the World Bank, the African Development Bank, and the Asian Development Bank, drawing on 3639 water and sanitation projects. It assesses territorial trends, technology choices, distribution of financial burdens, and reforms to institutional arrangements to understand changes in security, production, and finance structures over time. **The** third article scrutinizes the development of the water and sanitation sector in Dhaka, Bangladesh, between 1990 and 2020, centring on bargaining over the introduction recent policies. It expands the TPE framework with a power perspective applying the Power Cube Framework (PCF). By combining PCF with TPE, the article introduces the policy pathways framework, which consist of sequences of inception, design, legitimation, and roll-out that lead to the adoption of specific policies. This article highlights how donors link the ongoing introduction of citywide inclusive sanitation (CWIS) to the organization of sanitation through an economy, how the utility uses CWIS as an opportunity to avoid costly responsibilities in non-sewered sanitation, and how service co-production through community-based solutions is neglected. **The** insights gained through U-STASIS suggest that actors promoting CWIS should extend the flexibility in technology to organization and financing, and systematically collect and synthesize financing and organizational arrangements for non-sewered sanitation, to overcome the narrow focus on private investments and the organization of sanitation in a market. The conceptual tools introduced, namely the territorial political economy framework, the sanitation bargains typology and the policy pathways framework offer practical tool for practitioners, NGOs, and activists to analyse conflicting interests. This can support and empower them in politically informed programming and in strategizing pathways towards greater urban equality.

Final Scientific Report for the attention of the SNIS Scientific Committee

Initial problem statement: Two billion people have to gain access to safe sanitation to achieve SDG6.2 by 2030. Absent and inadequate urban sanitation infrastructures (USI) are especially prevalent in unplanned, densely populated urban areas, where the current gold standard of flush toilets, large scale sewer networks and centralized treatment plants is not affordable. Yet, low-cost technologies and adaptive approaches have failed to scale. To understand this puzzle, the U-STASIS project asked *why and how does USI fail to adapt to rapid urbanization in order to achieve SDG6.2?* The U-STASIS project maintained that previous research has addressed the innovation system for USI, focusing on why innovations in sanitation fail to scale (van Welie et al. 2018; van Welie and Romijn 2018; van Welie, Truffer, and Yap 2019; Cherunya, Ahlborg, and Truffer 2020); and the national political economy under which access to water supply and sanitation is provided, scrutinizing service provision from a technocratic perspective (Harris, McLoughlin, and Wild 2013; Finger and Allouche 2002). Against the backdrop of this literature, U-STASIS proposed that the link between innovation niches and the powerful interests that preserve the gold standard, as well as the dynamics between national and international structures, must be at the center of a power and politics analysis to understand why the expansion of urban sanitation infrastructures is not keeping pace with rapid urbanization. To this end, U-STASIS drew on international political economy (Strange 1988, 1996) to explain the persistence of sub-optimal institutional structures and technological solutions and centered on the role of multilateral development banks (MDB) as key intermediaries through funding, expertise, and project implementation (Humphrey et al. 2015). At its outset, U-STASIS aimed to develop conceptual frameworks to grasp and analyze the paradigms (*termed in the proposal: sector guiding paradigms*) which guide sector development and the processes and to structure the processes that mediate between the different geographies and actors involved in advancing the service delivery at the city scale (*termed in the proposal: mediating processes*). Empirically, U-STASIS aimed to combine case studies, discourse analysis of global policy process and quantitative analysis of multilateral investment projects through three work packages (WP). WP 1 aimed to reconstruct the discursive evolution of the driving mission behind USI investment over time and the evolution of effective funding priorities to understand to what extent they co-evolve, whether one emerges from the former or whether they are disconnected altogether. Thereby it aimed to understand the *sector guiding paradigms (SGP)* in their ideal typical representation in policy documents and discourses to analyze their distribution of structural power. Key to WP1 and the *SGP* was to link the technical and the political. Methodologically, WP1 aimed to analyze MDBs investment project's appraisal documents in an automated manner, through Natural Language Processing. WP2 aimed to scrutinize the formulation of SDG6 as a standalone goal for water and sanitation. It aimed to identify the successful discourse coalitions united behind specific *SGP* which decisively shaped SDG6 and analyze to what extent the *SGP* behind SDG6 were translated into sectoral strategies of MDB with a specific focus on SDG6.2 and its indicators. In doing so, WP2 aimed at deconstructing the politics behind the SDG6 process and the deferral of substantial negotiations to the "technical" level. Methodologically, WP2 originally focused on interviews and document analysis. WP3 aimed to trace how structural power materializes when USI projects are implemented. To this end, it aimed to analyze the translation of the *SGP* from the global governance discourse into the technological and operational choices at the city level improve the understanding of why centralized USI prevails, despite the signaled joint mission outlined in SDG6.2 to flexibly combine different technological systems to achieve citywide inclusive sanitation. The detailed study of two cities (Dar es Salaam, Tanzania & Dhaka, Bangladesh) was intended to reveal the methods and agency deployed by actors when mediating between different geographies to preserve their interest. Methodologically, WP3 was rooted in a case study approach combining interviews, document analysis and participant observation.

Data gathered and data analysis: U-STASIS strongly aspired a transdisciplinary design and execution (Pohl et al. 2021). This is first visible in the breadth of authors included in the publications, second in the different data gathered for each publication and third in the embeddedness of outputs in both research and practice. The transdisciplinary aspiration guided data collection and analysis. The empirical work for U-STASIS derives from both quantitative and qualitative data and methods and from the collaboration of researchers from sociology, geography, planning studies, civil engineering and practitioners in related fields. The empirical material analysed for the first article comes from several types of sources: The first are interviews with experts in academia (5), international NGOs (2), international organizations (2), the private sector (5), and from utilities (4). The second are scientific case studies of different sanitation systems, policy literature on water and sanitation, and key policy documents. To contrast with and complement the documents that focus on specific sanitation systems, scientific work on the historical development of sanitation systems forms the third source for data. The triangulation of the different information allows to identify the qualitative characteristics of specific sanitation bargains in an iterative process. The interviews guided the identification of distinct patterns in the extensive literature covering sanitation systems over time and space, including debates on sanitation technology, operations, and funding at local and global levels. While it is a single author publication¹, the discussions in the entire research consortium and all insights gathered throughout the duration of U-STASIS informed the work presented paper 1. The work for the second article centred on the construction and analysis of a novel dataset. The dataset describes all investment projects from the World Bank, the African Development Bank, and the Asian Development Bank with possible relevance to water and sanitation irrespective of financial instruments and subsectors as defined by the MDBs involved. For the investment projects studied, 40 variables were coded in four sets to analyse project appraisal documents and online project summaries and thus operationalize investment behaviour. The analysis of the 3639 water and sanitation investment projects was carried through a structured text analysis together with three research interns providing roughly 12 months of workload. In contrast to the expectation at the outset, automated text analysis was not feasible to fulfill the task. The dataset and details on how it was compiled can be found in the respective publication and its annexes. The data collection for the third article was gathered in a case study approach. The primary data (30 key informant interviews) was collected between November and December 2021 through interviews and observations in Dhaka, Bangladesh. Interviews were recorded and transcribed if consent for recording was given; otherwise, extensive summaries were compiled. Transcripts and interview summaries were coded in NVivo according to a deductive coding scheme informed by the conceptual frameworks. Further data collection occurred during the preparation of the interview campaign, which lasted nearly 8 months – also due to COVID-19 and an extended document analysis for the triangulation of the interview information during the write up of the article.

¹ The fact that this publication is single authored is also influenced by the regulations of the University of Neuchatel to obtain a PhD degree.

Main research results: A first main result of the U-STASIS research project is the territorial political economy (TPE) framework, which combines insights from urban political ecology (UPE) and international political economy (IPE). The TPE framework was developed and applied to explore the feasibility and usefulness of a synoptic approach to various dimensions of structural power and their entanglements from global to local and vice versa in mutually different and reinforcing ways. The TPE framework analyses structural power in the dimensions of production, security, and finance while exploring territorial aspects in two complementary ways. Horizontally, the TPE framework scrutinizes how basic services, in this case sanitation, structure the spatial arrangement of a city. The presence of pollution or diseases across the city makes visible how the costs, benefits, risks, and opportunities of safe and unsafe sanitation reinforce or mitigate inequality in spatial, temporal, and socioeconomic terms. Vertically, the TPE framework analyses the role of dominant actors in the security, production, and finance structure according to where they are situated between the local, such as sanitation enterprises, community-based organizations, and municipal authorities, and the global, such as INGOs, multilateral development banks (MDBs), and consultants and how their spatial positions interact with their roles in the dimensions of structural power. The TPE framework is most prominently introduced in the first publication but it structured the research in each article. In doing the formulation of the TPE framework achieved the aims of WP1, which lied in scrutinizing the interlinkages between the technical and political as well as local and global scales. **The** second main result of the U-STASIS project is the typology of five sanitation bargains, which operationalize the TPE framework for the case of USI. The sanitation bargains comprise various ideal-typical configurations of and arrangements in the production, finance, and security dimensions. The structural power embedded in these dimensions translates into particular social, political, and economic arrangements when sanitation systems materialize, which in turn produce a distinct distribution of the costs, benefits, risks, and opportunities of providing sanitation. U-STASIS identified five ideal-type sanitation bargains: household, municipality, utility, city works, and enterprise. Of these, the household bargain is geared not towards safe sanitation for public health but to the protection of health and cleanliness at the individual and household levels, often at the explicit expense of groups structurally marginalized by class, caste, race, and gender. Even though the household bargain is persistent and dominant in many cities and contributes substantially to urban inequality, the focus of U-STASIS was on understanding how the four bargains that can create access to safe sanitation, all interact differently with urban inequality. Under the municipality bargain unsafe sanitation is a threat to society by impacting public health and the environment, public authorities build sewers and treatment plants as security infrastructures. Their expansion is authoritative and supply-led. This often involves the use of eminent domain and displacement to make way for the vast sewer networks. The municipal budget covers the costs through bonds and tax revenues. Under the utility bargain, priority lies on making sanitation systems economically sustainable. The key actor is the utility, a ring-fenced and autonomous entity, ideally a private firm. Competition for the market and commercial principles ensure efficient service provision. The state regulates utilities to ensure minimal health and environment standards are observed. The total cost of sanitation is borne by households through cost-covering tariffs along the polluter-pays principle. Expansion of access is supply-led and prioritized based on the future customers ability to pay, splintering the city. In the enterprise bargain, the sewers are unbundled. Containment, emptying, transport, and treatment become separate business domains, each offered by a myriad of entrepreneurs. Enterprises directly compete for customers over technologies, price and service quality and households pay for the services out of their pockets. Securing public health is not a primary public concern anymore but expected to happen as secondary effect, that materializes once all households become customers of sanitation service. To this end, the state stimulates demand through social marketing and behavioural change interventions. The cityworks bargain capitalizes on the technological flexibility of

non-sewered sanitation while maintaining the priority of public health security. To expand access, the public authority takes responsibility and lead that safe containment is built at every household and that pits are emptied at regular intervals and vacuum trucks dispose of faecal sludge at treatment plants to ensure that no wastewater is released into the households or environment at any time. Costs are covered through income adjusted tariffs and cross-subsidies where households lack the ability to pay. **The** main line distinguishing the sanitation bargains results from whether the dominant actors in the dimensions of structural power favour public or private leadership. This dichotomy is again for conceptual purposes; real-life arrangements often are situated somewhere in between, with both public and private actors contributing to functioning sanitation systems. At the technological level, the sanitation bargains typology distinguishes network-and-sewer solutions from non-network and non-sewered ones. This distinction is made for two main reasons. First, the unbundling of network infrastructures allows different ways of provisioning sanitation services along a chain. Second, non-sewered sanitation requires substantially less upfront investment, with major implications for the relative importance of the finance structure. **The** third main result of the U-STASIS research project is the compilation of the investment behavior dataset. The World Bank, Asian Development Bank, and African Development Bank are key players in the finance structure for urban sanitation. They have the leverage and knowledge to shape how sanitation is provided. Both with regards to the infrastructures deployed and the social, political and economic arrangements that carry the infrastructures. The investment behavior dataset compiles all investments by the three key MDBs since 1960 and provides detailed information of the key determinants of investments and institutional reforms in 40 variables. The dataset is published open source and thus is an invitation to extend the data basis on which the investment behavior of MDBs can be understood. Beyond the compilation, the descriptive analysis showed that investments reflect the agenda-setting role of MDBs, and the World Bank in particular, in global policy discourse. It showed how the World Bank sets trends at both the technological and institutional levels and then embeds them in major investment projects around the world. In the territorial dimension, investments pretty much follow urbanization trends. The World Bank and the other MDBs have advocated for new public management and private sector principles in the production structure. This is reflected not only in the way public–private partnerships enter the water and sanitation sector but even more so in the way MDBs stick to their preferences. Only several failed attempts to divest and hand over water and sanitation to the private sector in the 1990s prompted the MDBs to review their policies. Even then the adjustment was not to review the aim of putting the private sector at the center but to make PPP arrangements more palatable by transitioning risks to the public sector. MDB investments appear to be less aligned with lessons learned and common understanding at the global policy level and more of a testing ground for introducing new institutional and financial arrangements aimed at moving the sanitation sector towards the utility bargain. **The** fourth main result is the policy pathways framework. The policy pathways framework is built with reference to the TPE framework and in its combination with the power cube framework (PCF). The policy pathways framework operationalizes the TPE approach for an actor and time focused analysis to understand the processes at play in embedding sanitation bargains at the city level, and how do they link spaces between local and global. For the construction and application of the policy pathways framework, the TPE approach is used to structure the various actors, activities, policies and technological systems by mapping them to the sanitation bargains typology. The PCF is used to trace the policy developments over a longer span of time by characterizing the arenas in which policies are negotiated according to the spaces and levels in which they occurred and linking this process to the distribution of structural power. For the case of Dhaka, the analysis revealed four important findings. First, both utility bargains and enterprise bargains were introduced top-down as global-level policies primarily because two MDBs, the World Bank and ADB, and donors made their adoption a condition for access to credit.

Second, the innovations of local NGOs could only scale successfully if they conformed to the logic of the dominant bargaining at the global level, because they have no means to enforce their own preferences in policy measures. Thirdly, the spaces and levels in which the bargaining over sanitation policy took place decisively shaped the outcomes. Typically, spaces that were accessible from the local level and to which actors were invited were those that raised resistance to top-down imposition, and enabled the emergence of alternative solutions. Fourthly, actors interested in rapid adoption and thus enforcement of the sanitation bargain deliberately introduced it in arenas in closed spaces with limited access to local actors who did not share their agenda. However, this led to a deadlock between the enterprise bargain proponents and the municipality during the introduction of the policy, with potentially fatal consequences for access to safe sanitation. This is because neither the utility nor the municipality were willing to acknowledge responsibility for the non-sewered sanitation facilities.

Conclusion and outlook - scientific and methodological: The U-STASIS research project has five major scientific and methodological implications. A first implication is the synoptic approach to structural power. It provides the possibility to understand the mutual interdependence of various dimensions of structural power, namely production, security, finance, and knowledge. This enables researchers to unpack the web of power relations that interact with urban inequalities into its constituent elements and thus open them for analysis. The TPE framework is a first step towards a synoptic understanding of structural power. **The** second scientific implication concerns its further development. U-STASIS identified urban political ecology (UPE) as a productive platform of debates susceptible for new forms of understanding and analyzing structural power. Thus, future research could explore the cross-fertilization of UPE with IPE to both strengthen the synoptic approach and deepen the understanding of each dimension of structural power in the TPE approach. The interest in this cross-fertilisation between UPE and critical IPE has only recently been explicitly expressed by IPE scholars, which in turn are interested in the situatedness and sensitivity to intersectional inequalities that UPE approaches offer (Babic and Sharma 2023). **The** sanitation bargains typology was introduced as an operationalization of the TPE framework. Its further development and application to other basic services is the third scientific implication of the U-STASIS research project. The structure of the typology is generic, and thus it lends itself to application to other sectors and other cases. The differentiation of the dimensions of structural power in production, security, and finance first and foremost through identifying the key actor in each and the differentiation between networked and non-networked infrastructures will also be useful for understanding the provision of basic services in water and electricity and transport, amongst others. The testing of the bargain typology should also aim at improving the TPE framework by optimizing how the dimensions of structural power feed into the description of the ideal types that are identified. In this regard, the variation of the application of the bargains typology between different sectors and cases seems promising. Thematically, water supply is as an opportune sector to which the bargains typology and the TPE framework could be applied to further develop them. On the one hand, the socio-hydrological processes that link water supply and sanitation result in the central relevance of similar actors, mainly the same utilities. On the other hand, a vast existing body of knowledge from UPE about water supply can foster possible TPE analyses. The fourth scientific and methodological implication stems from the policy pathway framework and centers on the actor versus structure dichotomy in studying power. The policy pathways framework has proven to be a useful methodological tool for operationalizing the TPE and PCF frameworks through its dual focus on the dynamics of negotiations and power struggles and characterization of arenas for negotiation. First, this enables the synthesis and neat display of bargaining processes over time. Second, this enables researchers to directly indicate the links between power distribution in key areas of decision making and their relationship to the distribution of

structural power from the local to the global level and between closed, invited, and claimed spaces. This conceptual extension makes it possible to focus on structural power methodologically while not turning a blind eye to the everyday processes that constitute the governance of urbanization. This extension is important because many UPE studies are dominated by the description of specific constellations of structural power in a particular place and time or the succession of various urban metabolisms over time. The study of how the distribution of structural power is changing and how this in turn affects processes of urbanization and their interaction with inequality has received less attention. Thus, a dual focus on dynamics over time and across levels and spaces of negotiations allows the policy pathway framework to make implicit manifestations and considerations of power explicit: a useful contribution to tracing and understanding policy processes that shape basic service provision. **Finally**, the investment behavior dataset provides an opportune starting point for future quantitative and qualitative analyses. The dataset can be further analyzed by asking new questions and expanded to include other MDBs, and it can also guide the identification of case studies. Because it identified investments in over 300 cities, this information could be contrasted with the growing number of ‘excreta flow diagrams’ (currently 241 SFDs in 235 cities). One possibility is to identify cities that achieve safely managed sanitation at the city level with comparatively low levels of investments or those that seem not to make any progress at all despite relatively large investments. As the dataset is proposed as a starting point for a more detailed, qualitative–quantitative analysis of multilateral investment into basic services, it is made publicly available to invite researchers, MDBs, and international organizations to expand upon it.

Conclusion and outlook - practical: The findings of U-STASIS are particularly relevant for actors that aim to advance citywide inclusive sanitation (CWIS) as a concept and that are engaged in achieving citywide and inclusive sanitation in cities. For actors that promote CWIS and sustainable sanitation, such as SuSanA, INGOs, and other organizations behind calls for CWIS, the findings suggest that the flexibility that CWIS currently offers in technology must be extended to organization and financing. To this end, these actors should systematically collect and synthesize the various existing and possible ways of financing and organizing non-sewered sanitation to overcome the limiting focus on a mix of business models that is currently propagated under the Manila Principles for CWIS. The city works and enterprise bargains can serve as signposts in such an exercise. The ways of organizing and financing non-sewered sanitation should be presented and provided as a portfolio of options in parallel to, for example, the existing compendium of sanitation technologies (Tilley et al. 2008). In the presentation and evaluation of organizational and finance arrangements, prime attention should be paid to the inherent trade-off between security and finance. The conflict arises chiefly because unsafe sanitation for marginalized urban dwellers and pollution of the environment is always the cheapest option for financial actors. **For** actors working to achieve CWIS in cities, such as INGOs and MDBs at the global level, and even more NGOs, CBOs and activist practitioners at the city level, the findings suggest that there is a need to move away from the ‘misleading language of ‘stakeholders’ and ‘good governance’, which downplays conflicting interests and falsely suggests that all actors are on an equal footing. For this endeavor, the policy pathways framework offers a practical tool with which to analyze the divergent interests and how they shape sanitation systems at the city level. Making the different competing interests visible will support MDBs and (I)NGOs in politically informed programming and becoming more accountable to the public, which funds them to a large degree. **For** actors at the city level, the three conceptual tools introduced by U-STASIS—the territorial political economy framework, the sanitation bargains typology, and the policy pathways frameworks—can support the planning process and analyze ongoing urbanization processes and how they interact with inequality. They are deliberately designed to speak effectively and pragmatically to activists and practitioners and empower them in strategizing and embarking on pathways toward greater urban equality.

References

- Babic, Milan, and Sarah E. Sharma. 2023. 'Mobilising Critical International Political Economy for the Age of Climate Breakdown', *New Political Economy*
- Cherunya, P. C., H. Ahlborg, and B. Truffer. 2020. 'Anchoring innovations in oscillating domestic spaces: Why sanitation service offerings fail in informal settlements', *Research Policy*, 49.
- Finger, Matthias, and Jeremy Allouche. 2002. *Water privatization: Trans-national corporations and the re-regulation of the water industry* (Spon Press: London and New York).
- Harris, Daniel, Claire Mcloughlin, and Leni Wild. 2013. "The technical is political: why understanding the political implications of technical characteristics can help improve service delivery." In *Politics and Governance Programme*, 8. London: Overseas Development Institute (ODI).
- Humphrey, Chris, Stephany Griffith-Jones, Jiajun Xu, Richard Carey, and Annalisa Prizzon. 2015. 'Multi-lateral Development Banks in the 21st Century: Three Perspectives on China and the Asian Infrastructure Investment Bank', *Overseas Development Institute (ODI) Report*. London: ODI.
- Pohl, Christian, Julie Thompson Klein, Sabine Hoffmann, Cynthia Mitchell, and Dena Fam. 2021. 'Conceptualising transdisciplinary integration as a multidimensional interactive process', *Environmental Science & Policy*, 118: 18-26.
- Strange, Susan. 1988. *States and Markets* (Bloomsbury: London, UK).
- . 1996. *The retreat of the state* (Cambridge University Press: Cambridge, UK).
- Tilley, Elizabeth, Lukas Ulrich, Christoph Lüthi, Christian Zurbrügg, and Roland Schertenleib. 2008. *Compendium of sanitation systems and technologies 1st edition* (Swiss Federal Institute of Aquatic Science and Technology (Eawag): Dübendorf, Switzerland).
- van Welie, Mara J., Pauline C. Cherunya, Bernhard Truffer, and James T. Murphy. 2018. 'Analysing transition pathways in developing cities: The case of Nairobi's splintered sanitation regime', *Technological Forecasting and Social Change*, 137: 259-71.
- van Welie, Mara J., and Henny A. Romijn. 2018. 'NGOs fostering transitions towards sustainable urban sanitation in low-income countries: Insights from transition management and development studies', *Environmental Science & Policy*, 84: 250-60.
- van Welie, Mara J., Bernhard Truffer, and Xiao-Shan Yap. 2019. 'Towards sustainable urban basic services in low-income countries: A Technological Innovation System analysis of sanitation value chains in Nairobi', *Environmental Innovation and Societal Transitions*, 33: 196-214.