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Published in:
 Planning Practice and Research

DOI:
[10.1080/02697459.2022.2104322](https://doi.org/10.1080/02697459.2022.2104322)

IMPORTANT NOTE: You are advised to consult the publisher's version (publisher's PDF) if you wish to cite from it. Please check the document version below.

Document Version
 Publisher's PDF, also known as Version of record

Publication date:
 2024

[Link to publication in University of Groningen/UMCG research database](#)

Citation for published version (APA):

Kempenaar, A., Laeni, N., van den Brink, M., Busscher, T., & Ovink, H. (2024). 'Water as Leverage': Design-Led Planning for Urban Climate Resilience. *Planning Practice and Research*, 39(1), 72-92. <https://doi.org/10.1080/02697459.2022.2104322>

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To cite this article: Annet Kempenaar, Naim Laeni, Margo van den Brink, Tim Busscher & Henk Ovink (2024) 'Water as Leverage': design-led planning for urban climate resilience, Planning Practice & Research, 39:1, 72-92, DOI: [10.1080/02697459.2022.2104322](https://doi.org/10.1080/02697459.2022.2104322)

To link to this article: <https://doi.org/10.1080/02697459.2022.2104322>



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'Water as Leverage': design-led planning for urban climate resilience

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ABSTRACT

To prepare for the impacts of climate change, many Asian cities aim to become climate resilient. This calls for innovative, integrative, inclusive, and transformative planning approaches. Although design is advocated as a means to develop such approaches, it remains unclear what a design-led planning approach actually entails. This paper explores the design-led planning approach of the 'Water as Leverage' (WaL) programme, and investigates how it unfolded in Semarang, Indonesia. We found that WaL was able to develop promising proposals by employing the potential of design. However, future design-led planning initiatives can benefit from more receptivity to local situations and initiatives.


KEYWORDS

Urban climate resilience; integrative and inclusive design; regional design; climate change adaptation

Introduction

Climate change will considerably impact many Asian cities through, amongst others, sea level rise, extreme weather events, and more frequent flooding (McGranahan *et al.*, 2007; PBL Netherlands Environmental Agency, 2018). It is estimated that Asian cities will account for 83% of the world's population affected by sea level rise (Vinke *et al.*, 2017). As a result of groundwater extraction, many major Asian cities are also rapidly sinking (Nicholls *et al.*, 2008). Moreover, in Southeast Asia, many cities are already prone to climate change impacts as a considerable portion of the urban population is living in informal settlements, which are often situated in the most vulnerable locations. Hence, while Southeast Asian cities are growing at an unprecedented rate, the current infrastructure, organisation, and functioning of these cities and their surrounding regions are generally not designed to accommodate and anticipate climate-related shocks and trends (Streets & Glantz, 2000), let alone prepare for future uncertainties.

The fundamental uncertainties regarding the impacts of climate change call for climate resilient responses and design solutions that are flexible and adaptive, and that can function under a wide range of possible future conditions (Brown *et al.*, 2020). Traditionally, planning

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for resilience has focused on increasing robustness and resistance through structural protection measures (Lu & Stead, 2013; Hegger *et al.*, 2016). Recently, this engineering or equilibrium-based perspective on resilience has been criticised for disregarding the ecological impacts of structural protection (Liao, 2012; Alexander Priest & Mees, 2016) and being less effective in coping with the current rapid changes in climatic conditions (Liao, 2012; Brown *et al.*, 2018; Zevenbergen *et al.*, 2020). In response, a more holistic, evolutionary perspective on resilience has been proposed (Davoudi *et al.*, 2012; Few *et al.*, 2017; Zevenbergen *et al.*, 2020), in which urban climate resilience includes the ability of a city to adapt and transform to changing socio-ecological conditions (Davoudi *et al.*, 2012; Meerow *et al.*, 2016). Next to structural protection, key strategies include spatial adaptation, community preparedness, and emergency responsiveness (Driessen *et al.*, 2018). However, the development of a more evolutionary resilience planning approach requires shifting away from the current traditional and sectoral-based way of thinking and working, towards a more comprehensive, integrative, and inclusive planning approach – thereby empowering local capacities to stimulate climate resilience planning, design, and implementation (Brown *et al.*, 2012; Friend *et al.*, 2014; Schoeman *et al.*, 2014).

In this context, planning approaches that focus on ‘design’—that is, design-led planning approaches, also coined ‘Resilience by Design’—are increasingly advocated as a means to develop more evolutionary-based resilience strategies and solutions (Bouw, 2017; Lochhead, 2017; Ovink & Boeijenga, 2018; Šakić Trogrlić *et al.*, 2018). Design is a multifaceted domain ranging from technical engineering solutions to creative conceptual design, and the term ‘design’ can refer to both the design process as well as the design outcome. So, what is meant by design in design-led planning initiatives tailored to urban climate resilience, and what are key characteristics of such design-led approaches? Although a body of knowledge is developing on the potential of design(ing) and its outcomes for urban climate resilience (Lochhead, 2017; Nilubon *et al.*, 2019; Van den Brink *et al.*, 2019; Nillesen *et al.*, 2021), so far, limited research has been conducted on design-led planning processes.

Therefore, the aim of this paper is to understand what ‘design’ entails in design-led planning approaches, and how such approaches induce urban climate resilience strategies and solutions. To this end, the international ‘Water as Leverage for Resilient Cities Asia’ (WaL) programme serves as an excellent case study. As one of the first ‘Resilience by Design’ programmes in Southeast Asia, WaL explicitly embraced a design-led planning approach to (1) balance long-term regional climate adaptation plans with transformative and ‘bankable’ projects, (2) integrate multiple sectoral perspectives and interests, and (3) be inclusive to all relevant local, regional, and (inter)national stakeholders (Netherlands Special Envoy for International Affairs, Netherlands Enterprise Agency & Architecture Workroom Brussels, 2018). The WaL programme was initiated in 2018 by the Dutch Special Envoy for International Water Affairs and focused on the following three Asian cities: Chennai in India, Khulna in Bangladesh, and Semarang in Indonesia (Laeni *et al.*, 2020; Nillesen *et al.*, 2021).

Drawing on insights from design theory, in the next section we further explain and operationalise four key design characteristics and impacts that are relevant in the context of urban climate resilience, namely ‘innovation by design’, ‘integration by design’, ‘inclusiveness by design’, and ‘transformation by design’. We then zoom in on WaL-Semarang and analyse how design was operationalised in this international resilience programme, and how its resulting design-led planning approach intended to induce innovative, integrative, inclusive, and transformative strategies, and solutions.

This paper closes with lessons for future design-led planning initiatives, conclusions and several recommendations for research on design-led planning initiatives for urban climate resilience.

Key Characteristics of ‘Design’ in Design-Led Planning

A design-led planning approach to urban climate resilience employs design for the development of novel ideas, plans, and proposals that enable flood-prone urban areas to become climate resilient. Design can help to understand and unravel complex climate resilience challenges and inform actions to mitigate climate change risks (Ovink & Boeijenga, 2018). In this context, the term ‘Resilience by Design’ has been coined, in which design is used both as a verb that refers to the characteristics and impact of design processes (Lochhead, 2017) and as a noun, in which design relates to specific design outcomes, encompassing the qualities of the design as well as its performative effect (Brown *et al.*, 2020). Both perspectives are needed to fathom ‘design’ in a design-led planning approach (Ovink & Boeijenga, 2018) and understand how ‘design’ enables the four key characteristics, which are considered critical for becoming urban climate resilient, namely being *innovative*, *integrative*, *inclusive*, and *transformative* (e.g. Ferguson *et al.*, 2013; Moore *et al.*, 2014; Laeni *et al.*, 2019; Rogers *et al.*, 2020).

Innovation by Design

Design processes are creative in nature and include both imaginative thought and logical reasoning (Lawson, 2006). They are innovative and future-oriented as they engage in ‘the playful creation and strict evaluation of the possible form of something, including how it is made’ (Lynch, 1981, p. 290). The creative and innovative potential of design processes is linked to the co-evolution of problem and solution space in design processes (Dorst & Cross, 2001) meaning that during the design process, a problem situation is researched, analysed, and (re-)framed in order to open up and widen the spectrum of possible solutions. This tactic enables out-of-the-box solutions that go beyond traditional solutions. However, not all design problems and issues require equally deep researching and re-framing. Simple or structured design issues require less, whereas for unstructured or complex issues re-framing, or frame-innovation, is often one of design’s main contributions (Dorst, 2015).

Furthermore, in the domains of architecture, urban design, and landscape architecture design competitions are frequently used to drive innovation (Chupin, 2011; Strebel & Silberberger, 2017). Design competitions build on a long-standing tradition, which is reported to date back to 15th century Italy (Lipstadt, 2003). Such competitions are highly praised for their experimental nature and ability to produce unforeseen solutions (Silberberger, 2012). Nowadays, design competitions are not only organised to commission the design of buildings, but also to spark innovation in the spatial domain, for example to develop long-term regional strategies (Kempenaar *et al.*, 2016) or innovative recovery responses (Šakić Trogrlić *et al.*, 2018).

Integration by Design

The integrative nature of design is reflected in the notion that designers are trained to examine various pieces of information (needs, challenges, interests, ambitions, ideas, silos, scales, etc.) and combine them into a coherent set of ideas (Lawson, 2006). This particularly applies to spatial design disciplines concerned with the design of outdoor public spaces (landscape architecture, urban design, and, to some extent, architecture). Spatial designers have to consider the demands, constraints, and interests of various land-uses, economic, social, and environmental goals, and a mixed group of users and owners in their design (Madanipour, 2006) while also identifying and exploring potential conflicts, spatial relationships, and interdependencies. Spatial designers often try to capitalise on these relationships and interdependencies in the development of smart solutions that align various interests and create multiple benefits. Furthermore, specific spatial design orientations, such as regional design, include thinking across different spatial and temporal scales, and, as such, cultivate a connection between long-term visions, often made for a larger area, and concrete place-based interventions, projects, and actions (Kempenaar & Van den Brink, 2018).

The careful attention to the integration of various needs and perspectives is, however, not guaranteed. The pursuit of beauty can be(come) an obsession in design (Van Assche *et al.*, 2013), leading to valuing aesthetics over comprehensive solutions, and creating multiple benefits. In addition, designers can be(come) overly focused on the interests and issues of their commissioner, or others in a powerful position, paying little or no attention to underprivileged groups, minorities, or interests not represented.

Inclusiveness by Design

In situations where a design is made for a particular area or site in close collaboration with various owners, communities, inhabitants, and other stakeholders, the design process can create inclusiveness. Therefore, it can be challenging to make sure all relevant stakeholders can actually take part in the design process and none are left out. The extent to which a design process is inclusive depends on the access of potential participants to the process and whether these participants also have a real say in the design process and outcome (Kensing & Greenbaum, 2013). To enable genuine participation, the designers in charge of the process have to share their power and influence over design decisions with the participants; otherwise, participation can easily remain confined to tokenism or placation (Arnstein, 1969). It is important to create a safe space to overcome lock-ins, vested interests, or even conflicts, and to strengthen trust and build relationships. In the co-creation of ideas during the design process, participants gain in-depth knowledge of the developed ideas and solutions, including how they emerged. This induces commitment and (a sense of) ownership of these ideas (Kempenaar & Van den Brink, 2018). As such, inclusive design, in which a variety of stakeholders participate, can build local capacity and contribute to an enabling environment for the (future) uptake and implementation of ideas (Kempenaar, 2020; Laeni *et al.*, 2020).

Communities can also be(come) lead designers themselves, and take control over both the design process and design outcome. This control and decision making power for communities can be considered as one of the highest levels of participation (Arnstein,

1969). However, in practice, such a situation of a ‘community as designers’ is rare as they often lack the resources, have limited (access to) knowledge, and miss the capacity to embark on such a journey successfully. In cases where resources, knowledge, and capacity are provided by third parties (e.g. the government), this is often accompanied by conditions and restrictions, and, as such, set boundaries to the power and control of the communities involved.

Transformation by Design

Although designs are typically focused on adding to, or changing the existing situation, they are, historically, not focused on inducing structural or transformative societal change, such as changing people’s behaviour or mind-sets. Design, thus, does not automatically lead to transformative change. However, as increasingly more designers and design scholars are engaging with pressing societal issues, such as sustainability and the impacts of climate change, the potential role for the design process and outcome in contributing to structural and transformative changes is becoming clearer (e.g. Thackara, 2006; Van den Brink & Bruns, 2014; Mulder & Loorbach, 2018; Gilliard *et al.*, 2020). In particular, ‘transformation design’ (Sangiorgi, 2011) and ‘transition design’ (Irwin, 2015; Gaziulusoy & Erdoğan Öztekin, 2019) are lines of thought in design research that focus on the potential of design in processes of structural change. In transformation design projects, key characteristics are defining and redefining the brief, interdisciplinary collaboration, employing participatory design techniques, building capacity (not dependency), designing beyond traditional solutions, and creating fundamental change (Burns *et al.*, 2006). Typical aspects of transition design processes are the inclusion of different value sets and bodies of knowledge, a holistic, self-reflective approach, and compelling and convincing visions that guide the process (Irwin, 2015). The design process can also result in a compelling vision, or framework, or strategy that functions as a navigation device in the transformation towards a desirable future (Langner, 2014). Such a design (vision, framework, or strategy) allows room for flexibility and future adaptation via multiple pathways (Zandvoort *et al.*, 2019). However, both transformation design and transition design are both relatively new in the field of design, and, as such, the body of knowledge on the transformative potential of design is still developing.

Method

The Water as Leverage Programme in Semarang

The WaL programme explicitly employed design in the development of urban climate resilience strategies and projects in three pilot cities in Asia (Netherlands Special Envoy for International Affairs, Netherlands Enterprise Agency & Architecture Workroom Brussels, 2018). This makes WaL an interesting case to explore and map what ‘design’ entails in a design-led planning approach, and draw lessons from for future design-led planning endeavours. In October 2020, the Dutch national government was awarded the Dutch Design Award for the commissioning of WaL (Dutch Design Awards, 2020). The jury described the design approach of WaL as refreshing and praised its daring mentality, considering it as a shining example for other (knowledge) domains. It shows the WaL

approach itself is seen as an innovative new approach, rendering WaL a clear frontrunner and resembling what Flyvbjerg (2006) refers to as an ‘extreme’ case. As Flyvbjerg (2006, p. 13) explains, since such cases activate ‘more actors and more basic mechanisms’, extreme cases typically provide deep insights in the phenomenon under study.

The structure of WaL consists of four main phases (Kempenaar *et al.*, 2020a; Laeni *et al.*, 2021). The first phase focused on preparing and setting up the programme, including the selection of the three cities. In the second phase, selected design teams worked on climate resilience plans, conceptual designs, strategies, and project initiatives. At the time of writing this paper, WaL is in its third phase, focused on the development of bankable and implementable projects, and slowly moving to the fourth phase, which focuses on upscaling and the replication of both the climate resilience solutions and the innovative approach of WaL.

To develop a granular and in-depth understanding of the design-led planning approach of WaL, and how it worked out in a particular context, we chose a single case study design. On the one hand, WaL Semarang was selected over WaL Khulna and WaL Chennai mainly for pragmatic reasons as it allowed to build on previous research (Laeni *et al.*, 2020, 2021). On the other hand, Semarang’s water-related climate adaptation issues, combined with the city’s previous experience in international resilience programmes and the interest in starting a design-oriented collaborative planning process, made Semarang a fitting case for our in-depth case study in the WaL programme. Semarang is a city with approximately 1.7 million inhabitants located on the north coast of the island of Java, which is a rapidly urbanising region in Indonesia. With regard to climate change, Semarang is vulnerable to the increase in extreme weather events as well as to long-term climatic effects (Netherlands Special Envoy for International Affairs, Netherlands Enterprise Agency & Architecture Workroom Brussels, 2018); it faces dangers from river and sea flooding, typhoons, and landslides. Expected long-term effects include drought stress, salt-water intrusion, sea level rise, land subsidence, water pollution, and water scarcity. Semarang already had ample experience with international resilience initiatives prior to the WaL programme, resulting in local capacity to deal with international programmes and donors. The participation in these initiatives also provided an ongoing discourse on resilience in the city of Semarang in which the WaL programme could be embedded.

Data Collection and Analysis

We studied WaL in Semarang using document analysis and 13 semi-structured interviews. Table 1 shows the list of documents used for our analysis. These documents included reports, leaflets, forms, and presentation slides produced by the WaL programme, and the reports from the multidisciplinary design teams. The presentation slides were collected from the Water as Leverage International Seminar in Semarang in March 2019.

The programme documents (nos. 1 to 7 in Table 1) provided information on the background, aims and goals, structure, set-up, and process of the WaL programme and on the city of Semarang. The reports produced by the multidisciplinary design teams (nos. 8 and 9) provided information on the design outcomes of WaL’s design-led planning process. They presented the analysis and framing of climate adaptation

Table 1. List of documents and reports.

No.	Title	Types	Year	Produced by
1.	Call for Action – Water as Leverage for Resilient Cities Asia	Document	2018	The Netherlands Enterprise Agency
2.	Guidelines – Water as Leverage for Resilient Cities Asia	Document	2018	The Netherlands Enterprise Agency
3.	Application form – Water as Leverage	Form	2018	The Netherlands Enterprise Agency
4.	Proposal Format – Water as Leverage	Form	2018	The Netherlands Enterprise Agency
5.	Setting the scene for A Call for Action	Report	2018	Netherlands Special Envoy for International Water Affairs, Netherlands Enterprise Agency, and Architecture Workroom Brussels
6.	City Report Semarang Indonesia	Report	2018	Fabrications
7.	Water as Leverage for Resilient Cities Asia, Final Evaluation and Lessons Learned	Report	2020	UN-Habitat
8.	Cascading Semarang Steps to Inclusive Growth – Phase Two Report	Report	2019	MLA+, Deltares, FABRICations, PT Witteveen+Bos Indonesia, UNDIP, UNISSULA, and IDN Liveable Cities
9.	Cascading Semarang Steps to Inclusive Growth – Appendix Phase Two Report	Report	2019	MLA+, Deltares, FABRICations, PT Witteveen+Bos Indonesia, UNDIP, UNISSULA, and IDN Liveable Cities
10.	One Resilient Semarang – Volume II Concept Design Proposals	Report	2019	One Architecture & Urbanism, Deltares, Wetlands International, Kota Kita, Sherwood Design Engineers, Grobak Hysteria, Atelier Ten, UNDIP, and UPenn
11.	Water as Leverage: Catalyst for Water Resilient Semarang	Presentation	2019	Netherlands Special Envoy for International Affairs
12.	Five Strategic Programs from Upland to Coast-towards a Resilient Semarang	Presentation	2019	One Semarang and Cascading Semarang
13.	Comprehensive Measures for Sustainable Water Management	Presentation	2019	City Advisory Council for Development of Semarang
14.	Roadmap: Next step for Water as Leverage leading up to Singapore	Presentation	2019	Netherlands Special Envoy for International Affairs
15.	Momorandum of Understanding (MOU) Water Indonesia – the Netherlands	Presentation	2019	Delegated Representative Water Indonesia-Netherlands

challenges in Semarang, the vision and strategy for a resilient Semarang, and the formulation of climate solutions for the city. The presentation slides (nos. 10 to 15) were used in different workshops organised as part of the WaL programme, and contained information regarding the progress, context, and planning of WaL.

The 13 semi-structured interviews were conducted in two rounds. The first set of interviews was conducted in March and April 2019 during fieldwork in Semarang, Indonesia, and while attending the WaL workshop in Singapore. The second set was conducted in June 2020, and, due to the COVID-19 pandemic, the interviews were conducted via Skype video calls. The focus of the interviews was to understand (1) the process and set-up of the WaL programme and Semarang's resilience-related challenges and activities, (2) the particular role of design and designers in the WaL process, and (3) the lessons learned from the programme. Interviewees included the design team leaders, key local design team members, a representative of the WaL programme team, a local and an international programme partner, and a local policy official. Interviewees 5 and 8 were interviewed twice, both in the spring of 2019 and 2020. They were both involved in the

Table 2. Overview of interviewees.

	WaL role	Background
Interviewee 1	Programme team member	Organising and commissioning (international) programmes and projects
Interviewee 2	Organiser and facilitator local and regional WaL workshops	UN Habitat Urban Design Lab
Interviewee 3	International member/team leader of the 'Cascading Semarang' team	Landscape architecture
Interviewee 4	International member/team leader of one of the 'One Semarang' team	Landscape architecture
Interviewee 5 (interviewed in 2019 and 2020)	Indonesian member of the 'One Semarang' team	Urban design and architecture
Interviewee 6	Indonesian member of the 'One Semarang' team	Urban design and community engagement
Interviewee 7	Indonesian member of the 'Cascading Semarang' team	Urban design and community engagement
Interviewee 8 (interviewed in 2019 and 2020)	Indonesian member of both 'One Semarang' and 'Cascading Semarang' team	Urban planning and research
Interviewee 9	Local knowledge and programme partner	Planning officer Semarang
Interviewee 10	Local programme partner	Science fund, contact local government
Interviewee 11	International programme partner	(Former) representative of the Netherlands and Indonesia MOU on water

immediate follow-up actions of WaL, and therefore also interviewed in the second round. An overview of the background of the interviewees and their relation to WaL is provided in Table 2.

The interviews were transcribed verbatim, and thematically analysed through a process of inductive and deductive coding, which resulted in the following thematic code groups: activities; lessons learned and reflections; and perceived and observed effects. The theme activities revealed information on the *integrative* and *inclusive* nature of WaL's design process in Semarang, whereas the lessons learned and reflections provided insights into the (perceived) *innovative* character and ideas for improvement of the design-led planning approach. The perceived and observed effects gave a first glimpse into the *transformative* potential of WaL. Furthermore, the interviews were a valuable source for developing an additional understanding of what the WaL design-led approach entailed, the role(s) of the design team and its local and international members in the design-led approach.

WaL's Design-Led Planning Approach in Semarang

A Design Competition for Stimulating Innovation

WaL was initiated and supervised by the Netherlands Special Envoy for International Water Affairs and executed through an (international) partnership led by the Netherlands Enterprise Agency (Dutch: *Rijksdienst voor Ondernemend Nederland*, RVO) in partnership with the cities of Chennai, Khulna, and Semarang, the Asian Infrastructure Investment Bank (AIIB), the Dutch Development Bank (Dutch: *Financieringsmaatschappij voor Ontwikkelingslanden*, FMO), the Global Centre on Adaptation (GCA), Architecture Workroom Brussels (AWB), the International Architecture Biennale Rotterdam (IABR), 100 Resilient Cities, and the Organisation for

Economic Co-operation and Development (OECD).¹ After the first preparation phase, the WaL programme team launched an open, two-staged design competition, which aimed to attract the best teams to develop innovative resilience plans and proposals for Chennai, Khulna, and Semarang.

The first competition-round was open to bids from multidisciplinary teams of international and local design, water, climate, urban, financial, and other experts. The bids had to address the teams' initial visions on the challenge for one of the three cities, the envisioned research, the design approach, and the teams' experience and expertise. The focus on a challenge as a starting point was an innovative aspect of WaL compared to other tendering processes. As expressed by the interviewed programme team member, who had also been involved in other tendering processes by the Dutch government:

Normally, we define the solution or the direction of the solution . . . , but in this case we only defined the challenge, and asked the international water, climate and urban experts to come up with a direction.

To support the applicants in developing their bid, the WaL programme team had produced a so-called 'Setting the Scene' document with background information on the call, the challenge, and the three cities.

All bids were assessed by an advisory board that acted as a jury for the design competition. The advisory board consisted of representatives of Chennai, Khulna, Semarang, 100 Resilient Cities, the GCA, IABR, AWB, and OECD and was chaired by the Netherlands Special Envoy for International Water Affairs. The AIIB and the FMO were observers to the advisory board. The fee for the work to be tendered by the competition was fixed, allowing the advisory board to assess all bids solely on quality based on the following three criteria: understanding of the challenge (max. 20 points), quality of the approach and first ideas to address the city challenge (max. 40 points), and quality of the team and project management (max. 40 points). Only bids with a minimum total score of 70 points could qualify.

For each city, the two highest-scoring bids were selected and commissioned to (1) execute a comprehensive study on (climate) vulnerabilities, risks, and interdependencies, (2) develop a vision and strategy, and (3) implementable (scalable and replicable) transformative place-based design solutions. The two multidisciplinary design teams selected in Semarang were 'One Resilient Semarang'² and 'Cascading Semarang'.³ Both teams were led by experienced designers from international architecture and urban planning firms, and consisted of both international and Indonesia-based experts.

How the Multidisciplinary Design Teams Developed an Integrated Way of Working

Following the design logic of the co-evolution of problem and solution, the second stage of the competition comprised research on the challenges and the local situation, in combination with the ideation of (possible) solutions. WaL aimed to develop a portfolio of creative and innovative solutions, and therefore did not include the competitive element that generally characterises a design competition in the second stage. The two selected teams for Semarang started to work closely together. This collaboration was unique to WaL-Semarang and did not occur in Chennai or Khulna.

Various interviewees indicated that the collaboration between the teams was instigated by the city of Semarang. One of the interviewed Indonesian team members formulated it as follows:

That was the first thing they [the city officials] said: ‘I am not going to deal with two teams, you guys had better form one team because I’m not going to answer the same question twice, and you guys are doing it for us’.

The collaboration of the teams led to the development of one programmatic approach for Semarang (see [Figure 1](#)). Both teams delivered their own final reports, but included the same overarching principles and perspective showing their integrated way of working. They presented the following proposals:

- (1) Water-neutral Industry (*One Resilient Semarang*)
- (2) Feeding the Industry (*Cascading Semarang*)
- (3) Network of Resilient Kampung (*One Resilient Semarang*)
- (4) Integrated Protective Coastal Zone (*One Resilient Semarang*)
- (5) Sponge Mountain Terrace (*Cascading Semarang*)
- (6) Rechannelling the City (*Cascading Semarang*)

The proposals aimed to be integrative in nature. Through the various experts in the teams and the interaction with a diverse group of stakeholders, the design process included various bodies of knowledge and a diverse set of values. The proposals not only addressed technical water or climate adaptation issues but also made smart connections to urbanisation, economical, ecological, community and governance issues and developments, and aimed for various co-benefits. Both teams employed systems thinking



Figure 1. Conceptual design of the WaL strategic climate resilience programmes in Semarang. *Source:* Water as Leverage 2019 – image produced by the two teams One Resilient Semarang and Cascading Semarang.

as the basis of their research and design approach, focused on the interconnectedness of issues, capitalised on relationships and interconnectedness, and addressed multiple geographical and temporal scales. In this sense, the design process reflected all ‘integrative’ elements aligning with the holistic and integrated resilience strategies required to respond to changing socio-ecological conditions. However, despite the attention to several governance aspects in the reports, the proposals in the final reports were predominantly spatially and technically oriented.

One crucial aspect was well advanced yet not integrated in the proposals: the bankability of the proposals. Although it was an important motivation for setting up WaL and the challenge of developing bankable projects was explicitly part of the brief, the final proposals were not ready to be financed and implemented (immediately). In the interviews, this was related to the following: untimely engagement with representatives of the Indonesian national government; lacking relationships with, or inclusion of, existing initiatives; lacking (international) financing and project preparation expertise in the design teams; and a fundamental misfit of integrated projects with the administrative structure of existing (international) financing programmes. One of the members of the design team remarked:

There is no funding for our ideas that are more integrated because that’s not how typical investments work, they like a narrow scope.

At the time of the research, WaL was in its third phase, in which various proposals were being further developed into bankable and implementable project initiatives. However, only time can tell if these turned out to be successful.

The Challenges of Inclusiveness and Creating Local Ownership

Significant efforts were made to connect to various stakeholder groups and to make the WaL process inclusive. Both teams conducted interviews with a broad range of stakeholders, such as governmental actors at the city, provincial, and national levels, community members and leaders in both coastal and upland areas, businesses, practitioners, academics, NGOs, and experts. Furthermore, both teams organised meetings and workshops with local actors, performed field research, and conducted multiple site visits. These activities were reported to reveal valuable information on actors, common issues, gaps, needs, and opportunities. Moreover, the workshops enabled the collaborative ideation of possible solutions, a dialogue about these possible solutions, and building of local coalitions, especially with local governmental agencies in Semarang. [Table 3](#) provides an overview of the stakeholders that the teams interacted with according to their reports. The final reports of the design teams do not provide details about how stakeholders were recruited and selected, nor do they reveal which ideas that emerged from the interviews and interactive sessions were included in the final outcome. The interviews suggested that a certain level of genuine participation was achieved. However, defining the level of participation (see Arnstein, 1969) reached calls for additional more granular investigation, which was beyond the scope of our research.

The interaction with local stakeholders and the collaboration between the teams was supported by the WaL programme team with the organisation of three local workshops in each of the cities, and two so-called regional workshops in Singapore. The local

Table 3. Overview of the stakeholders who the design teams interacted and engaged with during WaL-Semarang (Cascading Semarang, 2019; One Resilient Semarang, 2019).

Government (City of Semarang)	
BAPPEDA	Department of City Planning and Development – (1) Infrastructure Division, (2) Research and Development Division
DISTARU	Department of Spatial Planning – Spatial Planning & Utilization Division
DISSPERKIM	Department of Housing and Settlement
DPU	Department of Public Works – Water Resources & Drainage
DLH	Department of Environment – Pollution Control & Environmental Conservation Division
BPBD	Department of Disaster Management
DINAS KOPERASI & UMKM	Cooperative, Micro, Small and Medium Enterprises Office
DINKES	Department of Health
PDAM	Water Supply Company
KADIN	Chamber of Commerce & Industry
Government (Java Province)	
BAPPEDA	Department of Planning and Development
BBWS	River Basin Department
PUSDATARU	Department of Public Works, Water Resources & Spatial Planning
ESDM	Department of Energy & Mineral Resources – Geology & Groundwater Division
Practitioners	
UNDIRP	University of Diponegoro (1) Engineering Faculty (Civil Engineering, Urban and Regional Planning, Environmental Engineering), (2) Marine and Fisheries Faculty
UNIKA	Human and Disaster Institutions
UNNES	Center for Education, Population and Environment
BPP SIMA	Management Board of Banger Polder
BINTARI	Bina Karta Lestari Foundation
IUCCE	Initiative for Urban Climate Change and Environment
IAP	Association of Planners
PRENJAK	Environmental Care Youth Association
IALI	Indonesian Landscape Architecture
BUGIS	Blue Green Infrastructure project Semarang
Private Sector	
Wijayakusuma	Industrial zone
Temple Industrial Zone	Industrial zone
Graha Candi Golf	Private developers
Bukit Semarang Baru	Private developers
Bukit Jaya Metro	Private developers
Citra Grand Semarang	Private developers
Pt. Phapros TBK	Industry
People working in informal sector	Street vendors, traditional markets, traders, and local entrepreneurs
Local communities	
Kelurahan of Trimulyo & Terboyo Wtan	Community leader and local residents
Kelurahan of Wonosari	Community leader and local residents
Kelurahan of Nongkosawit	Community leader and local residents
Kelurahan of Tembalang	Community leader and local residents
Kelurahan of Bedono	Community leader and local residents
Kelurahan of Peterongan	Community leader and local residents
Kelurahan of Tegalsari	Community leader and local residents

workshops fortified the interaction with key local stakeholders, as well as the collaboration between the teams working in Semarang. The regional workshops were organised to interact with international financing institutions and exchange knowledge and experiences between the three cities involved in WaL.

Considering the relatively short time period for the development of the vision of around 10 months, the large geographical scope – the greater Semarang region – and the power dynamics related to (international) planning initiatives, it could be that not all relevant stakeholders were sufficiently included in the process. The interviews also

revealed quite some critique on this theme, for example on the late involvement of the national government, an important stakeholder to secure (international) funding. Several interviewees suggested to already engage with governmental bodies during the development of the WaL programme. Such early engagement of local, provincial, and national governmental stakeholders in the definition-stage of WaL would have not only better informed the formulation of the call, but also potentially created strong(er) ownership of local and national governmental actors in terms of the WaL process and outcomes, which is important in securing funding and implementing the developed proposals in later stages (e.g. Laeni *et al.*, 2020).

Critique was also expressed in the interviews on the limited on-the-ground presence of WaL in Semarang. Both the design teams and the programme team lacked a permanent base and representation in Semarang. This was said to restrain coordination with local counterparts. Moreover, it hindered the building of understanding and commitment through various levels of government for the developed solutions. A strong local presence could have facilitated and eased intense discussions, as well as active alignment with existing initiatives, between financial parties, beneficiary countries, donors, and coalitions of local stakeholders.

Towards Long-Term Transformation?

An important outcome of WaL was an overarching long-term vision for a (more) resilient Semarang, which could guide the future development of Semarang, combined with multiple localised proposals for short-term action. We encountered various initiatives during the interviews suggesting a serious follow up. Several project proposals of both teams were, at the time this research was conducted, being elaborated and transformed into financeable project initiatives. Furthermore, local members of the design-teams were commissioned by the city of Semarang to investigate how the long-term vision for a resilient Semarang could be translated and incorporated into the prevailing urban planning schemes, as one of them indicated in the interview:

‘We’re ... developing a road map for the city ... with the local taskforce because we understand better how the bureaucracy works and how government agencies would like to see things’.

Both developments indicate that the envisioned ideas and proposals produced by WaL for Semarang were compelling and convincing. Whether the vision is fit to be used as a navigation device in the long run, and whether it allows for flexibility and various (adaptation) pathways is uncertain. Both teams paid little attention to these aspects of the vision and proposals in their reports. It also remains to be seen if the involvement of local, regional, and national stakeholders and governmental bodies created sufficient commitment and engagement for the ideas to be fully adopted.

The focus of the vision and proposals was mostly on technically-oriented spatial interventions, leaving room for improvement on the social, economic, and governance aspects of an envisioned transformation towards a resilient Semarang. The interviewees, though, reported various appreciated effects of the WaL process that would be beneficial for long-term transformative change on these points. They mentioned, for example, the creation of an ecosystem in which different parties could bring in their expertise, the

development of partnerships between organisations, starting a conversation on the political level on urban resilience, the willingness of local stakeholders to engage, capacity building in the teams, and, as can be derived from Laeni *et al.* (2020), local capacity building. The WaL process built leadership capacity within the Semarang government, and strengthened Semarang's position at the national level. Furthermore, it made the Semarang partners more vocal and provocative, both inwards in their collaboration and outwards towards the international partners and the national government. It is, however, too early to tell whether, and to what extent, WaL induced or contributed to truly overcoming structural barriers and inducing transformative change.

Lessons for Future Design-Led Planning Initiatives

Our analysis of the design-led planning approach for urban climate resilience in WaL Semarang illustrates that 'design' can induce a process with innovative, integrative, inclusive, and transformative characteristics. As such, WaL provides several pointers for future design-led planning approaches. Firstly, two design-based elements of the WaL approach helped to evoke *innovation*, namely structuring the approach as a two-stage design competition, and having a combined focus of researching the challenge and developing solutions. Secondly, to develop an *integrative* perspective, the WaL approach included professional designers along with other experts in the design teams, and requested as an outcome a long-term integral vision for a resilient Semarang combined with financeable and implementable project proposals. Thirdly, the workshops organised by the WaL programme team, and the multiple interactions of the teams with local, regional, and national stakeholders, which were facilitated by the mixed international and Indonesian design teams, enabled – with room for improvement – interaction and the *inclusion* of multiple stakeholders in the design process. Finally, we encountered several indications that WaL's design-led planning approach is contributing to the *transformation* towards a climate resilient Semarang, although it is too early to tell whether this will fully bear out in practice. The research into WaL-Semarang also triggered reflections and ideas on improving future design-led planning initiatives.

Ideas for an Improved Design-Led Planning Approach for Urban Climate Resilience

Based on the findings, the following concrete ideas can be formulated for improving design-led planning initiatives for urban climate resilience. Firstly, having an experienced professional designer as a team leader turned out to be a successful factor for both design teams in WaL Semarang. Including this criterium in the selection of teams would secure the central position of design-expertise, and, as such, stimulate the full employment of the opportunities of a design-led approach. Furthermore, since developing financeable projects was such an important element in WaL, the inclusion of financial expertise in the design teams could also be considered as an additional qualifying requirement. Secondly, considering inclusiveness and creating (co)ownership in the beneficiary city and/or country, WaL points towards a strong(er) co-organising role for local and national governments of the targeted city/country, particularly in the preparation phase. Additionally, a permanent presence of the programme and/or the design teams in the city, Semarang in this case, would have opened up the potential of a timely, more

frequent, and deeper interaction and involvement of (local) stakeholders in the design process (cf. Laeni *et al.*, 2020). This is important not only for the development of proposals, but also to ensure continuity and to strengthen the enabling institutional environment. Finally, concerning the transformative potential of a design-led planning approach, the focus of the design outcome could have been more focused on adaptive (spatial) pathways (e.g. Zandvoort *et al.*, 2019), and flexibility and future adaptability of the vision and proposals.

We also found that particular attention is needed to continuity in the application of concepts and ideas. In WaL, the intellectual property rights of the ideas were granted to the design teams as a means to ensure such continuity. Based on what we encountered in the interviews, this construction could turn out to be counterproductive as this strategy challenges the idea of local ownership. Design – particularly spatial design – offers other options for ensuring continuity. These include a supervisory role for the designer during the implementation phase (Verweij *et al.*, 2021), or the installation of a quality team (Klijn *et al.*, 2013; Busscher *et al.*, 2019), consisting of designers and experts who advise decision makers. The latter could be particularly useful during long-term projects and programmes, in which many elements have to be elaborated and detailed, and in which adaptation of the envisioned ideas along the way is needed. A quality team could enable the continuation of the iterative and adaptive character of a design process beyond the planning phase into the project-development, implementation, and exploitation phases. However, many of these constructs, or policy instruments, originated in the Western world and can be costly. Therefore, whether similar kinds of constructs are feasible or could be beneficial to ensure continuity in a non-Western context remains to be seen and calls for careful consideration and translation.

Finally, although we found indications in our case study that design can have the potential to contribute to overcoming barriers and inducing transformative change, it also illustrates that this is not guaranteed. For example, the barrier between existing financing systems and funding innovative, integrated, and inclusive climate resilience projects proved to be persistent and strong. Such projects simply do not fit the sector-oriented funding schemes. Here, different thought-worlds with their own paradigms and logics need to be connected and bridged. This calls for time, commitment and perseverance, experimentation, continued engagement, and involvement of local actors (Booher & Innes, 2002; Friend *et al.*, 2014; Laeni *et al.*, 2019) to foster multi-level social learning (see e.g. Pahl-Wostl *et al.*, 2013). To fully understand the potential and limitations of design-approaches in relation to transformative change, more research and study of empirical cases is required, particularly where the overcoming of social, cultural, and institutional barriers and boundaries is concerned.

Design-Led Soft Planning Spaces

WaL was organised as a temporary programme targeted towards the development of both a long-term vision and concrete project proposals. As such, the design-led planning approach of WaL provided a soft planning space (cf. Kaczmarek, 2018; Ovink & Boeijenga, 2018). Soft spaces are set up to allow participants to freely share their ideas beyond their professional boundaries, are generally situated alongside formal planning spaces, and aim to infuse these formal spaces with new ideas (Haughton *et al.*, 2009).

WaL was an international initiative, and not part of any local, regional, or national (formal) planning system. The programme managed to create connections with existing planning institutions in Semarang, as illustrated in the follow-up projects mentioned in the interviews. At the same time, as also evidenced by WaL, connecting soft spaces to the political and institutional contexts, and transferring knowledge, ideas, and skills that are gained in soft spaces into hard planning spaces, remains challenging. Embedding and connecting soft spaces to the local contexts is still an important issue that can make or break the uptake of ideas (Kempenaar, 2020).

WaL's approach has many similarities with the Rebuild by Design process, which was initiated after Hurricane Sandy hit the New York/New Jersey region in 2012. This too can be seen as a design-led soft planning space (Ovink & Boeijenga, 2018). Additionally, other design approaches, such as living labs (e.g. Puerari *et al.*, 2018), architectural exhibitions (Von Petz, 2010; Enright, 2013), charrettes (Lennertz & Lutzenhiser, 2017) or atelier sessions (Kempenaar *et al.*, 2020b) also employ design-based mechanisms for creating soft spaces in the planning domain, often with the participation of stakeholders (see also AlWaer & Cooper, 2020). Further research on how the design process unfolds in different design-based soft spaces, on their 'successes' and limitations, and on their contribution to developing an enabling institutional environment, local capacity building, overcoming structural barriers, and/or inducing transformative change could help planning practice in the fruitful application of design, in its broadest sense, in planning for today's major challenges. In this context, particular attention is needed to (the organisation of) inclusiveness by design. As the involvement and commitment of a wide range of stakeholders is crucial, an important avenue for further research concerns the required methods for stakeholder recruitment and stakeholder engagement and interaction in design-led planning approaches. Insight in these issues could enhance and foster the effectiveness of future design-led planning processes in being inclusive by design.

Finally, WaL underlines that design, both as a process and an outcome, and therefore also designers, can have valuable roles and contributions in early and strategic planning stages and enhancing collaborative planning process at a local scale. These contributions are essential conditions for materialising climate resilience strategies in practice and transforming local planning practice (Brown *et al.*, 2012; Hegger *et al.*, 2016; Driessen *et al.*, 2018). This emerging design practice calls for specific design knowledge, expertise, and skills, and for new specialisations within the (spatial) design disciplines. Particularly knowledge and skills relating to organisational expertise and social capacities are relevant for this kind of designing (Ovink, 2009; Van den Brink *et al.*, 2019). The new role and position of designers in processes such as WaL also calls for a new, collaborative attitude of designers and a significant change in design culture (Manzini, 2015; Kempenaar & Van den Brink, 2018). Designers need to leave their 'starchitect' ambitions behind, become part of a team, interact with stakeholders, and share their power over the design process and its outcomes with others.

Conclusion

Our study revealed that design-led planning approaches, such as WaL, can facilitate the development of innovative and integrative proposals for urban climate resilience with the inclusion of multiple stakeholders, while also potentially strengthening an enabling

environment for the uptake of such proposals. Furthermore, we encountered indications that WaL's outcomes have the potential to contribute to a transformation towards a resilient urban future in Semarang. This is a promising outlook, considering major global challenges like climate change adaptation.

However, our analysis also showed that WaL's design-led planning approach had its limitations. It struggled, for example, to induce genuine engagement of the (international) financial sector. Furthermore, there is room for improvement regarding the timely involvement and commitment of local, regional, and national governmental representatives, as local ownership is a critical factor in the uptake of innovative ideas. We learned that future design-led planning approaches can benefit from a continuous presence 'on the ground', a more receptive posture to the local situation, actors, and institutional setting, and a focus on capitalising on local initiatives, opportunities, and ongoing processes. Finally, we call for more attention to design-led planning initiatives in both research and practice. Particularly evaluating studies of design-led and other planning approaches can reveal what the true potential of design-led planning is, what the drawbacks are, and what designers can add that other professions (e.g. planners and engineers) lack and vice versa. Only then can we fully understand what design has on offer to planning for transformative change towards climate resilient urban regions across the world.

Notes

1. Additional financial partners were the World Bank, Asian Development Bank, Islamic Development Bank, Green Climate Fund, and KfW. Additional organising partners: Pegasys, Partners for Resilience, UN Habitat, and WWF. The research leading up to the WaL programme was conducted under the leadership of Architecture Workroom Brussels (AWB), in partnership with Deltares, FABRICations, and the Netherlands Environmental Assessment Agency (Dutch: *Planbureau voor de Leefomgeving*, PBL).
2. One Architecture & Urbanism, Deltares, Wetlands International, Kota Kita, Sherwood Design Engineers, Hysteria Grobak, Iqbal Reza, and UNDIP.
3. MLA+, Deltares, FABRICations, PT Witteveen+Bos Indonesia, UNDIP, UNISSULA, and IDN Liveable Cities.

Acknowledgements

The idea for this paper emerged from discussions during the 'WaL-Reflect' project, commissioned by the Netherlands Special Envoy for International Water Affairs. The authors wish to thank their colleagues from the OECD and Architecture Workroom Brussels for the inspirational discussions during this project. The research for this paper builds on the NWO-SURF project 'Spatial Designers as Boundary Spanners' (granted by the Netherlands Organisation for Scientific Research, grant no. 438.19.176), the 'WaL-Reflect' project, and the PhD research project 'Institutional design for the transition to flood resilience in developing countries'. No financial interest or benefit has arisen from the research.

Disclosure statement

No potential conflict of interest was reported by the author(s).

Funding

The work was supported by the NWO [438.19.176].

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