Assessing transformative capacity for sustainable urban regeneration: A comparative study of three South Korean cities

Marc Wolfram

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Abstract Urban regeneration forms a key approach for coping with persistent sustainability problems in cities. In practice, however, it is often driven by motives other than sustainability transformation. This paper explores the preconditions that allow urban regeneration approaches to become transformative, and suggests a methodology to support this shift in practice. It does so by assessing the capacity available to prepare for, initiate, and steer a path-deviant sustainability transformation of urban areas in three South Korean cities, jointly with stakeholders. The findings reflect how local policy largely supports a conservative development pathway, favored by national government, sidelining especially ecological implications. Major deficits exist regarding systems thinking, sustainability foresight, and social learning processes, while collective visioning, intermediation, community empowerment, and repositioning science could become instant drivers. In conclusion, assessing transformative capacity offers a crucial lever to design urban-regeneration approaches for unlearning dominant development paradigms and to experimentally reconfigure urban social–ecological–technological systems.

Keywords Governance · Social learning · Sustainability transformation · Transformative capacity · Urban ecology · Urban regeneration

INTRODUCTION

Over the last decade, cities and urban areas have become a prime focus of the global sustainability debate. 85% of the global population live in urban areas since 2015 (Melchiorri et al. 2018), and a further increase is expected toward 2050 (UN DESA 2015). Correspondingly, two-thirds of total global carbon emissions, as well as two-thirds of total global energy consumption are estimated to be urban (C40 2017). In addition, despite sporadic progress, most countries display major or even widening gaps between cities and within cities in terms of social justice and economic welfare (UN HABITAT 2016). Therefore, different high-level international policy frameworks have underlined the vital importance of accelerating urban transformations toward sustainability only recently (e.g., UN 2030 Agenda, Habitat III, EU Urban Agenda, ESCP Basque Declaration).

A key to transforming the existing urban areas is *urban regeneration*, i.e., “area-based intervention which is public sector initiated, funded, supported, or inspired, aimed at producing significant sustainable improvements in the conditions of local people, communities, and places suffering from aspects of deprivation, often multiple in nature” (Leary and McCarthy 2013, p. 9; cf. Roberts et al. 2017, p. 15). Urban regeneration thus represents a high-profile field of governmental intervention, reflecting core policy priorities (ibid.). Consequently, there is no uniform approach to urban regeneration, but a range of typical aspirations described as property-led, business-driven, urban form and design-led, cultural industry led, health and well-being-led, or community-based aspirations (Colantonio and Dixon 2011, p. 7). However, approaches with a focus on *ecological* dimensions are still rare. There is, however, a major potential for managing ecosystem

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services, reducing environmental footprints, and increasing biodiversity in cities through comprehensive changes in building technology, infrastructures, and public spaces, while creating social and economic co-benefits (Balaban and Puppim de Oliveira 2014; Cohen-Shacham et al. 2016; Hodson and Marvin 2016). Urban regeneration could thus form a strategic intervention that triggers deeper changes in cultures, structures, and practices that enable urban sustainability transformations (McCormick et al. 2013).

This perspective seems particularly suitable for South Korea—a country facing severe urban sustainability challenges today. With its high level of urbanization (82%), rapidly shrinking population, sprawling cities, growing carbon footprint, and massive fossil energy dependency (85%), the need for radical urban change is pervasive. Furthermore, the noninclusive governance and practices of urban development established in the past appear to be entirely unfit to resolve these complex issues coalescing in urban areas (Wolfram 2017). In 2013, national policy has turned toward “urban regeneration,” suggesting to offer a more comprehensive response (Lee and Hwang 2013). However, the new approach has quickly been exposed as “culture-led” (Shin and Stevens 2013; Kim 2016; Park 2016) or “retail-led” (Kim and Jang 2017), while others also account for negative effects on place satisfaction and community spirit due to a focus on economic objectives (Kim 2014). In this regard, South Korea compares to other countries in East Asia like Japan (Tsukamoto 2013) or Taiwan (Hsu and Chang 2013), but equally shows parallels to China despite its rather different growth dynamics (Ye 2011; Lang et al. 2016; Zhou 2016).

Against this backdrop, this paper discusses to what degree cities in South Korea are currently enabled to confront the major challenge of sustainable urban regeneration through building *transformative capacity*, aimed at replacing the currently dominant urban systems and development paradigms. It asks what actions and structures may be required to overcome the existing weaknesses and foster available strengths for shifting toward a transformative urban regeneration approach, and suggests an assessment method to support this shift. “*Assessing transformative capacity for sustainable urban regeneration*” positions this study in the context of urban transformation research and lays out the conceptual framework used for assessing urban transformative capacity. “*Research methodology*” describes the methodology applied for case selection, data collection, differential assessment and interpretation. “*Transformative capacity for sustainable urban regeneration in South Korea*” then introduces to the South Korean context for urban regeneration and presents the findings of the comparative qualitative case study carried out in three selected cities: Changwon, Gwangju, and Seoul. Finally, “*Transformative capacity assessment and*

comparative discussion” highlights common issues and patterns, and “*Conclusions*” concludes about key implications for research and policy.

ASSESSING TRANSFORMATIVE CAPACITY FOR SUSTAINABLE URBAN REGENERATION

The utility of complex system ontologies for understanding urban-transformation dynamics, but also for designing intervention strategies that could steer urban change toward sustainable system configurations and performances, has been widely acknowledged (Wolfram and Frantzeskaki 2016; McPhearson et al. 2016; Webb et al. 2017). The scholarship of socioecological system resilience (Walker et al. 2004; Folke et al. 2010; Olsson et al. 2010; Wilson et al. 2013) and of sociotechnical system transitions (Hodson and Marvin 2010; Gottschick 2013; Rijke et al. 2013; Rauschmayer et al. 2015) have both equally contributed to develop more differentiated understandings of *transformative capacity* and its characteristics. Broadly defined as the ability to “create a fundamentally new system when ecological, economic, or social (including political) conditions make the existing system untenable [...]” (Walker et al. 2004, p. 4), transformative capacity thus represents a complex property shaped by a set of factors cutting across geographic scales, government levels, and agency levels. Nevertheless, most studies coincide in respect of these factors only in part, while suggesting diverse complementary ones that require consideration.

So far, very few researchers have attempted to undertake *empirical assessments* of transformative capacity, which draw on these diverse insights. Early on, Walker et al. (2006) recognized that such an assessment requires focusing on factors that affect the four system key characteristics of identity, feedbacks, structure, and functions: (1) incentives to change, (2) open networks and cross-scale awareness, (3) asset reserves and flexibility in institutions, and (4) experimentation and innovation activity (ibid.). Some have derived operational criteria from this perspective for a given social–ecological system (Wilson et al. 2013; Berman et al. 2017), while others have suggested to further emphasize the roles of individual and collective agencies in bringing these factors together (i.e., leadership, community action, and governance) (Westley et al. 2013; Griffith 2014; Ziervogel et al. 2016).

A more integrated framework that also considers various other research strands and focuses specifically on *urban transformation* has been developed by Wolfram (2016). It understands *urban transformative capacity* as “the collective ability of the stakeholders involved in urban development to conceive of, prepare for, initiate and perform

Fig. 1 Overview—interdependent components of urban transformative capacity: agency and interaction forms (C1–C3), development processes (C4–C8), and relational dimensions (C9–C10) (cf. Wolfram 2016)

path-deviant change towards sustainability within and across multiple complex systems that constitute the cities they relate to.” (ibid. 126). The framework identifies 10 interdependent key components (C1–C10) of urban transformative capacity (Fig. 1), and a total of 60 factors (Table S1) that specify requirements for their development, thereby indicating a baseline (all ten components reflected), as well as options and a direction for capacity growth (all 60 factors fully developed). Given the consolidated and operational character of this approach, as well as its urban focus, it is adopted in the following for the empirical assessment.

Central to the urban transformative capacity framework is an emphasis on key *forms of agency and interaction*, place-based and networked, and their interweaving through social learning (Cramer and Loeber 2004; Loeber 2007). As illustrated in Fig. 1, three components are thus placed at the core of the analysis: ‘Inclusive and multiform governance’ (C1) accounts for broad stakeholder involvement, diversity of formal and informal interactions, and effective intermediation; ‘Transformative leadership’ (C2) asks for individuals in the public, private, and civil society sectors who lead through articulating shared visions, motivating engagement, and shaping collaborative processes; ‘Empowered communities of practice’ (C3) identifies in how far resources and conditions of autonomy are provided for such communities to meet social needs.

These agency and interaction components need to engage with four critical *capacity development processes* (C4–C7) that include using systems analysis to understand change dynamics and path dependencies (C4),

sustainability foresight, i.e., participatory visioning and alternative scenario designs (C5), practical experimentation of communities with novel solutions (C6), and the embedding of effective sustainability innovations, e.g., through resource provision or regulations (C7). Social learning (C8) then forms the vital component required to feed outcomes of all four processes back into the articulation of governance, leadership, and community empowerment (C1–C3), e.g., through monitoring system change and collective reflexivity. Moreover, the analysis must account for critical *relational dimensions*, i.e., whether the scale levels (local to global—C9) and agency levels (individual, household, organization, association—C10) needed for system change are suitably involved.

Assessing urban transformative capacity thus provides insights regarding the particular strengths and weaknesses present in a given place to actually and effectively achieve path-deviant change toward sustainability. It does not assess the current sustainability of urban areas, but their *ability to get there*—whatever the starting point. Given its broad conceptual scope, urban transformative capacity can hardly be assessed for urban areas *as a whole*, i.e., as complex systems of systems (cf. Wolfram et al. 2016). Rather, to make the study of urban transformative capacity feasible and meaningful requires focusing on selected *social–ecological–technological subsystems* (Leach et al. 2012; Olsson et al. 2014) that have major impacts on the constitution and transformation of urban areas.

Urban regeneration forms such a subsystem that links particular knowledge, institutions and technologies to various ecosystem services ranging from water, energy,

Table 1 Case-study selection and balancing criteria

Criteria	Changwon	Gwangju	Seoul
Size (inhabitants in 2015)	1.047.488	1.466.143	9.631.482
Selected for national urban regeneration subsidy/no. of local intervention areas	Yes/5	Yes/17	Yes/27
Political orientation (party of mayor in the last two/three consecutive legislation periods)	Progressive/conservative	Progressive/progressive	Conservative/progressive
Political-administrative function (according to Korean law)	Specific city authority, 5 districts (created 2010)	Metropolitan city authority, 5 districts	Special city authority, 25 districts
Highest government function (according to Korean law)	Provincial capital	Autonomous city	National capital
Ex-ante assessment ^a of sustainability orientations in local policy (public website/urban master plan)	Average/weak	Strong/average	Average/average
Identified as urban regeneration ‘good practice case’ (Delphi survey, $n = 43$)	11/43	13/43	21/43

^a4-level scale: absent, weak, average, strong

and materials to biodiversity and climate. This also makes urban regeneration a particularly relevant case in terms of urban transformations as it could weave together a whole set of sectoral subsystems in an effort to achieve *holistic* change in urban areas. Such an approach represents a potentially powerful lever for large-scale urban sustainability transformations if it is designed to provide the experiences, lessons and examples required for this (cf. Voytenko et al. 2015).

RESEARCH METHODOLOGY

In order to respond to the questions raised in “Introduction” above, a qualitative, comparative case-study approach was adopted, selecting three cities for a ‘most different cases’ design (Blaikie 2009; Yin 2014). Only larger cities (> 100.000 inhabitants, $n = 79$) with higher levels of policy capacity were considered for this (cf. Wu et al. 2015). Apart from the common national context, a recognizable policy agenda addressing urban regeneration was used as a dependent variable, since only cities with this feature allow for a meaningful comparison of the related transformative capacity. To this end, all 79 cities were first screened for their overall sustainability orientations in a key local policy framework (obligatory urban masterplan) and in their public relations (city website). Based on that, 13 cities showed a more active engagement with sustainability issues, while for the remainder either none or only weak indications were recognized. In addition, results from a Delphi survey among Korean urban planning experts ($n = 43$) were used to inform the selection, identifying good practice cases in the field of urban regeneration (Wolfram et al. 2016). The criteria used to diversify the independent variables included the local political-administrative

constitution, governmental functions, and the political orientation of the local government (Table 1, Fig. 2).

Primary qualitative data was collected through a total of 49 semi-structured interviews with selected stakeholders across all cities, realized between January 2016 and March 2017. The interviewees were chosen with a view to obtain a balanced representation of different interests in and knowledge about urban regeneration in a given city, thus aiming for systemic coverage of all relevant actor roles and relations (including also those affected but not actively involved). Interviewees in each city thus always represent various government agencies, private businesses, civil society organizations, academia, as well as intermediaries (Table S2).¹ Where possible, complementary primary data was also gathered through participant observation at pertinent local events and meetings (13 in total), yet without targeting comprehensive coverage. Furthermore, secondary data provided by policy documents, research articles and the media was equally collated to contextualize interview responses and assessment results. This triangulation allowed for greater variance in the data collected since each method provides insights about different aspects of empirical reality (Patton 2002).

To assess the particular capacity strengths and weaknesses of each city, all data were then coded regarding the 18 subcomponents of the urban transformative capacity framework, judging their articulation on a 5-level Likert scale (1 = very weak; 2 = weak; 3 = average; 4 = strong; 5 = very strong). Coinciding recognition of all development factors (Table S1) underpinning a given subcomponent across data sources resulted in the highest score, while the identification of deficits, contradictions, or doubts lowered it correspondingly.

¹ See supplement; Based on Table S2, interviews are referenced as C1–C15, G1–G16, S1–S18.

Fig. 2 Location and scale of the selected case-study cities in the South Korean urban context (greyscale indicates urbanization rate in %)

In order to obtain a differential assessment, each interviewee was also asked to complete a subjective assessment of the transformative capacity for sustainable urban regeneration currently available, equally judging the 18 subcomponents of the analysis framework. To ensure consistency, they also received the set of development factors that explain each subcomponent. However, these individual assessments drew exclusively on the perceptions and knowledge of the respective stakeholder, whereas the researchers' assessment also implied careful attention to cross-case consistency, calibrating scores through sharing insights and joint discussion. Finally, the assessment scores for each city were aggregated arithmetically, differentiating researchers and stakeholders (Fig. 4).

The methodology adopted does therefore not aim to deliver an abstract "index" of transformative capacity since this would remain difficult to translate into practical action. Instead, it strives to engage stakeholders in creating an accessible metric themselves, and to open up a dialog space that juxtaposes their judgements and that of independent observers. Possible causes of inconsistency between individual stakeholder assessments may include (1)

interpretations of the subcomponents (what does it measure?), (2) normalization of the assessment score (how much is "strong"?), (3) insights and tacit knowledge about the case, not fully available to others. Regardless of these formal consistency challenges, however, methodically exposing such differences between stakeholder and researcher scores, as well as the reasons behind them, constitutes a focused approach to develop systemic reflexivity in practice and thereby actively build transformative capacity.

TRANSFORMATIVE CAPACITY FOR SUSTAINABLE URBAN REGENERATION IN SOUTH KOREA

Following the Korean War, South Korea has undergone a process of extremely rapid urbanization, continuing until the early 2000s. Propelled by state-driven industrialization, demographic growth and urban migration, new infrastructures and housing were quickly erected in the cities. Since the 1960s, the basic intervention pattern in this process is

Fig. 3 Apartment complex in Seoul 2016—built on an urban redevelopment site in the Northern green belt (photo by author)

termed “urban redevelopment”: Total demolition of all existing buildings and facilities in an urban area, and new construction by single developers, mostly subsidiaries of large national industry monopolies. This usually involves multiplying densities by factor 10–20. To provide legal leverage, urban redevelopment projects obtain formal permission if over 75% of real-estate owners in the area agree with them—a rule that has favored speculation, corruption, and violent evictions linked to urban redevelopment projects across the country (Gelézeau 2003).

Urban redevelopment has therefore also decisively shaped the dominant housing typology in Korea, the so-called “apartments”: Compact low-cost but high-rise building complexes of poor environmental performance (materials, energy, water, emissions) and design quality, equipped with basic green- and social infrastructures. Yet, due to their outstanding profitability for the large developers, apartments quickly gained prevalence in the housing stock, and today they provide home to as much as two-thirds of the total population. The remaining one third mainly inhabits older mixed-use urban fabrics, characterized by irregular street grids and diverse 1–5 story brick buildings, but with a similarly exiguous environmental performance and lack of green and public space (Park

2013). Depending on their location, these older areas subsist in a constant state of precariousness due to the impending threat of being designated for urban redevelopment, and thus evicted and demolished (Fig. 3).

The sketched default model of urban development in Korea apparently undermines the social and ecological sustainability of urban areas and could thus already form an important motive for transformative change. Yet, this is further exacerbated when considering the bigger picture of urbanization trends in the country: since the 1990s, the fertility rate has been falling steadily, today figuring among the lowest in the world (1.17 in 2017—KOSTAT 2017). The urbanization rate has thus stalled at the current level of 82% for the past decade, and even the largest cities are shrinking today (ibid.). More and more inaccessible real estate prices have, however, driven uncontrolled suburbanization, thereby shaping dispersed and car-dependent land-use patterns. With this, per-capita housing floor space has more than doubled since 1990 (33 m² in 2016) (ibid.), while in turn, the total urban greenbelt area in the seven principal metro areas is estimated to *shrink* by 8% between 1990 and 2020 (OECD 2015).

A systematic implementation of blue and green infrastructures through urban planning has not taken place,

which also implies major socioeconomic vulnerabilities as the incidence of climate change induced environmental disasters such as flash floods, landslides, and heat waves is increasing (Lee et al. 2015). Urbanization is also recognized as the most important threat to biodiversity on the peninsula, where 20.4% of wetland, 15.9% of farmland, and 2.1% of forestland have been lost only since 1995 (ROK 2013). Last not least, energy supply remains heavily dependent on imported fossil fuels (86%) and nuclear power (13%), with an insignificant share of renewable sources (1%) (IEA 2017), while energy consumption per capita is the highest among OECD countries and has been steadily growing over the past decade (KEEI 2016). Unsurprisingly, annual CO₂ emissions per capita have doubled between 1990 and 2014, peaking at 11.8t in 2017—but are expected to further grow at an annual rate of 1.2% until 2040 (IEA 2017).

Apparently, South Korea is in urgent need of a large-scale urban sustainability transformation. All types of existing urban fabrics would require an approach that strives to radically improve their sustainability and resilience by reconfiguring urban designs, infrastructures and buildings as social–ecological–technological systems, thereby enhancing inclusion and livability in the city and safeguarding compact urban form.

However, national policy has framed urban development requirements in a rather different way. Since the Lee Myung-Bak administration (2008–2013), sustainability considerations have been pushed back to favor a ‘green growth’ agenda instead, firmly prioritizing economic competitiveness (Kim 2016a, b). This orientation has also been reconfirmed by the subsequent Park Geun Hye administration (2013–2017), despite initial attempts to impose a distinctive ‘creative economy’ agenda (Lee and Kim 2016). Yet, in the aftermath of the 2009 financial crisis, ‘urban redevelopment’ appeared less and less suitable to support this agenda: Prospects for revenues started to dwindle, and major projects were halted as investors withdrew or even went bankrupt, while suburban sprawl continued to thrive. The coincidence of demographic shrinkage and economic stagnation seemed to finally dictate a more fundamental revision of the established redevelopment practices—and a rediscovery of the potential value of *existing* urban fabrics.

Consequently, in 2013, the ‘Urban Regeneration Act’ was adopted, providing a novel terminology and framework for more comprehensive interventions in existing urban areas deemed ‘under decay.’ With its overall objective to “improve residential environments, expand infrastructure and restore urban functions in urban areas that lag behind [...] in order to seek balanced urban development and contribute to improving the quality of life of citizens.” (ROK 2013), this act was widely celebrated as

a paradigm shift in Korea’s urban policy (Lee and Hwang 2013). However, the act expresses very limited concerns for the complex ecological dimensions of these interventions. This is obvious from the fact that the selection and evaluation of areas are only based on social and economic impact criteria, but not ecological ones. Furthermore, the local plans developed for implementation can even be exempt from environmental impact assessment and transport impact assessment for the sake of acceleration (ROK 2013).

Overall, the act creates a centrally supervised governance system to foster urban regeneration (UR) projects. For policy coordination, selection of areas, budget approval, and monitoring, an interministerial steering group was created. Further, a national ‘UR support agency’ was formed to provide operational assistance and to coordinate between local authorities and central government. At the local level, cities are required to establish ‘UR support centers’ staffed with public officials and external experts to facilitate practical implementation and report progress. These centers draw up municipal ‘UR plans,’ but also develop and implement concrete projects in collaboration with private and civil society stakeholders.

Already in 2011, the cities of Changwon and Jeonju were selected as national ‘UR testbeds’ to further specify the type, scope, and scale of possible interventions, and define new rules for implementation. After the act was adopted, local governments were then requested to submit applications for potential target areas, distinguishing whether these mainly required intervention in housing or business fabrics. Thirteen local authorities² were finally selected nationwide in 2014. These receive up to \$185,000 for plan preparation each, and from \$5.5 to – 23.0 Mio for implementation over a four-year period (ROK 2013).

Within this prescriptive national setting, it has therefore become increasingly decisive how *local* actors perceive and understand the UR challenge, in how far they recognize the complex sustainability issues involved, and what type of responses they start to develop. The following sections illustrate that the three cities studied display common patterns in this regard, but also significant differences. By briefly outlining basic characteristics and development dynamics for each city, they further contextualize the transformative capacity components assessed and compared in “[Transformative capacity assessment and comparative discussion](#)” below.

² Busan, Changwon, Cheonan, Cheongju, Daegu, Gongju, Gunsan, Gwangju, Mokpo, Seoul, Suncheon, Taebaek, and Yeongju.

Changwon: Beautiful places for an ‘environmental capital’

Changwon is a provincial capital with 1.0 million inhabitants and the ninth largest city in Korea. It is a polycentric conurbation shaped by modernist state intervention and administrative reform. Following the creation of a National Industrial Complex back in 1974, the three geographically proximate municipalities of Masan, Jinhae, and Changwon became an important industrial agglomeration, but also a major source of pollution. In 2010, the three cities were then formally merged, making Changwon the first case of a planned city in Korea. This move was motivated by the absence of intermunicipal coordination, which had also favored an accumulation of urban areas suffering from poor socioeconomic and environmental conditions (C13, C14).

With the first mayor of the new Changwon, Park Wan-Su (2004–2014), local policies strongly focused on two issues: Business development and local environmental quality. Pollution and ecosystem destruction had reached such unacceptable levels that a radical shift toward cleaner production and economic restructuring seemed inevitable. Park, who characterized himself as a ‘CEO-type leader’ thus combined an emphasis on location policy with rebranding Changwon as the ‘environmental capital’ of Korea (Yi 2013).

These orientations soon materialized in organizational and governance shifts. A ‘Department of Environmental Capital’ was installed to coordinate diverse projects related to green spaces, ecological restoration, water, waste, and transport. Although neither urban regeneration nor energy questions were addressed in this agenda, the city quickly gained international recognition for these sectoral measures (CCG 2006). In parallel, the ‘We Love Our Companies’ program was implemented between 2008 and 2010, equally led by a newly created city department. The program included streamlined administrative processes, networking events, and various awards for local businesses. These measures established close working relations between public officials and the business community, but remained largely disconnected from the city’s new environmental policies (C3, C7).

This divide between key local policy agendas became a main characteristic in the development of transformative capacity for UR. In 2011, Changwon was selected as a national UR testbed due to the gravity of problems in its deprived urban areas. The city put forward four old neighborhoods and a central business district for implementing pilot projects, involving 1100 households and 829 retail stores. While a separate UR department within the

administration was charged with managing project implementation, the new UR support center clearly focused on civil society involvement in the housing areas. Moreover, also a local ‘UR committee’ for policy review and advice was formed. Although representing various departments, academia, and professionals, this did, however, neither include civil society actors nor any ecological expertise (C2, C3, C6).

Despite its high environmental ambitions, Changwon thus adopted a narrow focus on socioeconomic issues and physical designs for UR, shaping an expert-driven, top-down governance structure. A shared long-term vision for UR that would address sustainability and relate to both main policy agendas pursued was not developed: “The city officials want a ‘user manual’ for UR, and citizens have no will to change their neighborhoods. So it is national government taking decisions. There is also no conversation between local government, citizens and private businesses.” (C14). Instead, notions of ‘clean and safe neighborhoods’ and ‘beautiful places’ were adopted as common short-term orientations, suggesting esthetic refurbishments of buildings and streets, rather than green infrastructures or energy retrofits (C2, C4, C13).

Within this framework, the UR support center concentrated its efforts on information provision for citizens and civil society organizations. Yet, engaged citizens formed a local NGO (‘Ghil Lab’) to train UR activists and mediate between city, owners, investors, and residents, but its funding basis remains uncertain (C12). Also local university faculty stepped in as individual brokers, although without a mandate. Yet, these interventions have partially allowed to shape UR measures and initiatives with more tangible social and environmental benefits (e.g., community gardens). It is also why most local actors perceive the UR approach as a radical departure from the previous practice of urban redevelopment. Nevertheless, stakeholder relations clearly lack inclusion and diversity, as reflected by a city official stating: “We prepare plans and actions first and then inform the residents, and they are following it.” (C2).

The setting in Changwon necessarily implies major deficits in terms of all transformative capacity development processes, regarding system knowledge, foresight, community empowerment, experimentation, innovation embedding and especially social learning. The political change brought about by the 2014 local elections has further weakened available capacities since the new mayor Ahn Sang Soo clearly stands for continuity of the business agenda, but not for the ‘environmental capital’ ambition (C7, C15).

Gwangju: Culture-led revitalization despite vital civic activism

Gwangju is one out of six ‘metropolitan cities’³ that have a certain degree of autonomy in the Korean territorial governance system. With 1.5 million inhabitants, it is the sixth largest city in the country and widely known for its active civil society and more leftist political orientations since the brutal suppression of a citizen revolt against the military regime in 1980. Driven through state interventionism, Gwangju had experienced a long period of economic decline and deindustrialization after the Korean War. It is only since the 1980s that the city established a more diversified economic fabric (Jeon 2011). Since the early 2000s, Gwangju also started to promote itself as a ‘Hub City of Asian Culture,’ supporting the creative economy and international cultural events (Seo 2013). This strategic orientation increasingly turned out to be decisive when facing the urban regeneration challenge (G13, G14).

Like his predecessor and fellow-party member Park Kwang-Tae (2002–2010), center-left mayor Kang Un-Tae (2010–2014) pursued an agenda of accelerated economic development in order to ‘catch up,’ thereby underlining a continued competitive disadvantage of the city. When in 2010 the national UR debate was taking shape, Kang thus recognized especially the economic opportunities involved in UR if linked to culture, heritage, and tourism: old neighborhoods should thrive through creative design projects, emblematic facilities, and new business developments in these fields (G1, G12). Although Gwangju simultaneously also pursued some more progressive environmental policies, such as the “SolarCity” promoting renewable energy use (Han 2014), none of these became linked to UR (G3, G11).

The city then rushed to create its own local policy frame for culture-led UR: Already in January 2011 the “2020 Gwangju Basic Plan for Adjustments of Urban and Housing Environments” was adopted, followed by a “Special Act on Urban Improvement Promotion.” These regulations preceded the creation of a local ordinance on UR to align with national policy requirements in 2013. Six support centers were set up: One for the city, and one for each autonomous district. Finally, a “2025 Gwangju UR Strategy” was devised in 2014, identifying 17 old neighborhoods for intervention, none of them involving apartment complexes, and indicating a balanced distribution among the five city districts rather than prioritization, e.g., by impacts or transferability (G7, G13).

Apparently, this rapid and biased move did not allow for deeper analysis or open stakeholder participation in UR strategy making. The diverse NGO’s, activists, and artists

already engaged in the so-called “village communities,” i. e., neighborhood-scale bottom-up place-making activities focused on social cohesion and quality of life, were not involved. Instead, the authorities drew on expertise provided by the city-owned ‘Gwangju Institute’ and local universities. Moreover, this concerned only urban planning, engineering and design disciplines, while ecology and social sciences remained blind spots (G1, G12, G13).

In Gwangju, UR is therefore often perceived as a continuation of urban redevelopment practices with other means, rather than a radical change (G6, G11, G12, G14). Public officials appear highly insecure as they confront the need to consult with a much wider group of stakeholders: “There’s no understanding about how to do urban regeneration in Gwangju yet. [...] We just have a very strong political decision.” (G2), and tend to cling to directions formulated by the mayor’s office, rather than investing in co-creation, experimentation or social learning: “I don’t think we can use citizen’s opinions. They are usually against urban regeneration plans, and simply want economic benefits.” (G1). Consequently, the new forms of consultation in culture-led UR have soon been criticized as legitimizing and neoliberal (Lee 2007; Jung et al. 2015), while also pointing to their gentrifying impacts (Lee 2015).

Actual implementation progress of UR projects thus appears to be inversely correlated to the degree of civic activism present in the respective district (G12, G13). Individual civil society activists or local NGOs such as ‘Green Gwangju 21’ and the ‘Climate & Environment Institute’ have tried to support wider and more substantive involvement through training programs (‘UR academy’), often also directly mediating between the city and residents. Yet, their resources are very limited, and most processes are run by the UR support centers, focusing more on awareness, information, and behavioral change than empowerment (G6, G7).

Transformative capacity development for UR in Gwangju has therefore been heavily undermined by the local government’s strong interest to capitalize upon UR economically, preventing the formation of an inclusive and diverse governance structure, as well as all basic capacity development processes. Despite the city’s vibrant community milieu, and although in 2014 even a civil society activist became mayor due to widespread criticism of these deficits, Gwangju is still far away from using UR for an urban sustainability transformation.

Seoul: Urban regeneration between compliance and innovation

Seoul is the national capital and with 10.0 million inhabitants also the center of its largest urban agglomeration. Due to its scale, Seoul has the administrative status of a ‘special

³ Busan, Daegu, Daejeon, Gwangju, Incheon, and Ulsan.

city authority' subdivided into 25 autonomous districts. Despite decentralization efforts the city continues to form the hub of the country's service industries and higher education system concentrating headquarters and universities, and accounting for 25% of national GDP in total (2014). This outstanding economic position has, however, also intensified the social and ecological problems in the city through the continuously high demand for housing and office space and related pressures for profitable urban redevelopment, rather than social–ecological regeneration (Schuetze et al. 2016).

Notwithstanding this pointed land use conflict, local policy in the capital only turned toward UR when national policy did in 2012 (S2, S5, S15). Following mayor Lee Myung-Bak (2002–2006—subsequent Korean president and architect of the national 'green growth' paradigm), fellow conservative party member Oh Se-Hoon (2006–2011) continued to promote large-scale redevelopment projects and to address urban ecology mainly as a location factor, supporting global competitiveness and citizen satisfaction (S8, S18).

The 2011 election of Park Won Soon, a cross-bench human-rights lawyer who had stressed social and environmental issues in his campaign, then marked a shift in goals and governance. Although UR as such did not figure on Park's agenda initially, two of his priorities became increasingly entangled with it. One was a strong engagement in social innovation and 'village communities' as a means to enhance cohesion and a local and social economy. From 2012, Seoul government thus provided financial and knowledge resources for over 2000 bottom-up, self-organized initiatives at neighborhood scale, ranging from care cooperatives and community gardens to energy collectives or food markets. Assisted by a growing network of support centers at different scales, this involved especially training for activists, community leaders, and social entrepreneurs (Wolfram 2018).

The other priority focused on energy and the dependence of the city on fossil fuels. In 2013, the local government deployed a program to save the amount of energy equivalent to the supply capacity of an average nuclear plant (2M TOE) by 2015, thus labeled 'One Less Nuclear Power Plant' (OLNPP). This implied a range of measures to reduce demand, increase efficiency, and expand renewable supply, addressing household and business users, as well as existing buildings and infrastructures (Lee 2017). Unlike any other local policy, these two programs were both elaborated in close collaboration with NGOs and civil society activists, in addition to selected officials, business, and academia representatives.

However, the local implementation of the national UR framework from 2011 onward remained largely unaffected by these policy innovations. Adopted in 2014, the "Seoul

2030" masterplan still envisages UR to "reactivate areas in terms of their social and economic condition and physical maintenance for improving quality of life and obtaining competitiveness." (SMG 2014) In 2015, a '2025 UR strategy' was adopted, as well as the legally required four-year 'UR Plan.' Yet, both plans were elaborated by officials and experts without noteworthy stakeholder consultation (S8, S18). For implementation, 27 areas were selected, thus ensuring that all district obtain a subsidy share. The UR strategy distinguishes 'old residential zones' (12), 'declining industrial areas' (3), 'history and culture' (7) and 'underperforming central areas' (5)—a typology that corresponds to the priorities set in Changwon and Gwangju, with only two of the residential areas also including apartment complexes (SMG 2015).

To develop and coordinate UR projects, the districts appointed 'master planners' for each area, most of which are faculty from local universities who display a rather parochial and autocratic understanding of UR (Um 2015, S7, S17). A first UR support center was set up in 2015, and by 2017 still only eight centers were operational in total. Inclusion and diversity in decision making were thus minimized in order not to jeopardize compliance: "UR has been more focused on maintenance because of the achievements that should be made. Therefore, residents' participation was hardly done until now." (S1).

However, recent efforts in UR are reflecting qualitative feedback obtained through a local monitoring of UR. Growing criticisms by local stakeholders and lessons from the community building and energy policy initiatives suggested to modify the approach taken (S11, S18). Therefore, the local government selected over 50 civil society activists as 'conflict mediators.' These are now helping the consideration of social and ecological values, and of alternative solutions in UR projects. A new support center program aims to discover and train 'regeneration activists' to enhance participation and deliberation processes (120 participants in 2017), and community initiatives working on energy were networked across the city to explore options for using UR projects for energy retrofitting (S5, S6).

Therefore, transformative capacity for sustainable urban regeneration has been developing in Seoul largely outside the narrow framework of UR policy, starting to modify its orientations and practices only recently. The strong inclusive vision articulated by the mayor and supported by most stakeholders, as well as environmental priorities anchored in his policy agenda and emerging bottom-up have favored the formation of novel communities of practice, seeking to engage in UR as a lever for multidimensional urban change.

TRANSFORMATIVE CAPACITY ASSESSMENT AND COMPARATIVE DISCUSSION

The above outline of the three cases based on interview- and secondary data broadly referred to the agency and interaction forms, development processes, and relational dimensions identified in the transformative capacity framework (Fig. 1). It illustrates the similarities but also differences between the cities in terms of their emerging approaches to urban regeneration, and already accounts for basic capacity strengths and weaknesses. These insights are now further deepened by using the results of the differential transformative capacity assessment (Fig. 4). The following paragraphs thus discuss and compare the principal assessment findings and point toward key lessons.

The *governance* of UR shows strong parallels in the three cities, clearly framed by national regulation. Authorities regard stakeholder involvement as an obligation rather than an opportunity. Actor diversity in core decision making processes remains limited, while the focus of inclusion support activities is on citizen awareness, information, and education. UR governance thus still clings to the top-down and exclusive approach of urban redevelopment, even where involvement practices have otherwise started to change (Seoul). However, *intermediation* turns out to be a key enabler in each city. This is already evident from the set-up of state-funded UR support centers that all facilitate civil society participation. Broader and more open involvement occurs only where intermediaries operate with a wider remit (Seoul), at various spatial scales (Gwangju, Seoul), or if they rely on different organization forms (NGOs in all cities). The latter always lack stable funding, but allow for independent and trusted mediation, effective community empowerment, as well as consideration of more diverse knowledge and values.

Leadership plays a crucial role in each city, but mostly without being transformative. The mayors all provide strong political directions, but these are either not addressing UR (Changwon, Seoul), or exploiting it for economic competitiveness (Gwangju). This leadership is not sensitive to the complex sustainability problems in UR and the various interests of the stakeholders affected, and thus also fails to engage in joint decision making. Even in Seoul where the mayor supports inclusion and empowerment, this does not refer to UR. Instead, emerging UR leadership in civil society makes a difference in all cities, and Seoul lately also tries to identify and train such leaders. The role of academic leadership varies considerably, however: While individual faculty from smaller universities in Changwon and Gwangju take the initiative for alternative UR approaches, appointed ‘master planners’ from the reputed large universities in Seoul even hinder attempts for innovation.

Fig. 4 Aggregated differential assessment of urban transformative capacity components for sustainable urban regeneration in Changwon, Gwangju, and Seoul (scale: 1 = very weak; 2 = weak; 3 = average; 4 = strong; 5 = very strong)

Communities of practice and respective empowerment approaches still appear to be in a nascent stage. Given the very recent formation of UR as a practice field, dedicated communities are rare and if existing, have originally formed in another domain (esp. social cohesion, environment, energy). Yet, despite efforts for participation, actions that effectively provide such communities with new skills and resources that support their self-

organization and autonomy are largely missing. The few exceptions encountered illustrate that, though self-evident for civil society organizations (Gwangju), this is still a learning step for authorities to do—even where major (non-UR) community empowerment programs already exist (Seoul).

System thinking and awareness of corresponding configurations and dynamics are a particularly poor component in all cities. This is most outstanding with regard to ecosystems, energy, water, and mobility systems, none of which are conceived of or analyzed in relation to UR. It is equally striking regarding the selection of areas, guided by balanced subsidy distribution—but ignoring cross-scale ecosystems as well as the relevance of apartment complexes and corresponding potentials for upscaling UR solutions. In line with the approach of the national government, local actors focus solely on older city areas, seeking synergies between upgrading the physical design, new economic activity, and a stable (but gentrified) social milieu. Other measures emerge only in a few cases where citizens, NGOs, and/or intermediaries actively push for integrating, e.g., community building, energy retrofits, or green spaces.

This has implications in terms of *sustainability foresight*, which equally turns out to form a very weak point across cities. UR largely builds on experts from the planning and engineering domains, instead of inter- and transdisciplinary knowledge coproduction. If undertaken at all, prospective analysis thus refers to phased development and real-estate markets, but largely ignores basic dynamics linked to, e.g., climate change, resource depletion or migration. Alternative scenarios based on different consistent trend assumptions and measures are not explored. Joint normative vision development for UR is equally missing. Merely in Seoul the collaboratively created visions for community cohesion and energy transition result to also provide some common orientations for UR, which stresses their value and validity for transformation.

Experimentation plays an important role in all three cities, but is neither conceived as such nor truly disruptive. The UR approach commonly implies that local stakeholders for the first time adopt a different role and perform novel activities in urban development. However, most measures remain highly conventional, innovation does not form an objective, and indicators to consistently assess process, outcomes, and impacts are entirely missing. Experiments that partially differ from this pattern emerge only where NGOs and academia played a more active role, including for intermediation and/or empowerment (Changwon, Seoul).

Corresponding to these characteristics of experimentation, *innovation embedding* is not provided for and has hardly occurred yet. Focused on adapting to the national

UR regulation, local authorities are so far reluctant to accommodate further changes based on feedback from some more innovative UR practice (e.g., energy retrofits). Minor modifications are only made, e.g., in the activity portfolio of UR support centers (Seoul), but no substantive changes concerning land use, building or mobility regulations. This reflects limited openness in the way urban planning and development currently operates to use UR as an opportunity for wider transformations.

Such a reading is underpinned by the faint characteristics of *social learning* in all cities, although with some variations. UR projects are monitored at the national level, but the focus here is on time- and cost-efficient implementation to justify subsidies. This approach is largely followed in Changwon and Gwangju, where the only opportunities for wider social learning are created through independent intermediaries. Seoul differs to some extent as the city developed a local monitoring approach that includes stakeholder hearings and qualitative reporting, and is now adopting new measures to improve the UR approach. Nevertheless, a clear awareness of the need for regular and systemic reflection, and its embedding in a wider process of societal deliberation and strategy development are lacking here as well. This also implies the absence of scientific support for this purpose.

Given the above features, the range of agency levels actively involved in UR is average overall. Large organizations in the public and private sector as well as universities prevail, while especially households, smaller companies, and individual citizens play a rather passive role. Also wider social networks and associations remain marginal actors, even if the recent move in Seoul to network energy-related communities for informing UR projects seems promising. In terms of the scale levels involved, all cities reflect substantial deficits regarding the consideration of larger scales, be that urban-regional (green, blue, gray) infrastructure networks, or city-scale relations between UR areas. Smaller scales are better addressed in the bigger cities by providing additional UR support at district scale. Yet, awareness of cross-scale interactions is missing also here.

Finally, regarding the differences encountered between stakeholder and researcher scores, two basic patterns can be distinguished. They clearly underline the reflexivity and social learning gap identified above, but also suggest that a more critical perception of actually existing transformation potentials may stem from advanced transformative capacity development in the field of UR or other related fields.

Stakeholder 'overestimation' Across components, stakeholder scores in Changwon tend to be much higher than those attributed by the researchers. This reflects the perception of UR as positive and even radical change compared to urban redevelopment, with authority-

supported citizen involvement as a key innovation. By contrast, given the already existing high level of community activism in Gwangju, stakeholders experience UR here rather as a step backward and thus score more skeptically. A common overestimation in all cities occurs for ‘system analysis’ and ‘sustainability foresight.’ For these components, stakeholders tend to disregard important specific requirements in their scores (although clearly described in the development factors, e.g., scoring feasibility analyses as ‘alternative scenarios’). This points to a wide-spread knowledge deficit in dealing with both complex problems and sustainability.

Stakeholder ‘underestimation’ Stakeholders in Seoul and Gwangju partly attribute lower scores than the researchers. On the one hand, this seems to indicate that very recent progress is not (yet) always acknowledged for (e.g., social learning and leadership in Seoul). On the other hand, it likely also points out that it is precisely due to the capacity already developed that scores are more skeptical as stakeholders start to better understand the requirements for transformation (e.g., social learning and intermediaries in Gwangju). Underestimation therefore suggests that transformative capacity development is in progress but would benefit from continuous reflexivity to account for emerging strengths.

CONCLUSIONS

This paper has explored in how far cities are prepared for initiating and performing radical urban system changes toward sustainability through urban regeneration (UR). By applying the conceptual framework for urban transformative capacity for differential assessment, it has illustrated the relevance of the individual criteria comprised for urban regeneration practice, but also provided novel insights regarding their interdependencies, thus offering valuable orientation for identifying intervention priorities—as discussed below. This represents an important step from the diverse empirical accounts of transformative capacity found in the literature toward conceptual approaches for co-designing strategies and actions aimed at *developing* urban transformative capacity. It equally enables comparative and longitudinal studies of how different capacity components influence *actual* transformation.

South Korea forms a highly pertinent case in point for this topic, considering the outstanding environmental challenges the country faces in terms of carbon emission reduction, fossil resource dependency, ecosystem destabilization, and biodiversity loss. It also represents an important reference as a development role model and proactive exporter of knowledge and technology toward East Asia and beyond, making the results presented here

relevant and applicable to countries in various stages of urban transformation.

The three cities selected for an in-depth qualitative analysis reflect strong similarities, but also significant differences. Overall it appears that the various components of urban transformative capacity in terms of UR are not well developed, with strong interdependencies between them. A common core deficit forms the lack of awareness and knowledge of the urban systems affected and their respective dynamics, which has negative implications for all other components, and involves that especially the ecological dimensions of UR are largely ignored. Also the processes that could create such awareness and knowledge (foresight and social learning) form a shared weakness, which significantly hinders faster and broader transformative capacity development. This is well illustrated by the monitoring and training approaches adopted more recently in Seoul, reflecting how such capacity could multiply rapidly through social learning.

In turn, key leverage points for initiating change appear to be the agency components: State-driven UR governance has started to open up toward civil society and citizens everywhere, enabling citizens to engage and articulate their needs. A more decisive difference is, however, made where intermediaries or individual brokers in civil society and academia emerge (Changwon, Gwangju), or if the remit of participation support is broadened (Seoul). Both triggers a move from mere information provision toward actual empowerment of communities and leaders, as well as a diversification of the expertise and values considered.

The political priorities set at national and local levels do, however, not support more substantive shifts in agency. As a result, the narrow focus on older urban areas, improved physical designs and socioeconomic fabrics—particularly prominent in Gwangju’s culture-led approach—necessarily deflects from more pertinent UR priorities (ecology, apartment complexes) and undermines an understanding of UR as experimentation. It equally limits the consideration of cross-scale interactions or agency at larger scales, and the openness to embed and reinforce emerging innovations that do not fit within this tight goal framework.

In order to develop urban transformative capacity for UR, these findings underline the fundamental need for high-level policy change, which obviously remains an uncertain factor—in Korea and elsewhere. Yet, they also point to four complementary mechanisms that could be triggered by different *local* stakeholders immediately and independently:

- (1) *Co-create genuine sustainability visions for UR* To overcome the cognitive and normative confines of the current approach, UR *must* be re-positioned in the wider context of urban sustainability challenges.

Questions about the type, speed, and depth of urban change required and desired need to be raised openly, collectively identifying long-term goals, priorities, and the potential contributions of strategic UR interventions.

- (2) *Empower communities and leadership for UR* The shift from top-down implementation toward open experimentation, innovation, and social learning presupposes polycentric leadership and active communities that can put forward alternative objectives and measures. It is equally a prerequisite to ensure social justice in UR by articulating values and needs that powerful actors readily ignore. Providing tailored skill sets and resources for this should be a priority, and thus the need to secure both public and private sector funding for this.
- (3) *Nurture and diversify trusted intermediation in UR* Understanding the specific needs and value sets of various stakeholders requires insights, social networks, and skills not widely available in the public sector. Civil society organizations as well as academia can help to fill this gap, mediating norms, and linking local and laymen knowledge to policy. To effectively perform this role, however, their financial and organizational stability are necessary conditions.
- (4) *Strengthen and balance the role of science in UR* The diversity of scientific knowledge used within UR processes forms a critical condition to foster system thinking, the recognition of goal conflicts and trade-offs, and the use of key methods for enhanced social learning (e.g., participatory scenarios, interactive models). Strong emphasis should thus be put on safeguarding a minimum range of social–ecological–technological scientific expertise involved.

Last not least, the differential assessment method employed for this study could in itself form an effective trigger for developing urban transformative capacity, applicable in any geographic context. If adopted in a transdisciplinary setting it offers significant potential to enable collective reflexivity regarding key transformative capacity strengths and weaknesses, thereby guiding stakeholders toward the most effective interventions. Further methodological improvements could be achieved if the criteria used would be thoroughly reviewed and formulated together with stakeholders before running the assessment, thus strengthening consistency. Moreover, interdependencies between the different criteria could be further specified to not only capture a “snapshot” of transformative capacity in a given moment, but also enable modeling and assessing its evolution over time. In this project, any such transdisciplinary work remained disabled unfortunately because the funding agency NRF (National Research Foundation of

Korea) does not support personnel costs of non-science actors. This sheds light on the equally critical role of science funding institutions, forming a fundamental barrier for the development of knowledge for complex sustainability challenges where they still impede stakeholder cocreation instead of requiring it.

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AUTHOR BIOGRAPHY

Marc Wolfram (✉) is an Associate Professor for urban sustainability and transformation at the SKKU (Sungkyunkwan University). His research focuses on sustainability innovations in urban governance, planning, policy, and design, targeting social–ecological–technological system change. From 2002 to 2013, he held positions as a senior researcher and consultant in Germany, working on diverse urban-sustainability issues. His academic background is interdisciplinary and combines engineering and the social sciences.
Address: Department of Architecture, SKKU (Sungkyunkwan University), 2066 Seobu-ro, 16419 Suwon, South Korea.
e-mail: wolfram@skku.edu