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## **Civic design to make cities more sustainable and resilient**

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### **Abstract**

In scientific literature, as well as technical reports by national and international organizations on urban sustainability and resilience, there is broad agreement on the need for a paradigm shift in spatial planning and design based on cross-disciplinary knowledge, an inter-scalar approach and integrated planning tools. In this vein, the contribution takes up the concepts found in literature of capital web (Crane 1960) and civic design (Scott Brown 1990), which identify two different levels of “direction” in the field of urban transformations, both the preserve of public administrations, revisiting them in light of present-day challenges and emergencies concerning urban sustainability and climate adaptation. Some good practices of integrated urban planning and design refer to this interpretation, which is emblematic of how a positive approach to the issues raised by sustainability and environmental and risk protection can lead to the creation of new types of public space and multifunctional infrastructure, with strong social and symbolic significance.

### **Keywords**

Urban planning, Urban design, Sustainable city, Urban resilience, Large-scale plans and projects, Open spaces

### **1. Holistic land management: challenge or chimera?**

Efforts to fight or adapt to global warming, as well as problems relating to the hydrogeological instability of territories and all other sustainability issues, focus attention on the importance of public policies and actions aimed at preventing, mitigating and neutralizing the impact of human activities on ecosystems, which can still be reversed, as well as metabolizing ones that are now irreversible. On the other hand, they require a profound rethinking of spatial planning and design methods and tools, with special regard for urban contexts where the main causes and effects of the disasters that threaten the planet are concentrated, along with the highest rate of exposed population.

A large number of international studies have addressed this issue, starting with a list of requirements that characterize a human settlement as “sustainable”, “green”, “ecological” (Gaffron et al. 2005; Lehmann 2010) (Fig. 1) and “resilient”, the latter becoming more and more important over time. The term “resilience” usually refers to adaptive capacity to climate change, but it can also be extended to include the transformations required to break the dependence of cities on fossil-based energy sources, which are responsible for the emissions that lead to climate change: a transition made otherwise inevitable by the depletion of fossil resources in the face of the increasing global demand for energy (Newman et al. 2009).

The performances and requirements identified by such research, largely overlapping although aggregated differently depending on the assumed perspective and particular objectives of each of them, show how land use choices, traditionally regulated by urban planning, must now be derived from an overall land protection strategy. This applies both quantitatively (which means promoting the reuse of abandoned or underused lots for redevelopment as an alternative to new land consumption), and qualitatively (that is preserving or restoring the ecological and hydrological functions of soil), by making efficient use of all

resources – which calls into question the relationship of all urban functions with the surrounding physical environment.

The keyword – a true leitmotiv in scientific literature, often echoed in recommendations issued by national and international institutions on urban sustainability, global warming and risk prevention (Bizikova et al. 2008; United Nations Human Settlements Programme 2009; European Environment Agency 2012, 2016; United Nations Office for Disaster Risk Reduction 2017, Intergovernmental Panel on Climate Change 2014), is “integration”. In the culture of architecture and the city, this concept has always interpreted the need to rediscover interactions between the parts and the whole. Examples of this can be found in Lynch’s (1960) and Cullen’s (1961) studies on the construction and perception of the urban landscape, or in Alexander’s attempt to define syntactic rules for harmonizing architectural projects to the genius loci (Alexander et al. 1977); or in McHarg’s call (1969) for the need to reconcile anthropic intervention and natural laws: different perspectives, which all converge in opposition to the mainstream model based on the clear separation between urban functions, assembled by type in zoning plans regardless of actual differences in the urban morphology, environment and landscape, and on the specialization of public policies, works and spending.

The insistence with which international reports call for a paradigm shift in territory management according to a holistic vision of problems – which implies overcoming disciplinary barriers as a prerequisite for the exploration of integrated place-based solutions – accounts for the persistence of the functionalist matrix of urban planning, despite its clear inadequacy when faced with the current challenges. Moreover, it accounts for the risk of responding to the inefficiency of traditional planning methods with the proliferation of sectoral approaches and plans, in addition to or even in conflict with them, but paradoxically informed by a similar reductionist view: that is the attempt to provide standard solutions to any type of problem – in the form of constraints or monofunctional interventions – by applying technical rationalities that are, once again, extraneous to the peculiarity of places<sup>1</sup>.

Instead, sectoral approaches, which are essential for understanding the different aspects and evolutionary dynamics of territories, should help to form the knowledge base on which to establish a new project culture, accompanied by necessary adjustments to the regulations, technical apparatus, and financing mechanisms, applicable with appropriate instruments at the various scales. First and foremost, this means acknowledging the prominent role of large environmental systems in guiding regional planning towards forms of territorial organization, which are at the same time efficient, adaptive, and safe for the population. Consequently, it also means recognizing any spatial transformation consistent with such objectives as an opportunity to affirm, through the project, its civil significance beyond utility: its being an expression, always and in any case, of a general attitude to the improvement of the human habitat, whose main lever is the improvement of open space, in any of its forms.

The need to make the territory more resilient and safer can thus become, with the strength and legitimacy resulting from its recognized urgency, an opportunity for the systematic intervention of urban and environmental regeneration, fruitfully combining the protection of territorial resources and adaptation measures with the creation of socially and culturally significant places, landscapes and architecture.

This approach to the project is diametrically opposed to the instrumental use of greenwashing gimmicks in market-driven operations for self-promotional purposes or mitigating new environmental impacts produced by the same.

Taking into account the different “contexts” (Carmona et al. 2010), against which spatial plans and projects have to measure themselves, it seems appropriate – and this is the aim of this contribution – to define unambiguously in disciplinary terms a field of project research focused on sustainability – that is the “global context”, according to Carmona’s definition (p. 51) – different from the most widespread practices of urban design.

To do this, the discussion will develop in the next two paragraphs using a twofold method:

- deductively, by referring to two of the main authors who in the past dealt specifically with the topic of public interest in large-scale physical planning and urban design, highlighting how the very notion of public interest carries an intrinsic symbolic value that projects should be able to make explicit; the validity of this theoretical approach is put to the test by the assumption, developed more recently through the studies mentioned above, that public interest in the management and transformation of physical space is to be sought primarily in the (re)constitution of a healthy and safe urban habitat, in

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<sup>1</sup> Some recurring examples: retention basins, canals and embankments conceived solely as hydraulic devices; impact mitigation works provided as mere shields to standard infrastructures, without any attempt to integrate them into the surrounding landscape according to different project parameters; impact compensation measures, defined exclusively on a quantitative basis, etc.

- harmony with natural processes;
- inductively, by referring to some international best practices of integrated urban planning and design, which are particularly significant for the role played by public actors and the ability to turn environmental and climate challenges into opportunities for territorial and urban regeneration.

## 2. Physical planning and urban design as tools for sustainable adaptation and mitigation

Two concepts from literature seem particularly suitable to be taken up, updated and integrated in order to redefine the domain of public city designing, aimed at providing blended spatial responses to instances of sustainability and urban resilience:

- “Capital designing” - an approach to metropolitan or regional planning proposed in 1960 by David Crane, at that time Assistant Professor at the University of Pennsylvania. The term “capital” refers to the main pattern of the spatial organization of the territory – the capital web – which is for the most part under the jurisdiction of public administration. “[...] Capital designing is a process for making more creative use [...] of urban structure which the public sooner or later pays for but does not design. Capital designing should become the primary tool of local physical planning, backed up by time-zoning and other methods of rationing new development and urban renewal” (Crane 1960, p. 285).
- “Civic design” - that is the application of urban design to the components of the public city, according to the definition proposed in a famous essay by Denise Scott Brown, published in 1990 in the *Architectural Design* magazine. Unlike urban design, which potentially concerns the city as a whole as well as different actors and interests, civic design is what shapes the *public realm*, that is “the public sector seen in physical terms”. “Civic design projects are typically designed for, built by, and maintained by the public sector, civic groups or a combination of both”. Their domain is made up of the same components as the capital web – a notion that Scott Brown takes from Crane: “simple-mindedly [...] everything on the city transportation plan and everything that is blue or green on the city land use plan” (i.e. urban facilities and public space) (Scott Brown 1990, pp. 21-22).

Capital design, in particular, shifts the emphasis from the quantitative regulation of private intervention, which is the pivot of functional planning, to the qualitative definition of the capital web, the territorial structure formed by the essential elements of the environmental system and public infrastructure and equipment, from which it deduces the rules of compatibility for private transformation. This approach implies that the project is informed by a vision of the future – “A large-scale design philosophy must begin with objectives, not with techniques or shapes” (Crane 1960, pp. 284-285) – to be made explicit and shared through public debate. It was Crane himself, 60 years ago, who recognized objectives that reflect “environmental morality and man’s long-run interdependence with nature; organized change capacity and permanence of structure” (p. 284) as priorities. That is, in other words, what we now mean by sustainable development and resilience, whose implications on the built environment are topical in the above-mentioned international studies and reports. Sustainability can no doubt be assumed as a large-scale design philosophy which now informs, by means of adequate techniques and shapes, regional and urban planning in terms of capital designing.

Susceptible to incremental development over time, “The capital web must become to individual city builders or dwellers what a river or canal is to desert farmer” (p. 285).

In an ideal path that, starting with the concept of capital design, continues along the lines of *Design with nature*, the seminal book published nine years later by Crane’s most famous colleague at the University of Pennsylvania Ian McHarg (1969), and arrives at current studies on sustainable adaptation and mitigation (Cohen and Waddel 2009; Brown and Eriksen 2011). The evocative image of the river is even more significant outside of the metaphor, if we consider what a prominent role river basins and coastal systems, as well as all other features affecting the geomorphological balance of territories, can play in large-scale landscape and urban projects.

In this framework, new symbolic places acquire relevance by greatly expanding the operational field and semantic range of civic design, which affirms itself as an indispensable driver of the change towards a different urban model and landscape, including among other things new infrastructure developed (or redeveloped) for sustainable mobility, “hybrid” parks and public spaces, where collective use is combined with ecosystem services, such as flood protection, prevention of the heat island effect, production of clean energy (Fig. 2), etc.; brownfields and abandoned buildings turned into community places and facilities, innovative technological plants conceived as “monuments” of the sustainable city, etc.

As a whole, the project activities referred to in the two concepts cover all scales of urban planning and design (from the region to the site), from which they distinguish themselves due to the greater centrality that themes concerning the public city and interest are acknowledged to have compared with the objectives of optimal organization of urban functions based on socio-economic criteria and the interests of real estate.

### **3. Resilience as an opportunity for integrated urban planning and design**

#### **3.1 The interpretation of the Emscher Park regeneration project as capital design**

A well-known example of physical planning at regional scale where this type of approach can be seen is the regeneration programme of the Emscher River valley, which over the last 30 years has transformed the heart of the ancient mining district of the Ruhr, in Germany, into a landscape park system (Fig. 3), starting with the reclamation and naturalization of the hydrographic network from a former condition of extreme degradation.

In this programme we can find all the salient features of capital design, that is:

- the preliminary construction of a well-defined vision, resulting from broad consultation with local stakeholders,
- implementation in stages, in all of which the public sector acted as the leader and driver of the change,
- the assumption of a territorial framework, consisting of three main layers. The first one is the environmental system, a green continuum comprising the Emscher River valley and seven transversal green corridors, wedged between the urban areas along its 75 km length; the second one is the transport infrastructure network, including not only the canals, railways and road network inherited from the region's industrial past, but also, and no less important, the new walking and cycling routes that link and cross in and around the parks; and finally, the major urban facilities and landmarks, most of which are industrial heritage sites turned into educational and socio-cultural facilities, which together form the third layer.

The process, sponsored by the Land Nordrhein-Westfalen, was initiated with the IBA-Emscher Park initiative, thanks to which the consortium of the 17 municipalities of the region – responsible for the ecological regeneration plan of the main valley and the framework plans for the green corridors – was supported over ten years (1989-1999) by an ad-hoc agency with a consulting and coordination role, tasked with soliciting, evaluating and selecting projects, consistent with the goals of the rehabilitation and deconstruction (*Rückbau*) of the industrial landscape, as a premise for the socio-economic revitalization of the area (Marchigiani 2005).

In the next decade, the design of the capital web, expanded by an increasingly dense and branched network of ecological connections between the seven main green corridors, was finally institutionalized as a tool of integrated management of the territory through the adoption of two master plans, respectively referring to the whole region (Projekt Ruhr GmbH 2005) (Fig. 4) and the Emscher River corridor (Emscher Genossenschaft 2006). Notably, in the latter one, design guidelines for flooding and water-retention areas are provided, in which the issue of hydraulic safety is assumed as a part of the multifunctional “hybrid park” character of riverbanks, reconciling the risk protection objective with those of environmental regeneration and the creation of freely enjoyable public space.

More recently (2013), the design of hybrid parks has once again become the focus of the Emscher Landschaftspark 2020+ action plan, promoted by the Land Nordrhein-Westfalen within the framework of the EU programme INTERREG IVC, specifically dedicated to them, as a tool for responding to climate change: this challenge has provided a new input to the greening projects in the Emscher Valley, now underway (Meltzer 2014)<sup>2</sup>.

#### **3.2 Rethinking urban space for climate resilience: the new frontier of civic design**

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<sup>2</sup> The Emscher model was later extended to the whole region thanks to the establishment of programmes (“Regionalen”), with which, since 2000, the Land Nordrhein-Westfalen has assigned with priority, through competitive selections initially called every two years, and more recently every three, the available resources to strategic projects proposed by associate municipalities for large territories (Ministerium für Heimat, Kommunales, Bau und Gleichstellung des Landes Nordrhein-Westfalen n.d.). In many of these programs – including the latest, the Regionale 2025, referred to the territory of the Bergische RheinLand – the dominant theme, which links the various projects, is the environmental regeneration of a river corridor following the logic of capital design..

It is therefore through civic design interventions at intermediate or local scale that so many different needs can find a common answer in spatial terms, producing representative places of what we can define as a new “responsible urbanity”: a perspective that paves the way for unprecedented experimentations, which can completely renew the forms, uses, meanings and design techniques of public space.

Rethinking traditional urban spaces like public parks and squares as blue-green infrastructures fits with this perspective. This is the case of water-squares and water-gardens, obtained by integrating specific nature-based solutions, gravitational drainage systems or a combination of both in the design of urban ground surfaces – what Italian spatial planner and academic Bernardo Secchi (1989) used to define as the “project of soil” (“progetto di suolo”), understood as the quintessence of urban design<sup>3</sup>.

Two early applications of this multi-sectoral approach to urban infrastructure are the celebrated Water Square Benthemplein in Rotterdam (Fig. 5), and the Vuores Central Park in Tampere (Finland), respectively designed by the firms De Urbanisten (2011-2013) and Atelier Dreiseitl (2012-2014), where the shaping of the ground surface – completely paved in the former, mainly green in the latter – in the event of extreme rainfall, allows the ground to retain a large amount of water which is channelled by pipes from the surrounding roofs and streets.

In recent years, the idea to use capital and civic design, in terms of large-scale landscape planning and water-sensitive urban design, as a tool to adapt the urban environment to climate emergencies has informed many important renovation programs, such as the plans to redevelop the New York City waterfront as a sequence of parks, resilient to sea level rise, coastal storms and catastrophic flooding (McPhearson et al. 2014; New York State Department of State 2016) (Fig. 6) or, at national level, China’s “Sponge City Initiative”, which since its launch in December 2014 has involved 30 pilot cities, with the goal of retaining, absorbing or reusing onsite 70–90% of average annual rainwater by means of blue-green infrastructures (Hui Li et al. 2017; Zevenbergen Ch. et al. 2018).

The most innovative plans focused on climate adaptation recently carried out in Europe include the Cloudburst Masterplan, developed by Rambøll Group on behalf of the City of Copenhagen, whose application is bringing about radical change in the design of the space “between buildings” (Gehl 2011), conceived as the matrix of urban regeneration, aimed at making the city at the same time waterproof and more liveable (Fig. 7).

The plan is in continuity with the Climate Adaptation Plan (City of Copenhagen 2011), and with the innovative Cloudburst Management Plan of the following year (City of Copenhagen 2012), which decided to combine nature-based solutions for local rainfall storage, resulting in the redesign of parks, sports grounds, open spaces, and similar, with measures where the water is led out to sea via new flow routes, including canals, urban waterways, subterranean tunnels and the city road system, after dividing the city into “catchment areas”.

The solutions proposed in the masterplan, which are currently being tested in the Saint Klejd neighbourhood (City of Copenhagen 2016) (Fig. 8), are new types of roads and boulevards, which can work when necessary, without danger to people, as a drainage system that retains or conveys excess water to Copenhagen’s harbour or, whenever possible, towards large basins with adequate capacity, built for this purpose in public green areas.

Hence, the protection of the city acquires the character of a large-scale renewal operation, intended to significantly modify the urban landscape in a dynamic way, making it sensitive to meteorological changes.

#### **4. Conclusions**

The few best practices mentioned seem to confirm the assumption stated by the Committee of Regions of the European Union (2014) that towns and cities are “bodies with great potential for environmental efficiency”. Strong public leadership and a cross-disciplinary approach, able to strategically integrate the aim of environmental efficiency with the other social, cultural and economic objectives inherent to the urban model, are the two essential conditions for these potentials to be fully expressed.

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<sup>3</sup> “A ‘project of soil’ must be placed at the center of every urban plan and project, at any scale; this is what the urban plan first draws [...]. A ‘project of soil’ concretely and precisely defines the technical, functional and formal features of the open space, possibly classifying them by type; it defines the variability of the open space, interprets its relationships with the activities and functions that take place or can take place within the surrounding built space, integrates the different open spaces, mutually and with covered areas: streets, avenues, squares, gardens, orchards, parks, churchyards, street enlargements, parking lots, but also courtyards, hallways, loggias, etc.; it assembles them in sequences and paths, according to systems of significant associations and oppositions; it defines the elements that rule their articulation, organizes the mediation between one and the other” (Secchi 1986, p. 272-274). Translation from Italian by the author.

In this sense, the concepts of capital and civic design can be used both as a key to understanding successful plans and projects and as a design paradigm to make the human habitat more sustainable and resilient, based on the following principles:

- trans-scalar continuity between regional planning and urban design, reflected in the broad scalability of interventions;
- public control of transformations, focused on the redevelopment of the capital web, as a lever for ecological transition and climate adaptation of settlements as well as increased urban liveability;
- the project as a tool to give shape, meaning and imageability (Lynch 1960) to the urban environment, while meeting a wide range of various needs.

From a semantic point of view, the adjective *civic* refers simultaneously to the sense of collective responsibility that inspires sustainable spatial planning and design, social cohesion which is one of its pillars, and communities as the recipients and beneficiaries of environmental improvements and adaptation measures.

Looking for a single definition that encompasses all scales, we can then extend the notion of civic design to large area planning referred to by capital design (an expression which can be misunderstood), while maintaining the definition of capital web to mean the network effect of the actions on the public realm.

Despite the scientific and academic world and international institutions being aware of the need for such an integrated approach to spatial planning to face the challenges of sustainable development and catastrophic risk protection, an increasing number of good practices and experimentations around the world, which combine urban regeneration with environmental improvement, climate adaptation and mitigation, and the ever greater mobilisation of civic organizations – witnessed by Greta Thunberg’s “Friday for future” – calling for action against the threats of Anthropocene, which implies a radical change in terms of urban ecology and metabolism (Kennedy et al., 2010), there are still obstacles to the widespread diffusion of physical planning and urban design inspired by a holistic approach, the principle ones being:

- the structural weakness, in many countries – especially in the Global South – of public institutions, resulting in the absence or inadequacy of territory management and urban development strategies and policies; indeed, strong “accountable and inclusive institutions”, as declared by Goal no. 16 of UN Agenda 2030 for Sustainable Development (United Nations [UN] n.d)<sup>4</sup>, are a fundamental discriminant for the achievement of all other goals concerning the human habitat, starting with Goal no. 11 – “Make cities and human settlements inclusive, safe, resilient and sustainable”;
- the priority usually given at all levels by politics, beyond statements, to objectives linked to economic growth, which favours land uses and infrastructures according to a logic of mere mitigation of impacts. In times of crisis, such as that currently generated by the Coronavirus pandemic, this attitude easily relegates to the background the request for effective public control over land transformations, to the advantage of free enterprise.
- resistance to change in the systems of professions and bureaucratic apparatus, traditionally organized according to sectoral criteria which are reflected in technical regulations, administrative procedures and financing mechanisms, which often need to be reformed just to make innovative interventions feasible – as indeed occurred in Denmark, where amendments to the national Planning and Water Sector Acts passed in 2012 made it possible for municipalities to include mandatory, locally specific regulations for climate adaptation in the local development plans, and for wastewater companies to co-fund municipal projects.

A form of rhetoric, intrinsic to spatial disciplines, which leads to a clear separation between means and ends (and finally confuses them) can be traced back to this closed-minded attitude. Way back in 1960, David Crane stigmatized it as “the City Procedural”, “[...] the culmination of a growing preoccupation with the concept of ‘planning’ per se, an increasing interest in the means and the process rather than with the product being planned”. This preoccupation, even when opposing old-fashioned functionalism in words, ends up, in turn, superimposing a virtual model on the real world, where “the chief goal [...] is acceptance of planned decisions rather than the decisions themselves” (Crane 1960, p. 283).

Unless they are used as meaningless labels, “sustainability”, “resilience” and “territory safety” must be assumed as the keywords for a radically different approach.

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<sup>4</sup> The full phrase describing Goal no. 16 is: “Promote peaceful and inclusive societies for sustainable development, provide access to justice for all and build effective, accountable and inclusive institutions at all levels” (UN, n.d.) .

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## FIGURE CAPTIONS

Fig. 1 The features of an ecological city, according to the EU-funded project “Ecocity - Urban development towards appropriate structures for sustainable transport” (Gaffron et al. 2005)

Fig. 2 The Energy Hill in Hamburg (Germany). Within the framework of the IBA Hamburg initiative (International Building Exposition), in 2009-2013 a former toxic waste dump was turned into a park with a belvedere on the city harbor, which supplies electricity and heat to the surrounding neighborhood of Georgswerder using wind power, solar energy and landfill gas (IBA Hamburg GmbH / [www.luftbilder.de](http://www.luftbilder.de))

Fig. 3 Aerial view of the Emscher Valley at Oberhausen (Photo by Raimond Spekking / CC BY-SA 4.0 via Wikimedia Commons)

Fig. 4 Masterplan Emscher Landschaftspark 2010, elaborated by Land Nordrhein-Westfalen in 2005 (Projekt Ruhr GmbH 2005).

Fig. 5 The Water Square Benthemplein in Rotterdam (2011-2013). Project by De Urbanisten, (Roel Dijkstra Fotografie-Vlaardingen / Photo by Joep van der Pal)

Figure 6 Hunter’s Point South Waterfront Park in New York (2018). Project by SWA/Balsley + Weiss/Manfredi ([www.weissmanfredi.com](http://www.weissmanfredi.com))

Fig.7 City of Copenhagen, Cloudburst concretization masterplan (2013). Project views for a “green and retention road” and a central “retention space” (Rambøll Group n.d.)

Fig. 8 The new arrangement of Tåsinge Square in the neighbourhood of Saint Klejd, Copenhagen (2013-2015). Project by Malmos, GHB Landskabsarkitekter, Orbicon, VIA Trafik, Feld Studio for Digital Crafts (GHB / Photo by Steven Achiam)