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# Circular design in everyday urbanism: Towards regenerative and restorative dynamic spaces in cities

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## Foreword

Circa 60% of the urban areas that will exist in 2050 have not yet been built. Urban settlements are placed where most materials are used and wasted, and where buildings, lands, and other infrastructures are constantly underutilised. Environmentally, about 75% of the consumption of natural resources occurs in cities, which produce around 50% of global waste and between 60% and 80% of CO2 emissions.

What makes our urban environment a transformative place? What does a circular economy contribute to the perception and creative change of our post-industrial cities? The urban circularity offers a restorative and regenerative opportunity to respond to these challenges by creatively rethinking the way how we perceive materials and use the as ecological sound products and services. It leads to envision alternative forms of co-creation towards an *"Architecture of Enjoyment"* (Lefebvre, 1973), with high social and cultural value.

Within our material culture, what would happen if we creatively reuse waste by designing sensorial spaces, products and materials; promoting a long-term cyclical routine; and maintaining or improving its perceptual value within different scales of intervention in the cities?

The selected manuscripts in the *Visions for Sustainability* (special issue 11) on *"Wellbeing in Daily Built Environments"* reflect on wellbeing and the perception of citizens in everyday city life by interconnecting and balancing psychological, environmental, socio-spatial and cultural challenges. The article titled *"Surprise, Arousal, and Pleasantness in Entering a New Space"* put emphasis on dynamic perceptions and environmental experiences by examining movement through spaces. The article titled *"Local Identity in Material Culture as Part of Wellbeing and Social Sustainability"* bridges local identity and material culture into the design of contemporary regional buildings or ecofriendly products. The article named *"From the City of Gaps to the City of Wellness"* reflects on DOT TO DOT© an experimental community garden. It connects regenerative urban design, sensory gardens and creative waste reuse in vacant lands situated in deprived areas of Glasgow by sharing an innovative methodology of community-based participatory research and somatic outdoor learning. The article titled *"I Care (My Home)"* highlights the importance of biophilic design and nature-based solutions applies in domestic environments, offering an approach based on an all-inclusive exploration of the instinctive human proximity with nature. The article titled *"A Review of Restorative Nature Aspects for the Improvement of Urban Living: Perception, Attention, and Aesthetics"* stresses that several attributes

of restorative environments are needed in cities and these new urban settings can be taken from rural landscape and the Attention Restoration Theory.

All chosen studies represent both retrospective and prospective approaches in the areas of perception and design in dynamic spaces. They reconceptualise theoretical frameworks and principles; analyse paradigmatic cases, models and innovative research methodologies; and study heterogeneous geo-cultural and perceptual environments towards a collaborative transition from grass-root innovators in local communities to cultural worldviews. Findings allow strengthening the notion of *circularity* of the act of making and perceiving our cities by sharing new concepts, mindsets and methodologies in order to address common challenges at multiple scales.

## The Circularity of Design

This article analyses and explores innovative ways to activate spaces into sensorial places in cities using circular design in restorative and regenerative actions throughout co-creation, social innovation and nature-based solutions. In order to change the perceptions in cities, citizens demand the-right-to-the-city with democratic occupancies of commons (Mitchell, 2003).

The underlining fundaments of the New Urban Agenda Habitat III (Andersson, 2016) and also the UNICEF principles for innovation and technology in design development stress that humanity needs to tackle the pressing challenges whilst maintaining social, economic, health, environment and climate balances on our urbanised planet Earth. What has to be the role of design and of the designer to be ethically useful to society? Cities necessitate the implementation of design principles for the real world, so-called the politics of design (Papanek, 1971). The new notion of regenerative and restorative urbanism is not limited to recycling and the elimination of residual and toxic waste, but also focuses on the design of the cycles for biological and technical materials, the so-called *nutrients.* Circular design explores the creative use of materials, flows and spaces in systematic, experimental, local and inclusive ways.

What should we (re)make beyond the phenomenon of Petropolis or carbonised cities? In order to envision the circularity in design science, we should learn from significant books: [a] *Spaceship Earth* by Fuller, B. (1968); [b] *Ecopolis* by Tjallingii, Sybrand P. (1995); and [c] *Cradle to Cradle (C2C)* by McDonough, W. & Braungart, M. (2002), from a global, urban and local approach respectively.

We are all astronauts on a little spaceship called Earth. Bucky Fuller (1968)


**Figure 1.** The new urban question (photomontage). Source. Suau, 2019.

Bucky Fuller in his oeuvre *"Operating Manual for Spaceship Earth"* (1968) refers to the Earth is a spaceship, being the sun our primal energy supplier. He represents our planet as a mechanical vehicle that requires frequent maintenance and if we do not keep it in good shape it will stop to function. In this metaphor, cities are also considered spaceships. In the doctoral thesis titled *"Ecopolis: Strategies for Ecologically Sound Urban Development"* (1995), Sybrand Tjallingii interrogates and deals with cities and sustainability, linking general

strategies to concrete practical tools and planning proposals, drawing lessons taken from several pilot projects in medium sized cities in the Netherlands. The strategy framework of Ecopolis is represented as part of/in the urban ecosystem. Ecopolis means a city of flows of energy, water, waste and traffic applied in distinctive urban areas -such as the city core, suburban and periphery- and for self-organisation and co-participation in the marketplace, learning organisations, etc. In their masterpiece *"Cradle to Cradle: Remaking the Way We Make Things"* (2002), McDonough and Braungart reflects on a system of lifecycle development called upcycling. Once produces have reached the end of their useful life, they become either biological or technical nutrients. Biological nutrients are materials that can return directly to the environment whilst technical nutrients are elements that remain within closed-loop industrial cycles.

## Towards a Circular City

The regenerative/restorative model of Circular Economy (EC, 2014) demands the implementations of new design principles in the fields of urban planning, architecture, product design and environmental psychology. Tangible products and services are the most obvious parts of this changing economy, but we also need to redefine and redesign services, business models, exchange relationship, markets and many more aspects.

The new regenerative urbanism does not limit itself to recycling and disposal of residual and toxic waste but focuses on designing cycles for biological and technical materials (nutrients) from the beginning. The new principles of circularity are:

*[a] There is no city waste anymore, but only recycling and flows of nutrients.*
*[b] No more resource squandering, depletion and exploitation in cities but resource use in cycles.*

However, how the perception of innovative solutions is performing at city level to stimulate a circular effect rather than linear? Circular city is a strategy framework, which envision systemically how cities have elaborated and implemented urban strategies in context of the following economy dimensions:
*[a] Sustainable use of resources, natural and cultural capital, i.e.: Waste or water.*
*[b] Circular mobility, i.e.: Smart, green and integrated public transport networks.*
*[c] Resource efficient buildings and urban spaces, i.e.: Urban regeneration and reactivation of gap sites.*

Circular city requires a widening focus from the city-products to material flows, production processes and conditions, as well as aspects of use and reuse. It needs an extended systemic view as well as profound understanding of ecological principles.


**Figure 2.** Everyday Urbanism, grassroot masterplan and design charrettes at MOBILELAND© site, Glasgow. Source. Suau, 2015.

## Remaking the City

Urban economies promulgate a new geography of centrality and marginality not only expressed between regions or countries but within cities. Social asymmetry is the new urban question worldwide (Secchi, 2013), which is convoyed by the abrupt inequity of income distribution; environmental disasters; demographic shrinkage; inner displacement of urban communities; rising of informal cities; and the proliferation of vacant lands and buildings, which are stigmatised, residual and contaminated spaces.

According to Henry Lefebvre an abstract space is a geographic space of bureaucratic politics that produces, imposes and reinforces social homogeneity. On contrary, the perceived space is the first dimension in the production of space. It is followed by the conceived space and lived space. Nonetheless, the notion of *Everyday Urbanism* (Lefebvre, 1974; Chase, Crawford & Kaliski, 1999) requires strong research and discourses on understanding the social use of public spaces and finding its meanings in everyday life, in which the daily reality of the occupants becomes the focus of interest.

According with Margaret Crawford (2005), the key principles of Everyday Urbanism are [a] *refamiliarisation* that seeks to make hostile spaces more liveable by trying to domesticate and appropriate them, and [b] *dialogic*, in which words, languages or meanings of perceived spaces interact between designers and community, becoming deprivileged, isotropic and then interchangeable ones. Everyday Urbanism is based on heteroglossia, multiplicity and heterogeneity. It is radically experiential and highly site-specific rather than abstract.

Circular design is a dialogic theory of action. It is a systemic interdisciplinary research framework that experiments with visionary, disruptive and real-world impact, exploring urban challenges and transformations through grassroots actions and didactic methods using resources creatively.

It is known that the challenge of managing and reducing urban waste is a growing sustainability problem for governments and local authorities. For instance, recycling rates are increasing, but this is not enough to address the environmental challenges faced by the throwaway material culture.

What does radical remake mean? Radical here means primal, fundamental. Etymologically, the term derives from late-Latin *radicalis*, *"of or having roots";* from Latin *radix, "root, going to the origin".* Rather than linear, radical means a close loop, a circle. The act of remake is multi-sensorial, offering something to make again or anew with special value. Its agile design features are portability, sensory and temporariness. In order to rescue or repair critical environments or habitats in risks at different scales, author suggests that situations (and scenarios) of everyday urbanism are categorised in six groups: [a] Extreme (severe and remote environments); [b] Essential (elementary spaces); [c] Fantastic (utopian and fictional); [d] Transgressive (edgescapes); [e] Transformative (social forms in motion); and [f] Informal (survival architectures).

## Challenging Perceptions in Circular City-Making

The city is not just a morphological phenomenon but also environmental, social and political. Cultural, aesthetic and technological advancements as well as the evolution of advanced design tools and trans-disciplinary demands for tackling city problems in multiple scales have radically changed the way designers research, experiment evaluate, communicate and disseminate knowledge exchange (Fikfak & Suau, 2015).

Let's focus on the challenges of remake culture and place-learning. Nowadays, high education and research pathways in architecture and urbanism are in urgent need for adaptation and transformation as result of rapid changes in demographic, mobility patterns, economic flows and social accessibility inclusion in cities. Academically it denotes the exploration of circularity in new competences, mindsets and methods of design and city-related professions to address these challenges at all scales by designing community based on experiential learning. Learners are not passive consumers anymore but experimenters.

To envision better greenspaces, author employs three design principles: [a] Place-Making; [b] Remake, [c] Place-Learning by experimenting with regenerative and restorative projects applied for resource-efficient cities (Suau, 2019). Author works at Studio Pop CIC www.studiopop.net as an agile think tank of circular design. Methodologies combine research by design (project-based and theoretical) and community-led experiments, supported by qualitative and quantitative techniques and open demonstrations to test/pilot live projects, clinics, community consultations, design charrettes, among other tools. Our main research themes are waste reuse, water innovation and gaps reactivation:

*On waste reuse:* Author has previously led and explored the structural capacities of timber pallet boards and whole care tyres for the development of affordable modular dwelling frames, creating the PALLET HOUSE© (2003) and TYRESPACE© (2006). Since 2017, Studio Pop is developing a creative reuse of packaging plastics called REPLASTICO© www.replastico.com which invites to redesign with plastic junk in inventive ways, from neglected polyethylene-made grocery bags into wearable accessories and artwork, giving it great social value.

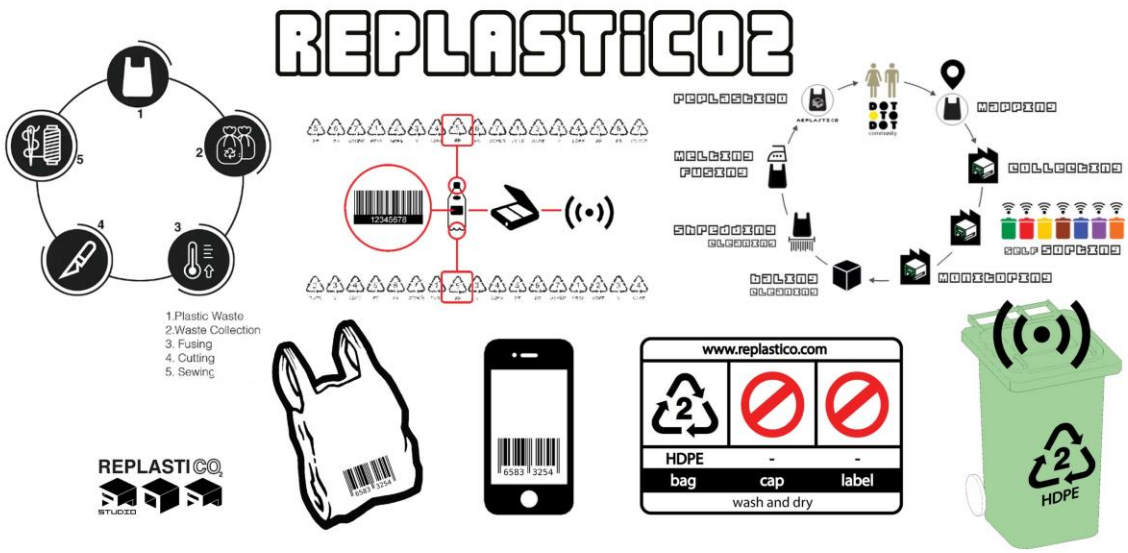


**Figure 3.** REPLASTICO© long-life cycle scheme. Source. Studio Pop, 2019.

*On water innovation:* The United Nations WHO recognizes water access as a human right, as well as an essential instrument for the realization of all other human rights. Water is essential for life, health and dignity in extreme emergency situations, crucial for hydration, cooking and hygiene. Poor communities depend on the seasonality of extra water supplies in low-income regions, where it is polluted, unreliable and/or unaffordable. The future of water is in the air. Fog collection can effectively contribute to alleviate water scarcity in water-stressed regions harvesting, treating and distributing clean drinking water in remote settlements. The recent development of textile-responsive water technologies can play a key role in the improvement of local water planning participatory and user-centred design, experimentation, and self-maintenance of water supply systems for disadvantaged groups. Since 2010, author has developed several experiments condensing water from fog promoted by physical surface effects such as cooling, coalescence and condensation in arid sites with high fog occurrence: FOGHIVE© (2010), AIRDRIP© (2016) and 3DFOGTECH+© (2019). They are portable water stations for survival in regions with frequent fog occurrence, enabling to develop, run and maintain autonomous urban water systems in poor/disadvantaged communities worldwide. These 3D devices follow the multi-directionality of winds. It is a passive water technology of fog collection powered without any active energy demand to obtain at least 7,5 litres of fresh drinking water per 1 m2 of selected mesh surface. This water tower (space-frame type) offers effective methods to measure fog water yield, quality and affordability by catching more water than conventional fog collectors in remote and low-income communities (Suau, 2018).

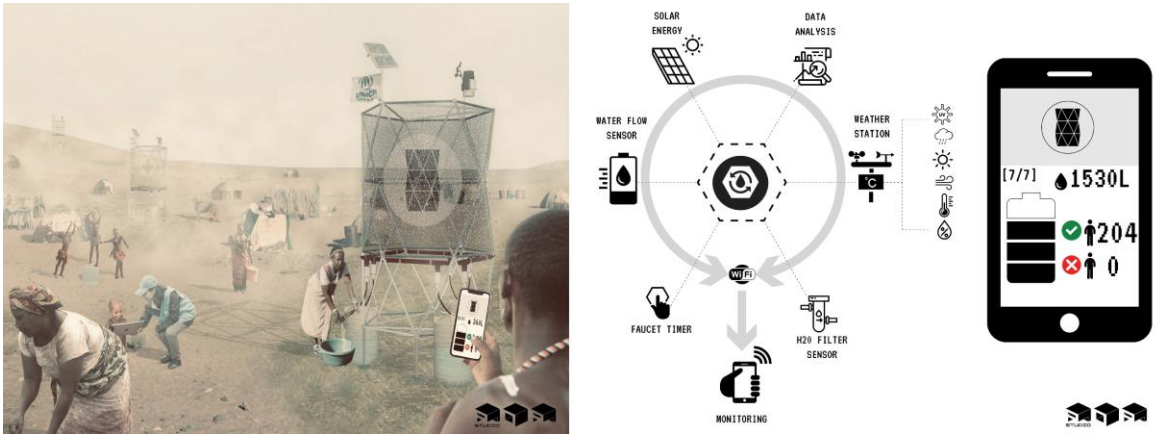


**Figure 4.** Advanced development of 3D fog collection: Circular model of water e-monitoring and simulation of portable fogtraps in the Namib desert. Source. Suau & Studio Pop, 2018.

*On urban reactivation:* Author has explored in everyday urbanism initiatives under the framework of "Remaking the City" (Suau, 2017). The earliest case was NOMADIC ALLOTMENTS© (2010) http://www.nomadicallotments.co.uk/, an agile solution to grow food on mobile mini-gardens made of Euro-pallets. They debuted at Borough Market. As result of an invitation made by Stalled Spaces Glasgow, MOBILELAND© (2015) https://mobilelandglasgow.wordpress.com/ was the first temporary community garden, which applied a C2C model to transform creatively biological and technological nutrients, including an open phytoremediation garden in Gorbals. DOT TO DOT© (2017) www.dots.scot is another live experiment of everyday urbanism situated in a brownfield at Maryhill, a post-industrial area with a profound historical heritage in risk. It acts as urban reactivator to restore creatively a derelict land improving the perception of deprived areas and disadvantaged groups in North Glasgow.


**Figure 5.** MOBILELAND©, YELLOWFIELD© planters (2015): Deployment of nature-based solutions and phytoremediation techniques in an outdoor sunflower garden. Source. Suau, 2015.

All subject-related cases enable researchers, educators, local residents, entrepreneurs, and youth to transform the city by connecting creatively waste and design through ecologically sound solutions using material and site experiments, nature-based solutions (NBS), somatic learning, community-based participatory research and grass-root local policy making. These innovations were focused on the relationship between emerging/changing societal and environmental challenges for the co-production of the built environment.

In order to increase wellbeing in cities you have to increase the qualitative attributes of the spaces we live in. The value of good places is made by the interplay between local resources and communities. It implies that any successful place-making initiative requires to upturn the levels of social interaction in outdoor learning and organisational autonomy of local resources. The more remake and place-learning we implement, the best place-making we achieve.

## The Circularity of Everyday Cities

Environmental characters along with atmospheric and sensorial qualities are becoming key factors in the definition of circular city, even from its economic standpoint. Nonetheless, is it possible to combine the different sensibilities to everyday urbanism with sensorial attributes able of offering a wider understanding of circular flows whilst contributing with the enhancement of the commons?

Within circular cities, mental, physical and sensory wellbeing is required in public spaces. Paradigmatic cases of regenerative services and products include community

gardens, remake stations, upcycling projects, bartering networks, food-sharing apps, collaborative consumption, tool libraries (open source) and time-banking, among others. These examples of grassroot innovations aim to ultimately offset waste through agile social and technical arrangements, either by reducing material consumption and dealing with waste perception in a more creative way to deliver no-waste lifestyles.

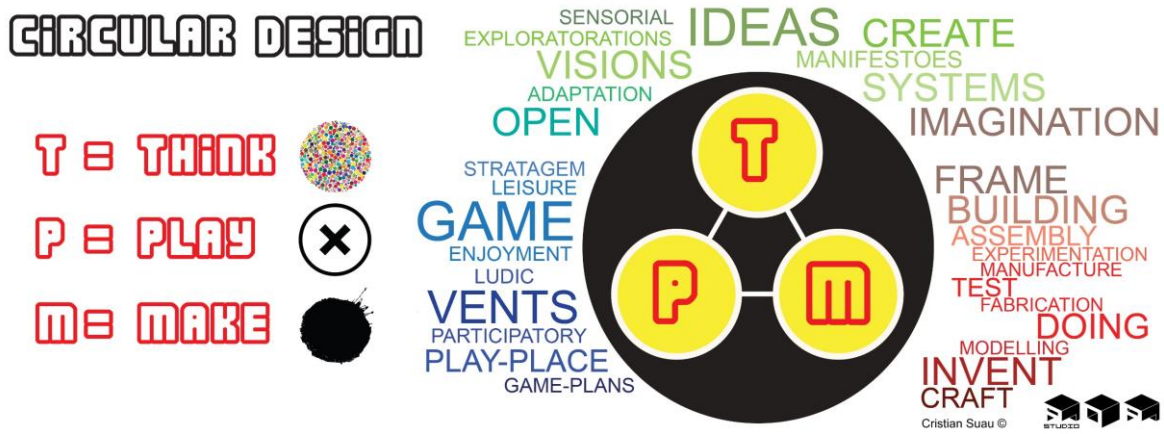


**Figure 6.** Think2Play4Make is sensorial learning model applied to circular design. Source. Suau, 2019.

To achieve these innovations, we have to design community first. Once done, projects can potentially envision radical solutions for more sustainable community waste management. Local initiatives should include practical place-based experiments, sensory learning, live projects, charrettes (intensive design and planning workshops) and then design-based codes to support public decision-makers and other stakeholders to work more closely with innovators by offsetting waste creatively and employing socio-technical systems, social practice theory and grassroots innovations (Seyfang & Haxeltine, 2012; Seyfang & Smith, 2007; Shove & Surling, 2013).

Circularity offers a twofold pathway. On one hand, it is a return to envision new spatial structures of the perceived city by citizens as experimenters and, on another hand, it reveals the importance that the construction of the circularity has in building it. Its design framework allows the activation of public spaces as ecosystems with widespread porosity, permeability and accessibility; considering the sensorial quality of the cities that preceded us and rethink about its collaborative dimensions.

## Conclusions

The phenomenon of urban shrinkage has deteriorated the urban tissue in many post-industrial cities creating an archipelago of voids, derelict lands and brownfields. They often become stigmatised spaces and battlefields between the conflicting interests of municipalities, innovators, developers and disadvantaged communities. Being an unresolved environmental and social problem, urbanites see waste as a valueless material far from synergies to offset, reuse and repurpose it and therefore build ecologically sound smart communities.

The wellbeing of everyday life is a sensorial condition associated with initiatives striving to interlace environmental sustainability and circular economy, displaying appreciation and fulfilment in occupants for the recovery of the built environment.

Circular city becomes a replicable urban framework with high potential for community-led grassroots innovations to contribute with a lower-waste future locally by reconceptualising waste reduction and management in diversified schemes.

In order to implement a viable circular scheme, it should include to: [a] define and map waste systems and practices; [b] study the scope, scale and character of the community waste sector; [c] evaluate the impacts of community waste projects; [d] investigate the potential, and challenges faced by this sector; [e] experiment remake touchpoints in chosen sites; [d] building capacities on circular design by training urban innovators and managers; and [e] evaluate local community versus authority-led initiatives to improve waste reduction and recycling.

This study proposes to rethink and remake the everyday city by challenging the mono-sensorial dominance of the visual in the urban environment and offering a systemic approach of the environmental qualities, perceptions and sensory dimensions of urban life. Hence it is an incitement to collaborate with the shift towards a future of thriving cities that are liveable and adaptive, using the wide range of policy instruments at all scales, from grassroots innovations to route maps or urban codes.

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