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# Regenerative Territories

Dimensions of Circularity for Healthy  
Metabolisms

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# Introduction to the Volume

*Eliminating the concept of waste means designing everything - products, packaging, systems - from the beginning based on the principle that waste does not exist*

—Braugart and McDonough, *Cradle to cradle. Remaking the way we make things*, 2002.

This book is a multi-faceted reflection on the links between territory and circular economy, a theme that revolutionizes our way of understanding the logic of production and consumption, of organizing social and urban structures, and of thinking about the principles and objectives of planning.

The circular economy changes the forms of urban life: this volume intends to explore how the concept, starting from its origin and in relation to its possibilities of directing individual and collective choices and behaviors, reorients planning and territorial management models.

“The circular economy is a resource-rich economic system and a device for innovation, bringing ongoing benefits to society, now and in the future. It is planned cradle to cradle, for an endless recirculation of clean technical and biological materials, energy, water, and human ingenuity”. Innovation is the focus of our attention because it allows us to rethink the territory in terms of sustainability and relationships between city and environmental components, between society and ecology, as references to innovate objectives and methods of observation and description, models of prediction and design, forms of participation and evaluation, of contemporary urban planning.

Our reflection starts from a Horizon 2020 research entitled REPAiR (Grant Agreement No. 688920), which worked on the concept of urban and territorial metabolism aimed at the regeneration of territories in crisis, problematic and malleable of the contemporary: those of the peri-urban, crossed by phenomena of incipient mutation, where more at risk is the integrity and continuity of the ecological and environmental system in relation to settlements, functions, and people who live there.

To implement circular and healthier urban and territorial metabolisms, and to ensure a better quality of life for all, towards a more Circular Economy (CE) (EC, 2014; Ellen MacArthur Foundation, 2017) requires a true paradigm shift. Although studies show that over the past decade there is a growing amount of existing research

and practical implementation of best practices in this direction, still in many cases, it is more limited to that of a reuse economy instead of a Circular Economy: circular principles are only applied in a sectorial way and/or at a very small scale (e.g. at the building scale), focusing mostly on reuse and up-cycling of materials and components. Very seldom, if at all, a more holistic approach towards the urban sphere is realized. This shortcoming is quite clear if existing plans, strategies, and policies, at the urban, regional national and even European level, are analysed.

Nevertheless, it is well known that the transition towards circular cities has been gaining momentum in the last decade, and more recently the search for a sustainable territorial metabolism is upfront as a new paradigm for change.

Several challenges should be tackled to move towards a circular Urban Metabolism as a new design approach, while including quantitative approaches typical of the accounting of the metabolic material flows as well as the qualitative aspects related to socio-ecological values. In literature, the importance of considering the four ecologies which compose a territorial urban metabolism has been recognized (Grulois, Tosi, & Crosas, 2018): (i) human ecology, which deepens the adaptability to humans to the environment; (ii) industrial ecology, which studies the impacts of the anthropic activities on the environment, the related availability of natural resources and the capability of the environment to metabolize waste; (iii) urban political ecology, which is related to the achievement of more just and sustainable decision-making processes; and the (iv) landscape ecology, which is focusing on ecosystems and it studies the effects of urbanization on contemporary territories, including a specific focus on city and countryside. The first three mentioned are not sufficient if considered separately from landscape ecology, since they do not include the reflections on the complex interrelations among city and countryside. This book takes all four ecologies together and thus emphasizes the importance of a regenerative approach, and its interdisciplinary nature.

At the same time new questions and further challenges—arising during this actual critical moment and exacerbated gravely by the pandemic due to the spread of the COVID-19—are asking for different kinds of answers for urban and territorial planning and the use of space in particular. *What kind of new questions can be identified? How to fill the gap between research and practice to imagine new possible ways of living in cities? How to implement a circular management of (land) resources in the contemporary territories, considering waste and wastescapes as new materials for sustainable urban transformation? How to implement regenerative approaches to the regeneration of neglected urban and peri-urban resources?*

Therefore, the aim of this book is also to clarify some of the definitions and new terms one could encounter nowadays when applying CE principles in daily research and work.

In this edited volume, in particular, the spatial dimension of circularity is explored, as it aims to address the application of the principles of CE in the wider territorial context, contributing to bring to light the spatial impacts (both positive and negative) of the implementation of circularity principles. It can be read as an underpinned manifesto for circularity and regenerative territories, as a new logic and design approach for a new urban planning *modus operandi*.

The European H2020 REPAiR project (Grant Agreement No. 688920) is the starting point of this edited volume, which presents some of the explorations carried out within the framework of the aforementioned European Horizon 2020 project “REPAiR. Resource Management in Peri-Urban Areas. Going Beyond Urban Metabolism”. In this project, among other aspects of a more circular economy for better urban metabolisms, the need to understand the impacts of circularity principles on the spatial structures of our territories has been studied (EC, 2016). However, for the sake of completeness, it also brings together further studies, beyond the framework of REPAiR (e.g. including Cities of Making, and P.U.R.E. projects).

Outstanding scholars have been thus invited to contribute to this edited volume, to bring their, and their projects’ specific perspective on circularity. All the included contributions have been deepening different kinds of outlooks, which according to the editors, show to be fundamental to delineate the different aspects that all together can give form and draw the philosophy of “Regenerative Territories” towards an updated concept of circularity.

As stated, a specific focus on land, an aspect that has been overlooked for a long time in the academic and practical discourse about CE (Williams, 2019), has been put forward, with the aim to improve the understanding of the functionality of territorial metabolism (Grulois et al., 2018). In fact, the spatial debris of metabolic processes namely wastescapes (Amenta, 2019; Amenta & van Timmeren, 2018; Cerreta, Mazzarella, Spiezia, & Tramontano, 2020) have been included as resources in the metabolic chains, opening up on the reflection on life cycles of territories and on closing the loops of their possible use and reuse in a sustainable manner. Besides the urban, particularly peri-urban areas become important contexts for rethinking urban transition in the light of a Circular Economy. Peri-urban areas are fragile territories since they are characterized by low-density urbanization and contain often a infrastructure-based fragmented spatial structure, while being affected by a huge presence of wastescapes, including both drosscape (Berger, 2006) and operational infrastructure of waste (Brenner, 2014). Wastescapes ask for fixing the attention beyond the reduction and the reuse/recycle of material waste, as it requires the understanding of how to apply circularity principles to the regeneration of abandoned, underused, or polluted spaces that need to be regenerated.

Multidisciplinary and participative approaches are also key in the application of circularity principles, combining top-down (institutional) decisions, with bottom-up and spontaneous practices from the local communities. This can be done in (Peri) Urban Living Labs (PULL) environments, which support inclusive tackling of complex problems. Experimenting in Peri-Urban Living Labs means to realize a procedural approach that derives from the geodesign framework (Steinitz, 2012) in which processes of social interaction, decision-making processes, and innovative project aims of the territory are interwoven. Actors representing the quadruple helix in co-creation sessions address the specificity of the challenges. In addition, Living Labs can be considered a transferable methodology for learning, and for producing innovation, through the identification of specific guidelines. Living Labs allow going beyond institutional lock-in situations, ensuring a dialog among stakeholders.

A territorial vision for regenerative territories is composed of a set of images for the city, and it deals with both the physical space and the local practices that take place in it, systematizing, through eco-innovative solutions (REPAiR, 2018a), the bottom-up reflections widely shared with all local stakeholders, with a top-down and properly institutional approach. In this way, a vision can hold together integrated and systemic images, which are able to re-interpret the existing city and to build feasible and sustainable projections towards a desirable and circular future (Secchi & Viganò, 2009).

A multiscale approach is crucial for a strategic regenerative vision. In order to really function, such a vision is strongly connected with the urban and territorial environment, and to their socio-economic structures. A vision is not just a simple sum of actions, but should have a strategic value, with an innovative approach capable to rebuild territorial connections at different scales, as well as through a systemic and multidisciplinary approach. To build overarching regenerative and site-specific visions for the palimpsest of contemporary territories (Corboz, 1998), a multi scale approach is configured as a central principle to analyse and plan the increasing complexity of contemporary cities. It is an important aspect to achieve healthier metabolisms: through a multiscale approach, ecology and landscape are the essential values embedded in the contemporary urban project (Russo, 2015).

## **Dimensions of Circularity for Healthy Metabolisms and Spaces (Chapter 1)**

In the first chapter, Michelangelo Russo and Arjan van Timmeren introduce the main topic of the book in a reflection on Circularity and Spatial Planning within the wider context of global processes and their consequences for the field. The focus is on the development of spatial planning in relation to circularity over time, and in particular, the way how spatial planning and strategies respond to new urgencies and opportunities related to territorial metabolisms. In relation to space and time, five grand rules are explored extensively.

## **New Definitions: Amplifying the Perspective of Circular Economy (Part I)**

In the first part, this book aims to outline a wider approach for circularity that could amplify the very concept of Circular Economy (CE), by better defining its scope and the related disciplines involved in its interpretation.

When CE is applied to cities and territories, its environmental, economic, and design features are often disregarded, thus presenting the need for a broader theoretical discourse on the CE's territoriality. In Chapter 2 "Territorialising Circularity",

by Cecilia Furlan, Alexander Wandl, Chiara Cavalieri, Pablo Muñoz Unceta, the role of territory in the CE conceptualization in the urbanism literature is explored, to develop insights on which tools and methods are requested to interpret territories through the lens of circularity.

In Chapter 3 “Shifting Risk into Productivity: Inclusive and Regenerative Approaches Within Compromised Contexts in Peri-Urban Areas”, Francesca Garzilli, Federica Vingelli, Valentina Vittiglio, present peri-urban areas as challenging territories to enact regenerative design and practices, stressing how new policies in sustainable agriculture are considered as potential solutions for the rapid soil consumption in Europe.

Next, in Chapter 4 “The Circular Metabolic Urban Landscape: A Systematic Review of Literature”, by Chiara Mazzarella and Libera Amenta, it is shown that during the past ten years, the scientific literature on Urban Metabolism (UM) and Circular Economy (CE) is constantly evolving and requires to be systematized also in order to underline the importance of collaboration between the different disciplines and the useful aspects to be deepened for designers, planners, and policy-makers to move towards circularity.

Finally, in Chapter 5 “Urban Manufacturing for Circularity: Three Pathways to Move from Linear to Circular Cities”, by Birgit Hausleitner, Adrian Vickery Hill, Teresa Domenech, Víctor Muñoz Sanz, the need for merging both expert knowledge and transdisciplinary collaboration is highlighted. The argument is that urban manufacturing and its manufacturers are of great importance in delivering CE ambitions through processing materials, providing skills and technology for repair or reconditioning goods and the capacity to deliver innovative technology.

## **The Spatial Scope of Circularity (Part II)**

Moving towards the definition and understanding of the relationships between urban form, spatial characteristics, and structure of urban areas, Part II focuses on argumentations to understand the ecological, spatial, socio-cultural, and site-specific impacts of the implementation of Eco-Innovative and Circular Solutions to contemporary territories. This chapter focuses on case studies across Europe and beyond, including an example from Vietnam.

In Chapter 6 “Evolving Relations of Landscape, Infrastructure and Urbanization Toward Circularity”, Bruno De Meulder, Julie Marin, Kelly Shannon argue that contemporary spatial circularity practices are often decoupled from their site-specific socio-cultural and landscape ecologies. This is symptomatic of the role that performative aspects have, and of how a series of normative tools generate solutions, which do not take into consideration locational, spatial, and socio-cultural specificities.

In Chapter 7 “Circular City: Urban and Territorial Perspectives”, Giulia Lucertini and Francesco Musco elaborate on the possibility to optimize the space used by flows and how to improve their interactions in urban and peri-urban areas, to construct another step towards circularity. It requires to rethink and redesign urban spaces,



urban practices, and infrastructures, for facilitating a shift from linear to circular city.

In Chapter 8 “New Urbanization Phenomena and Potential Landscapes: Rhizomatic Grids and Asymmetrical Clusters” Enrico Formato explores the closing of short supply chains for the use and recycling of materials—also with reference to the CDW streams—as urban reconfiguration processes, which are structurally open to uncertainty, through a condition of “unfinished”, open to the assembly and accumulation over time of functions, forms, aggregations, and densifications.

In Chapter 9 “From Wastescapes Towards Regenerative Territories. A Structural Approach for Achieving Circularity”, Libera Amenta and Arjan van Timmeren investigate the spatial dimension of circularity, going beyond material resource management, by deepening the importance of revalorizing territorial waste and thus the spatial implications of a more circular management and reuse of wastescapes, investigated at the urban and metropolitan scale.

In Chapter 10 “Towards Circular Port-City Territories” by Paolo De Martino, ports are shown to play a crucial role in the transition towards circularity, by transforming the challenges of the port into opportunities and new forms of integration. It shows however also how limitations and path dependencies could obstruct the transition to new forms of circular economy in the future.

## Methodology and Representation (Part III)

Part III unpacks the characteristic of complex tools and methodologies which have been set up for representing and interpreting waste streams, including the wastefulness of land and of parts of the territory. To support the significant transition towards circularity, metropolitan areas need planning, co-designing, and implementing solutions, which are shared with a wide range of stakeholders, who thus have to deal with data on material and territorial resources.

A geodesign framework helps model information and present consequences to inform the planning process and decision-making.

In Chapter 11 “Eliciting Information for Developing a Circular Economy in the Amsterdam Metropolitan Area”, by Gustavo Arciniegas, Alexander Wandl, Marcin Mazur, and Damian Mazurek, a novel Geodesign Decision Support Environment (GDSE) developed in the REPAiR project as an interactive web application for facilitating the collaborative process of developing spatial strategies for advancing circularity is shown.

This concept elaborated as a ‘Collaborative Urban Living Lab’, presented in Chapter 12 “Collaborative Decision-Making Processes for Local Innovation: The CoULL Methodology in Living Labs Approach” by Maria Cerreta and Simona Panaro, is able to support the Collaborative Decision-Making Processes to activate local innovation processes at the neighbourhood, city, or landscape scale and has been tested in four different research projects (including REPAiR), supporting the

co-design, co-production, and co-decision cycles of urban innovative and sustainable solutions.

Finally, in Chapter 13, “Urban Metabolism Evaluation Methods: Life Cycle Assessment and Territorial Regeneration” by Pasquale De Toro and Silvia Iodice, the use of Life Cycle Assessment (LCA) is elaborated as a crucial evaluation of circular solutions, to support and assess the environmental impacts of the life cycles of industrial products and services. Here, it is extended to the field of urban planning, thus assessing sustainability of a territorial approach to circularity.

## **Sustainable Strategies and Solutions for Circular and Healthy Metabolisms (Part IV)**

Finally, in Part IV, several practical examples and case studies are analysed, showing that the implementation of circular principles requires a focus on the involvement of experts and professionals from different fields through collaborative processes.

The chapter 14 “Planning Wastescapes Through Collaborative Processes”, by Anna Attademo and Gilda Berruti shows that places originally designed for public use, but abandoned over time or never actually completed, are actually available for new uses and services. Their redesign could be based on criteria of flexibility, activating a dialogue between public institutions, private enterprises, local associations, and citizens’ groups. Issues on spatial inequalities in access to spaces and services could be part of a wider redefinition of welfare and welfare spaces concept, as an effect of global economic and financial crisis.

Next, in Chapter 15 “Manufactured in the Peri-Urban: Regenerative Strategies for Critical Lands” by Giuseppe Guida, peri-urban areas are defined as intermediate land, characterized by a hybrid nature which makes them specifically vulnerable to speculation, indiscriminate use of soil resources, erosion of agricultural residues. Moreover, in some contexts, they lack control due to inadequate planning instruments and policies which require eco-innovative solutions and strategies.

In continuation, in Chapter 16 “Urban Regeneration: An “Incremental Circularity” Perspective” by Paolo Cottino, Dario Domante, Alice Franchina, Urban Regeneration (UR) practices take into consideration Circular Economy principles and their application. Contrasting soil consumption by catalyzing social energies to reuse territorial heritage, such as brownfields and disused buildings is presented as a method that reaches potentials and it requires an interdisciplinary perspective, combining in particular policy analysis and urban planning.

Chapter 17 “Reloading Landscapes: Democratic and Autotrophic Landscape of Taranto”, by Francesca Rizzetto and Fransje Hooimeijer, introduces the concept of a Democratic Landscape beyond its natural environment, by recognizing the well-being of the inhabitants. This approach aims to overcome the conflicts between economy and environment. The analysis of a Democratic Landscape in relation to the concept of an ‘autotrophic organism’, merges together the transformation

by regeneration of the ecosystem and the economic regime, by establishing new economic models in order to make a sustainable city.

In Chapter 18 “Hybridizing Artifice and Nature: Designing New Soils Through the Eco-Systemic Approach”, Marina Rigillo elaborates on Ecological thinking as a design approach able to produce and implement eco-innovative strategies for achieving environmental and societal challenges of our global age. Today’s major environmental challenges are not about single issues, such as waste reduction or soil loss, rather they involve systemic change and design processes, linking together economy, social habits, and technological responses.

Finally, in Chapter 19 “Towards Regenerative Wasted Landscapes: Index of Attractiveness to Evaluate the Wasted Landscapes of Road Infrastructure”, Maria Somma analyses and assesses, through spatial indicators, the potential of wastescapes along with major road infrastructures, and how they can provide society with economic as well as environmental benefits.

In the Afterword to this edited volume, the editors look beyond the actual status quo of circularity in relation to spatial challenges, and in particular, how recent disruptions, like the Covid19 pandemic, on the one hand, re-value land and space, particularly near living areas, and on the other hand highlight the importance of finding strategic pathways towards securing safe ways to realize and include regenerated waste(d) territories into our living areas, and to do so in such way, that it can help make individuals, communities, and society as a whole, more resilient to such disruptions.

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