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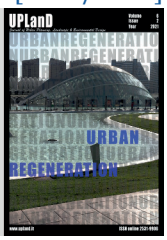

Research & experimentation
Ricerca e sperimentazione

Design Processes for the Redevelopment of Toxic Landscapes in Napoli Est.
The Role of Soil in Contemporary Spatial Transformations

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Highlights

- Exploration of the existing gap between spatial design and ecological restoration.
- Urban regeneration and remediation processes of a former industrial area in Napoli Est.
- Research trajectories to re-think the soil as a socio-technical resource.

Abstract

Urban transformations are critical to understand and orient design trend and governance processes. In the framework of Urban Metabolism and Circular Economy, the paper focuses on the cyclical use of resources in the processes of urban renewal that are carried out in contaminated lands. Through the explanatory case study of the ex Manifattura Tabacchi – a former industrial site located in the polluted eastern area of Napoli, in South Italy – the research underlines that local policies still strive to operationalize the dialectic between urban design and ecological restoration, raising numerous challenges in both governance and design dimensions.

The paper addresses the unfruitful gap between design and remediation as a new frontier that architects and urban designers must overtake to govern the transition towards an effective ecological turn in design disciplines. The objective of this study is to provide fruitful insights in revealing the soil as a socio-technical resource whose value has to be culturally acknowledged in order to rise stakeholders' awareness, and thus being instrumental in decision-making. In the conclusion, research trajectories are provided to implement the debate.

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1. Introduction

In the Anthropocene era, the realm of spatial transformations becomes an essential core in the reconceptualization of a sustainable development led by an ecological approach (Beatley & Manning, 1997; Steiner, 2008). Ever since the 1987 Brundtland Report introduced the concept of sustainability, cities have addressed development goals towards ecological, social, and economic targets with the final aim to achieve human wellbeing without resource depletion. More recently, the 17 Sustainable Development Goals (SDGs) tackled accurately a wide range of global challenges such as climate change, hunger, environmental degradation, health and education, also pointing out the role of cities in altering the earth system. As reported in the SDGs 11 "Make cities inclusive, safe, resilient and sustainable", the increasing urbanization phenomena are threatening air quality, resource consumption, infrastructure capacity, and social equity. This implies that urban transformations have a role in driving the change towards sustainability. Spatial reconfigurations create the opportunity to orient the governance and management of the city towards inclusive, safe and resource-efficient urban ecosystems. In fact, the global awareness on the state of crisis calls for a spatial reorganization of territories and for reinterpreting the urban project as a tool to investigate conflicts, question the new conditions and design future trajectories (Bianchetti, Cogato Lanza, Kercuku, Sampieri, & Voghera, 2015; Secchi, 2011). As urban ecologists point out, urban ecosystems are defined dynamically at multiple scales by the ever-changing interactions between socio-economic and biophysical processes, and thus by human activities and natural habitats (Alberti, 2008; Collins et al., 2000). This implies considering cities as hybrid and heterogeneous landscapes determined by a complex coupling of human and natural phenomena that cannot be addressed separately to understand how urban ecosystems change and evolve. Although the link between spatial configurations and ecosystem dynamics is well-known, urban design disciplines are still experimenting methods and procedures to apply ecological research and to provide paths forward for contemporary cities in an unpredictable world (Reed & Lister, 2014). With the aim to explore the still existing gaps between spatial design and ecological restoration, the paper focuses on the cyclical use of resources in the processes of urban renewal carried out in contaminated lands. In the framework of Urban Metabolism and Circular Economy principles, the research tackles the role of soil in urban transformations through an explanatory case study. The redevelopment strategies applied in the ex industrial site of the ex Manifattura Tabacchi (MT) in Napoli, reveal that local policies still strive to operationalize circular approaches. The involvement of the Department of Architecture (DiARC, University of Napoli Federico II) in the preliminary studies for the remediation program of the ex MT, within the Neapolitan SIN, allowed us to understand critically the complexity of regenerating toxic brownfields in the presence of a predetermined design project. In fact, the redevelopment scenario for the ex MT was already defined by a private commission, and the DiARC research study had to contribute in proposing a complementary strategy that could allow for opening the site to the city during the remediation phases. In this case, the redevelopment and the remediation design projects went on parallel paths unraveling the opportunities for an integrated methodological approach as future research trajectory. The lesson learned from the applied research on the site of ex MT is that soil has to be addressed as a socio-technical resource whose value needs to be acknowledged culturally to raise stakeholders' awareness, and thus to have resonance in design and decision-making processes.

2. Urban Soil in the Framework of Metabolic and Circular Approaches

The urban environment is a continuously changing socio-ecological landscape shaped by socio-metabolic processes of dense networks with different nature (human, physical, discursive, cultural, material, and organic) (Heynen, Kaika, & Swyngedouw, 2006). As explained thoroughly by Swyngedouw, metabolism and circulation are concepts that have provided adequate principles to tackle and guide modern transformations of urban areas (Swyngedouw, 2006). In this paragraph, within an urban planning and design perspective, we address Urban Metabolism (UM) and Circular Economy (CE) as fundamental scientific frameworks to address contemporary urban regeneration. The study of the two complementary approaches allowed us to interpret the role of soil in both the environmental and spatial dimension of urban projects. Concurrently, we recognized its limits in

the urban governance sphere as the consequence of a poor social awareness in soil protection and management.

The city as a consumer of resources and producer of waste is the emblematic image at the base of UM. This approach applies the metaphor of living organisms to the city's behaviour with the aim to analyse and manage the continuous need of inputs for performing activities, and the consequent discarding of outputs as the result of the transformation/consumption process (Christopher Kennedy, Cuddihy, & Engel-Yan, 2007). The UM concept was introduced in the '60s by the engineer and geographer Abel Wolman who proposed UM as a model to describe and organize flows of materials and commodities in order to sustain city's inhabitants (Wolman, 1965) UM has emerged as a quantitative method and it pioneered the study of the relationship between anthropogenic activity and natural system in an era where environmental issues and the limit of resources were just emerging in relation to urban growth. After a temporary loss of interest in this subject during the '80s, an increasing attention in the study of UM led to expand and improve the concept. Nowadays there is a shared opinion that the city is not comparable to a simple organism. Conversely, the spatial and temporal scales at which cities operate reflect the nature of ecosystems, meaning a complex level of organization that also takes into account settlements' liveability (Golubiewski, 2012; Newman, 1999) The applications of UM in urban planning and design are at a speculative and experimental stage. The core of the research studies mainly consists in the collection of data and the assessment of impacts – also through methods such as Material Flow Analysis and Life Cycle Assessment (Ferrão & Fernández, 2013; Kennedy, Pincetl, & Bunje, 2011) – with remarkable efforts made to include socio-cultural drivers (Baccini, 2014). From a pragmatic perspective, the design approach of UM leads to develop procedures and tools that can close loops of water, energy, nutrients and materials by fostering circular actions based on the R-framework[1] (Potting, Hekkert, Worrell, & Hanemaaijer, 2017). Therefore, if UM provides knowledge on flows in terms of quantities, spatial data (mapping) and networks' interconnections and hybridity, CE intervenes to regenerate and restore, also repairing previous damages, by designing better systems (UNEP, 2006). The CE approach emerged as a model for the industry, and it has been conceptualise in urban contexts only recently (Williams, 2019) also because of the resonance that the CE concept had in the European action plan "Closing the loop" (EC, 2015) with sustainable principles articulated also in other important directives (EC, 2011, 2019).

In cities, the application of circularity means moving towards resource-efficient behaviours that can be pursued through three main actions (Williams, 2021):

1) Reducing waste with interventions that improve the life-cycle of materials and resources (i.e. recycling and reusing outputs as new inputs in the urban system);

2) Protecting ecosystem services to preserve the functional natural capital or, in other words, the benefits human beings receive from nature[2] (A. Breure et al., 2012);

3) Localising resources for achieving a local and regional carrying capacity (self-sufficient systems) that allows decision-makers to directly assess and correct the consequences of their decisions on consumption and restoration of resources.

To achieve resource-efficient management in urban environments, land and soil are crucial elements of a circular management. In fact, land and soil are natural capital and functional resources that provide biomass and food but also space for social and economic human activities. The seven soil functions, as defined by the European Commission (2006), reveal the soil in its twofold nature: a rich depot of materials, nutrients and biodiversity (sub-surface), and a physical and cultural platform for humans (surface). This ambivalent character is a key player in CE principles as it deals with the functioning and improvement of natural cycles, the provisioning of services such as mineral and biobased resources, and the land management (A. M. Breure, Lijzen, & Maring, 2018). Ethical considerations about the intrinsic value of soil are insufficient to raise effective actions; this means that the anthropogenic perspective – focusing on the functional benefits of soil – prevails in soil policies and governance (Römbke, Breure, Mulder, & Rutgers, 2005). Efficient spatial planning of urban and rural areas becomes instrumental to guarantee the soil security (McBratney, Field, & Koch, 2014), and it deals with land take, soil sealing and urban sprawl (Blumlein et al., 2012). In this sense, urban development faces the challenge to minimize the impact on natural resources, and to mitigate or compensate for resource consumption in urbanization processes. Among other actions, the remediation and regeneration of brownfields is crucial to address both the environmental goal

of soil quality – the maintenance of the soil functional properties – and the spatial reuse of land for economic and social activities. If on the one hand, techniques of soil remediation are rapidly improving (Petruzzelli et al., 2016), on the other hand, especially in the Italian system, redevelopment procedures and planning guidelines are lacking as opposed to rigid and sectoral regulatory instruments (SuRF Italy, 2014). The governance gap between remediation and redevelopment results in the disconnection between technical solutions and urban design projects that may compromise the fulfilment of a successful sustainable regeneration (Norrman et al., 2016). The complex dynamics that the remediation-regeneration gap can determine in local contexts are addressed through the case study of the ex MF. The unconventional process that has been pursued in Napoli offers insights on a broader inadequacy of the soil culture. With this term, we refer to the need to go beyond the mere notion of soil as the solid part of the earth, acknowledging soil as a multiple resource that has always influenced civilization and livelihood (Minami, 2009), and thus it is part of human culture. In this regard, reconceptualising soil as socio-technical resource – implying its role in the interactions between humans, technology and artefacts – is instrumental to raise soil awareness. Only through a common knowledge that is shared among scientists, civil society organizations and policy makers, soil governance can be improved at different scales and it can have a central role in leading the UM and CE approaches in urban regeneration projects (Keesstra et al., 2016).

3. Methodology

The research study is conducted in a twofold framework that relates the territorial application of UM and CE to the redevelopment of Napoli Est as a long-time urban concern of the Municipality of Napoli (Lucci & Russo, 2012). The opportunity to improve a design approach for the contaminated land of the ex MT[3] is framed in this paper as a mean to tackle and deepen the notions and principles that constitute the scientific knowledge on UM and CE: a theoretical framework that has been developed also in continuity with previous and parallel researches carried out at DiARC[4].
The explanatory case study allowed for confronting the research background with existing issues and actual governance models of urban transformations. In fact, the case of the ex MT sheds lights on a specific natural resource, the soil, and challenges its role in spatial transformation processes with the aim to develop an informed research trajectory for further investigations. This implies to offer an alternative perspective to the topic of ecological approaches in design disciplines by giving not-conclusive evidence for understanding the local urban complexity. In attempting to do this, the next paragraph reports the case study in form of a descriptive analysis that outlines the sequence of procedures, decision, and actions regarding the redevelopment of the polluted ex industrial area in Napoli Est. From the history of the transformation process, what emerges is a practice of ecological corrections that this paper tries to investigate by questioning the role of environmental awareness in urban governance models. In this perspective, the structure of the research study "sustainable processes for the rationalization of environmental impacts of the ex MT" – the main research framework that this paper stems from – is instrumental to unfold the institutional and design context.
The whole research process developed into three main phases:

Phase 1: Urban analysis
1. Study of the condition of soils in an area defined as SIN – Site of National Interest – Napoli Orientale (SIN Napoli Orientale L. 426/1998).
2. Urban and territorial knowledge of the area of the ex MT and its context. The city plan of Napoli classifies the area of the ex MT as zone D, in particular, some buildings are in sub-zone Da that includes "settlements and industrial artifacts that have architectural or typological testimonial value". In 2010, the Urban Implementation Plan, within a private initiative, is applied in the area through a Recovery Plan that provides for the preservation of the most valuable buildings and the construction of new buildings to create a new public space of the city.

Phase 2: Case study analysis
1. Analysis of the Project approved as a Recovery Plan by Mario Cucinella Architects and Land Architects. It involves the demolition of over 7000 cubic meters of buildings and the construction of new buildings that will house residences, university residences, offices, commercial activities, areas for recreation and leisure, a market, and a school.
2. Architectural survey and study of the buildings, BIM (Building Information Modeling), and DTM (Digital Terrain Model). BIM – applied to the built heritage and decommissioned soils – combines modeling with the preparation of an abacus to compute and catalog buildings and soils for the demolition and remediation project. The parameterization of abacuses makes it possible to create a semi-automated process aimed at obtaining useful information for the building demolition project and a qualitative and quantitative assessment of the materials recycled on-site.
3. Definition of the Sampling Plan and Waste Management Plan with the identification of possible scenarios for the management of CDW (construction and demolition waste).

Phase 3: Urban Regeneration Guidelines
1. Proposal of Zero Waste Philosophy urban regeneration approach to design the life cycle of waste from the demolition of some of the existing buildings to provide an alternative to the traditional process of recycling materials. The strategy is based on the definition of selective demolition, it ensures both a reduction in the consumption of material to be reused in the new building and the timing of the construction phases by proposing temporary uses between the remediation and new construction phases.
2. Identification of a soil remediation process linked to the redefinition and recycling of construction waste: the materials deriving from the demolition of buildings can be part of the remediation process.
3. Use of BIM methodology to manage all the data involved in the regeneration project. This method proposes to create a semi-automated process for the management of waste from CDW to establish a practice to be applied to similar cases.
This paper focuses on the phase 3.2.

4. The Conflicts of the ex Manifattura Tabacchi

The ex Manifattura Tabacchi (MT) was built in the '30s, and it opened in 1956 when it represented one of the most important tobacco factories in

Figure 1: The urban context of the ex Manifattura Tabacchi. *Source: own elaboration.*

South Italy; since 1998 it has been abandoned and it became an emblematic case study for the urban transition and the regeneration process of Napoli Est.
The geographical condition of the Gianturco district – where the ex MT is located – reveals a complex territory of ex industrial sites that extends from the eastern part of the historical center of Napoli to the volcano Vesuvius. During the industrial revolution, this area represented the working-class sense of community, whereas nowadays fragments of industrial archaeology occupy the district that appears as a terrain vague (de Sola-Morales, 1996), a drosscape (Berger, 2006).
The whole area has been abandoned because of economic, political, and urban transformation issues which have shaped this area as an enclave, closed off to the people and difficult to reintegrate in a fragmented urban fabric. In this context, one of the main problems of the area is the soil condition: many sites are abandoned and inaccessible because of contaminated soils that transform them into a wide wasteland with no sense of urbanity and community. The isolated condition has a strong impact also on social, economic, and cultural aspects of Napoli Est. In the last twenty years, this part of the city has been recognized as an opportunity to rethink Southern Italian peripheries as both public and private sectors proposed many redevelopment initiatives in the area. Unfortunately, this became just a political slogan considering that many paper projects have never been realized because of economic and political issues. Nevertheless, the underused land, the proximity to the business center of the city and the eastern part of the historical city, the infrastructural system of Garibaldi Station, and the port determine a good transformative potential for the redevelopment of the area.
Despite the great interest in undertaking redevelopment strategies through private and public investments, the design proposals for the Neapolitan spatial transformations barely tackle the serious soil condition. The PRG (variante generale 2004) proposal for urban development collides with the soil pollution representing the legacy of the industrial activities that came to the end of their life cycle in the '90s. Specifically, a large part of Napoli Est is 830 ha SIN (Site of National Interest, Law 426/98) which means a contaminated area with a high environmental impact to be managed at the government level – the Ministry for the Ecological Transition (MiTE).

Figure 2: Napoli Est - Site of National Interest and localization of ex MT. *Source: own elaboration.*

4.1 The urban transformations: from the design strategy to the soil condition

The ex MT represents a typical paradox of the Neapolitan urban transformation: the possibility of operating a transformation has translated into an endless bureaucratic process. In 2010, Fintecna Immobiliare srl, the company that owns the site, presented a Recovery Plan to the Municipality of Napoli. The urban regeneration design process has been entrusted to Mario Cucinella Architects, while the soil remediation proceeded as a parallel but autonomous issue with two characterization plans (2009, 2010) and the operations of emergency safety (2012). The lack of relations between the design and remediation processes of the project has led to slow down the redevelopment of the area. The project by Mario Cucinella Architects with Land Architects Studio covers 170.000 square meters. It consists of 590.000 cubic meters of both new constructions and renovation of existing buildings. The project preserves the memory of the industrial area connecting the most relevant industrial plots and the new functions. The new program hosts different uses: housing, commercial offices, student housing, schools, and a covered market.
The mixité and the interaction between open and built spaces define a new urban fabric that grafts into the surrounding areas creating new relationships. The project triggers a new life cycle for some existing buildings and new ones. It proposes an urban system characterized by the reuse of the built spaces and the new public ones that reconnect the area to the surrounding urban fabrics. The total volume of planned demolitions is more than 7.000 cubic meters: a considerable amount that suggests the possibility of recycling and reusing materials in-situ. However, some interventions have already launched the transformation process: in the eastern part of the site two ex industrial structures have been converted into student residences and other two facilities have been built by reproducing the same formal aspect of the ex industrial warehouses with the aim to host new collective and sport activities. Unfortunately, the soil condition of the area does not permit to use in a proper way the open space and so this condition underlines the paradox of the design strategy: how can people occupy those buildings if they cannot use the public and open spaces around them?
Indeed, the surveys and analyses[5] that were conducted in selected points of the area for the Permanent Safety Project showed the presence of toxic materials[6], and thus the need for remediation to reduce risks for users. According to the Italian law 426/1998, this condition immediately led to adopting reclaiming procedures to restore the safety of the area.

4.2 A possible alternative: rethinking the soil value and integrating it with new technologies

The research project has been carried out within a collaboration between the DiARC-University of Napoli Federico II and CDP (Cassa Depositi e Prestiti) with the aim to provide a mediation tool between Cucinella's project and the operations of emergency safety. This was considered necessary for activating the area, meaning to fulfil the urgent issue of merging remediation and regeneration as driver for the rehabilitation of the whole district.
Although the urban regeneration project developed a sustainable strategy for the new area, it did not consider in a significant way the ecological and environmental issue of the site, meaning its complex conditions that have been compromised by the previous land use. Consequently, the remediation procedures had to be adapted to an already defined project without the opportunity to have an active role in the design process. This status has shown complications both in the outcomes and the proceedings that have slowed down and complicated the implementation process. Learning from the case study, the research claims the need to reconceptualize the soil as a new frontier that architects and urban designers must overtake to govern the transition towards an ecological turn in design disciplines.
One of the first aspect of the research has been the identification of a management plan for the buildings to be demolished already foreseen by the design project. This action becomes substantial to activate the area by reducing the building site phase and to mediate between the soil remediation process and the design of new spaces. The different phases of the site have been structured to simplify the viability, logistics management and demolition site. The different phases of the construction site also correspond to a temporal strategy of reclama-

tion of polluted soils in order to activate the area of the ex MT for different parts. In the different phases, the research has also identified spaces to host temporary uses in order to reconnect the abandoned area to the city and to activate the already realized buildings to the urban context.
As part of the research outcomes in defining the ex MT remediation process, the DiARC research study proposed CDP to apply techniques based on considering waste as a value in both regeneration and remediation processes. The waste from the demolition process will be integrated as material to support the capping remediation strategy for the soil and the aquifer. This solution intends to use the waste materials resulting from the demolition processes to create the new concrete soil in order to provide isolation between the polluted layers of soil and usable open spaces: a strategy based on a circular action of recycling in a zero-waste philosophy.
From a physical perspective, the analysis of the built environment, the mapping of activities, and the BIM modeling of buildings ensure a deep knowledge of the context. In fact, the research explored the possible use of IT technologies as a tool to inform decision-makers in the definition of sustainable scenarios. In particular, the BIM technology gives information on the materials of the buildings to be demolished and/or integrated, it provides the quantitative data of materials available for the remediation project and defines the technology to reuse them. This method enables, therefore, the automation of the processes that regulate the flow of construction and demolition waste (CDW) and the definition of procedures applicable to similar cases to support the life cycle of buildings. As a broader goal of CDP, the research on the ex MT case study aims to activate, in a second phase, a digital workflow to identify the CDW waste in a circular process. Although the research tries to integrate technical aspects with the design ones, the lack of an awareness of the available resources and their status in all the phases of the urban design process is still evident.

5. Discussion and Conclusion: From Toxic Lands to Circular Places

The research study found in the lack of soil awareness a major challenge to integrate the remediation techniques with the spatial design. In fact, although the need for reclaiming the land was clear

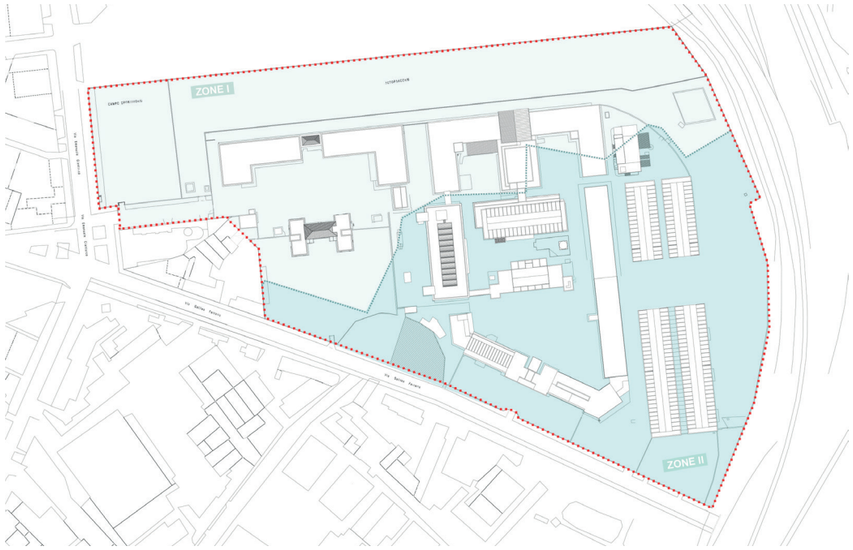

Figure 3: The soil condition of the ex Manifattura Tabacchi area. Zone I (north) soil remediation with protection of the vapors, Zone II (south) soil remediation. *Source: elaboration by Marianna Ascolese.*

Figure 4: Current condition of the ex Manifattura Tabacchi. *Source: photo by the authors.*

to all the involved stakeholders of the ex MT, the chance to rethink the soil as element that could have changed the defined design project (by Cucinella Architects) was not an option. Therefore, the research study served a twofold purpose: on the one hand, it identified the solution to deal with a polluted soil (the capping), and to improve possibly the process with the use of IT technologies; on the other hand, it explored the ex MT bottlenecks to define a research trajectory based on the empirical efforts to apply UM and CE to the design of toxic lands.
The research study identifies some aspects that need to be explored in a collaborative learning environment for raising a collective awareness and defining shared guidelines for an ecological urban regeneration:
1) proposing a multidisciplinary approach to deepen the knowledge of places also through an integration of traditional methods with new technologies (i.e. BIM, GIS implementation, etc.);
2) rethinking the value of waste (and depleted resources) as urban mining to reuse the material and immaterial residuals in the entire redevelopment process with the aim to have an impact in the urban governance;
3) improving the design strategy towards an adaptive process by considering the time as a tool to implement the dynamic nature of urban ecosystems and include the uncertainty of planning.
The MT case study suggests that the application of an efficient circular approach to the city cannot be pursued only through a series of norms and the completion of sectoral obligations. Rather, the circular transition should be part of a new social awareness that evolves by acknowledging local resources as elements to preserve and adapt to new circumstances.
The research activity on the MT case study, although constrained by many technical issues, proposes a new perspective on the soil as suggested by Ingold (2020): «The soil comprises a domain in which the lives and minds of its human and non-human inhabitants are completely knotted together. It is [...] a composite, interwoven with different materials, and its surface, subject to continuous generation, is that of all its surfaces» (p.80). In urban processes, the soil is a key material of the transformation strategies with a central role in improving landscape adaptivity and activating metabolic transformations above and below the ground's surface.

Figure 5: The interior and exterior spaces of the ex industrial buildings. *Source: photo by the authors.*

The paper aims to propose and continue a reflection on the need to rethink the soil as an essential component in the design process of this fragile urban contexts rather than defining a unique solution that can be adopted in similar case studies. The soil conditions have their own specificity depending on different factors that influence the urban transformation and the remediation processes. Considering the specific condition of each territory, the research conducted on the case study of the ex MT highlights that the soil can become an urban element capable of triggering changes – from waste to renewable resource. Moreover, the ability of soil to welcome economic and cultural spaces in a human and natural domain, can be enhanced when its conditions are embedded into the design process, avoiding to jeopardize the institutional and financial effort of regenerating toxic lands.

1. "Reduce, reuse, recycle, and recover", recently evolved in the nine-Rs: refuse, rethink, reduce, reuse, repair, refurbish, remanufacture, repurpose, recycle, and recover.

2. Specifically, ecosystem services can be divided in four categories: resource services (such as food, water, land, energy), supply services (food production, fuel, drinking water, etc.), regulation (climate and disease control, pollination, water purification, etc.) and cultural services (such as ecotourism, art inspiration and scientific discovery). According to (MA, 2005).

3. In the framework of the scientific collaboration agreement between DiARC and CDP: "Studio su processi sostenibili per la razionalizzazione degli impatti ambientali delle demolizioni selettive nel complesso della ex Manifattura Tabacchi di Napoli, volto alla valorizzazione del vuoto negli interventi di rigenerazione urbana", Scientific staff: F. Rispoli, M. Giammetti, with the collaboration of a technical-operational commission composed by M. Losasso, M. Rigillo e F. Rispoli (DiARC) and by E. Gentilucci, A. Cammarata e M. Ciaburri (CDP Immobiliare).

4. We refer in particular to the H2020 REPAiR Project "REsource Management in Peri-urban Areas: Going Beyond Urban Metabolism" (2016-2020, Scientific Coordinator of the UNINA team: M. Russo) and the departmental research "EcoRegen. Circular Economies for the Regeneration of Territories" (2020-2022, Scientific Coordinator: M. Russo).

5. Data taken from the Permanent Safety Project, proceedings ex art. 242 D. Lgs.152/06, 2018 show the presence of non-compliance for metals, PAHs, heavy hydrocarbons.

6. In particular: metals, PAHs, heavy hydrocarbons.

Attributions

All the parts of this paper have been discussed and approved by all the authors.
However, the §§ 1 and 2 are by Marica Castigliano; the §§ 4, 4.1 and 4.2 are by Marianna Ascolese; and the §§ 3 and 5 are by both the authors.

References

Alberti, M. (2008). Advances in Urban Ecology: Integrating Humans and Ecological Processes in Urban Ecosystems.

Baccini, P. (2014). Understanding and Designing the Metabolism of Urban Systems. In D. Ibañez & N. Katsikis (Series Eds.), New Geographies 06: Grounding Metabolism. Cambridge: Harvard Graduate School of Design, Harvard University Press.

Beatley, T., & Manning, K. (1997). The Ecology of Place: Planning for Environment, Economy, and Community (Illustrated edition). Washington, DC: Island Press.

Berger, A. (2006). Drosscape: Wasting Land in Urban America (1st edition). New York: Princeton Architectural Press.

Bianchetti, C., Cogato Lanza, E., Kercuku, A., Sampieri, A., & Voghera, A. (2015). Territories in Crisis: Architecture and Urbanism Facing Changes in Europe. Berlin: Jovis.

Blumlein, P., Kircholtes, H. J., Schweiker, M., Wolf, G., Schug, B., Wieshofer, I., … Jaensch, S. (2012). Soil in the City. Urban Soil Management Strategy. Stuttgart: City of Stuttgart – Department for Environmental Protection, Germany.

Breure, A., De Deyn, G., Dominati, E., Eglin, T., Hedlund, K., Van Orshoven, J., & Posthuma, L. (2012). Ecosystem services: A useful concept for soil policy making! Current Opinion in Environmental Sustainability, 4(5), 578–585.

Breure, A. M., Lijzen, J. P. A., & Maring, L. (2018). Soil and land management in a circular economy. Science of The Total Environment, 624, 1125–1130.

Collins, J. P., Kinzig, A., Grimm, N. B., Fagan, W. F., Hope, D., Wu, J., & Borer, E. T. (2000). A New Urban Ecology: Modeling human communities as integral parts of ecosystems poses special problems for the development and testing of ecological theory. American Scientist, 88(5), 416–425.

de Sola-Morales, I. (1996). Terrain Vague. Quaderns, (212), 36–38.

European Commission. (2006). Thematic Strategy for Soil Protection.

European Commission. (2011). Roadmap to a Resource Efficient Europe.

European Commission. (2015). Closing the Loop—An EU Action Plan for the Circular Economy.

European Commission. (2019). The European Green Deal.

Ferrão, P., & Fernández, J. E. (2013). Sustainable Urban Metabolism. The MIT Press.

Golubiewski, N. (2012). Is There a Metabolism of an Urban Ecosystem? An Ecological Critique. AMBIO, 41(7), 751–764.

Heynen, N., Kaika, M., & Swyngedouw, E. (Eds.). (2006). In the Nature of Cities: Urban Political Ecology and the Politics of Urban Metabolism (1st edition). London; New York: Routledge.

Ingold, T. Siamo linee. Per un'ecologia delle relazioni sociali, Treccani, Roma 202

Keesstra, S. D., Bouma, J., Wallinga, J., Tittonell, P., Smith, P., Cerdà, A., … Fresco, L. O. (2016). The significance of soils and soil science towards realization of the United Nations Sustainable Development Goals. SOIL, 2(2), 111–128.

Kennedy, C., Pincetl, S., & Bunje, P. (2011). The study of urban metabolism and its applications to urban planning and design. Environmental Pollution, 159(8), 1965–1973.

Kennedy, Christopher, Cuddihy, J., & Engel-Yan, J. (2007). The Changing Metabolism of Cities. Journal of Industrial Ecology, 11(2),

Lucci, R., & Russo, M. (Eds.). (2012). Napoli verso oriente. Napoli: Clean.

MA. (2005) ‘Ecosystems and Human Well-Being’. Millenium Ecosystem Assessment Synthesis

McBratney, A., Field, D. J., & Koch, A. (2014). The dimensions of soil security. Geoderma, 213, 203–213.

Minami, K. (2009). Soil and humanity: Culture, civilization, livelihood and health. Soil Science and Plant Nutrition, 55(5), 603–615.

Newman, P. W. G. (1999). Sustainability and cities: Extending the metabolism model. Landscape and Urban Planning, 44(4), 219–226.

Norrman, J., Volchko, Y., Hooimeijer, F., Maring, L., Kain, J.-H., Bardos, P., … Rosén, L. (2016). Integration of the subsurface and the surface sectors for a more holistic approach for sustainable redevelopment of urban brownfields. Science of The Total Environment, 563–564, 879–889.

Petruzzelli, G., Pedron, F., Grifoni, M., Barbafieri, M., Rosellini, I., & Pezzarossa, B. (2016). Soil Remediation Technologies towards Green Remediation Strategies. International Journal of Geological and Environmental Engineering, 10(6), 654–658.

Potting, J., Hekkert, M., Worrell, E., & Hanemaaijer, A. (2017). Circular Economy: Measuring innovation in product chains. PBL Netherlands Environmental Assessment Agency. Retrieved from

Reed, C., & Lister, N.-M. (Eds.). (2014). Projective Ecologies (Har/Chrt edition). ACTAR, Harvard Graduate School of Design.

Römbke, J., Breure, A. M., Mulder, C., & Rutgers, M. (2005). Legislation and ecological quality assessment of soil: Implementation of ecological indication systems in Europe. Ecotoxicology and Environmental Safety, 62(2), 201–210.

Secchi, B. (2011). La nuova questione urbana: Ambiente, mobilità e disuguaglianze sociali. Crios, (1), 83–92.

Steiner, F. R. (2008). The Living Landscape: An Ecological Approach to Landscape Planning (II edition). Island Press.

SuRF Italy. (2014). Sostenibilità nelle Bonifiche in Italia. Retrieved from

Swyngedouw, E. (2006). Metabolic urbanization. The making of cyborg cities. In N. Heynen, M. Kaika, & E. Swyngedouw, In the Nature of Cities: Urban Political Ecology and the Politics of Urban Metabolism. London; New York: Routledge.

UNEP. (2006). Circular Economy: An alternative for economic development. Paris, UNEP DTIE. Retrieved

Williams, J. (2019). Circular cities. Urban Studies, 56(13), 2746–2762.

Williams, J. (2021). Circular Cities: A Revolution in Urban Sustainability. Routledge.

Wolman, A. (1965). The metabolism of cities. Scientific American, 3(213), 179–190.