Journal of Mediterranean Cities

2023, Volume 3, Number 1, pages 119–127

City Sediments in Beirut: An Urban Ecology Perspective

Dr. **Nadine Hindi**
Notre Dame University, Department of Architecture, FAAD, Zouk Mosbeh, Lebanon
Email: nhindi@ndu.edu.lb; nadine.hindi@gmail.com

ABSTRACT

Cities are products of urbanization processes, economic changes, technology and climate change. Adversely, in specific contexts, they are affected by wars' enduring physical effect, long after armed conflicts are over. Hence cities are perceived as dynamic organisms, in continuous change of spatial abandonment, neglect and regeneration process, unfolding a continuum of space and time. In tandem between urban ecology and the urban history specificities, this paper addresses Beirut as a case study in its actual condition, and the different representations of the informal resurgence of green areas. It follows a methodology of identification and mapping of the different urban sediments which constituted over time potential reservoirs for urban ecology. These include previous war demarcation line, train tracks traces, cemeteries, destroyed wheat silos following the 2020 port explosion and other liminal spaces. This approach brings in a new perspective for approaching urban ecology differently according to the urban contexts historiography.

JOURNAL OF MEDITERRANEAN CITIES (2023), 3(1), 119-127
https://doi.org/10.38027/mediterranean-cities_vol3no1_8

www.mediterranean-cities.com

ARTICLEINFO:

Article History

Received: June 22 2023

Revised: September 12 2023

Accepted: September 30 2023

Available online: Oct. 08 2023

Keywords:

Urban Ecology; Beirut; Urban Sediments; Dynamic Organism

1. Introduction

The prevailing notion on urbanization has long been, that as cities grow, nature shrinks. While more than half of the world's population lives in cities, a ratio expected to reach 68% by 2050 (UN, 2018), cities represent the direct threat to nature. Lately urbanists are concerned with the increasing consumption of energy with gas emissions reaching 75% of global CO2 emissions (UNEP). Therefore, beyond representing the antipode of nature, cities, as a scientific fact, became mainly responsible of climate change. With these facts in mind, the discourse is shifting away from the nature-city perspective to further exploring underpinning notions and principles between ecology and city. Over a decade ago, Mostafavi and Doherty (2010) first coined the term '*ecological urbanism*', tapping into ecological matters in urban contexts. Linking the urban discipline with the science of ecology became an increasingly important discourse across various disciplines. While some discourses address the fluid expansion and flows of natural ecosystems and the urban patterns changes over time (Beck, 2013; Forman, 2014), many discourses focus on the development between human and natural ecosystem processes in urban contexts (Corner, 2006; Danilo and Steiner, 2011). Setting principles and guidelines for the link between

Corresponding Author:
Dr. Nadine Hindi
Notre Dame University, Department of Architecture, FAAD, Zouk Mosbeh, Lebanon
Email: nhindi@ndu.edu.lb

How to cite this article:
Hindi, N.(2023). City Sediments in Beirut: An Urban Ecology Perspective. Journal of Mediterranean Cities, 3(1), 119-127.
https://doi.org/10.38027/mediterranean-cities_vol3no1_8

urban ecology and the built environment became an important objective in many works (Niemelä et al. 2011; Pickett and Cadenasso, 2017). Forman (2008) first published in his book a roster of urban ecology principles linking the science of ecology to the spatial constituents of the city. This link was further elaborated into a more extensive list of principles in his subsequent book (2014). The latter were further synthesized to other authors' scholarly work in the same field and consolidated into a fully comprehensive list of 90 principles in Forman (2016). These principles were inspiring for this article and as further described in the methodology section, will serve as a benchmark for the findings. Concurrently, rather than studying the shrinking or growing boundaries between the urban environment and the natural ecosystem as antagonistic systems, *Ecological urbanism* (Mostafavi and Doherty, 2010) is a mind-opener concept for delving into the city resources and the opportunities they could bring forth to an ecologically balanced urban life. A major role of *Ecological urbanism* is to explore the relationship between the spatio-temporal patterns of urbanization and the ecosystems processes. This forms a point of departure for this present article, by stretching the limits into the different systems in the city that are formed over time.

Cities are perceived as dynamic organisms, in continuous change and regeneration process, unfolding a continuum of space and time. Following the industrial revolution, they were mainly shaped by factors such as population growth and infrastructural development. The factors affecting cities' metabolism and transformation changed over time. Contemporary cities and metropolises are products of processes and changes, including economy, technology and climate change. Though cities share common factors affecting their urban fabric, similar to the industrial revolution, other circumstances have deep impacts such as the man-made and natural disasters. The resulting unused and under-managed areas, become obsolete urban spaces subject to the informal recovery of nature over the course of its time. This article refers to them as urban sediments and addresses their potential from an urban ecology perspective. It also considers the formation of these urban sediments as intrinsically related to the historic trajectory of each urban context. The objective of this article is to highlight the urban spaces subject to abandonment and neglect in Beirut. It considers them as urban sediments, where nature resurged informally over time, and addresses them as potential spaces from the perspective of urban ecology. In tandem between urban ecology and the urban history specificities, this approach brings in a new perspective for approaching urban ecology in relation to the urban contexts historiography.

2. Methodology

While climate change and natural disasters constitute global and common threats to nowadays cities, man-made disasters affect cities otherwise. In contexts of conflicts and urban violence, armed hostilities affect the urban fabric in different forms. Cities which underwent an armed conflict, go through a different metabolism during the wartime years, and in some cases long after the conflicts are over and the peace established. Beirut is no exception to cities which went through a conflict situation. In addition to the post traumatic sequels of the war time, other abandoned and under-used spaces constitute sediments accrued different periods of the city history. Deterioration and neglect are not the only factors marking spatially these areas over time. In that context, the natural recovery phenomenon represents opportunities rather than threats. Reconciling ecology with urbanism in Beirut, a city with different historic sediments, requires a particular perspective, acknowledging that the presence of an informal type of ecology can form the basis for a symbiotic relation with the built environment. Departing from the body of literature on ecology and the built environment in the introduction, as a framework, this article aims at approaching urban sediments from an urban ecology perspective. It follows a methodology of identification and mapping of the different urban sediments spaces which constituted over time potential reservoirs for urban ecology. A comprehensive combination of a map, some photographs and a historic narrative constitutes the basis of the work.

Two urban sediments form the basis of this article, namely the previous war demarcation line and the train tracks traces. They are identified and represented on the map of Beirut in the case study, based on a first-hand knowledge of Beirut's urban context and its urban history. The identification of both spaces is done in a representational scale on the map. The methodology extends beyond these two urban sediments to include cemeteries, destroyed wheat silos following the 2020 port explosion and other liminal spaces, as potential ecological reservoirs. This approach brings in a new perspective for approaching urban ecology differently according to the urban contexts history. The methodology further identifies and summarizes the different urban receptacles which constituted the tools for the informal return of nature to the different mapped urban areas. Following this identification and mapping, the receptacles are enumerated and described inductively. They are further benchmarked with the broader principles of urban ecology set forth by Forman in 2014, in the form of brief guidelines aiming at improving the existing balance between the built environment and the growing ecosystems. Moreover, the paper concludes with the identification of urban attributes specific to the case study context.

3. Case study: Beirut

3.1. Urban sediments over time

As cities grow and decline over their course of history, they expand horizontally and vertically under different forms. The growth of cities determines the complexity of their systems. The more complex a city becomes, the higher the need to supply its different systems gets (Tainter, 2011, p. 86). The need for sustaining the city and its population implies an increasing supply chain under different forms, not limited to food, energy, materials and products. In common discourse, cities increasingly established physical connections beyond their boundaries to constantly sustain their systems. Starting the 19th century, links and urban growth became increasingly visible on the urban landscape with the significant development of infrastructure and train tracks. In other terms, a substantial part of the infrastructure is becoming irreversible, as their traces often remain on the urban landscape for years following the end of each period. Beirut was no exception to such urban changes. However, the industrial revolution is not the only era that significantly marked its territory. Over the course of the twentieth century, it underwent a distinct form of urban mutation following a fifteen years' civil war (1975-1989) which divided it into two parts, East and West. Similar to other cities affected by the industrial revolution and acts of war, both the post-industrial infrastructural remains and the traces of war, were further subjected to abandonment and under management over time. Time itself implies an evolutionary process that is intrinsic to the city, manifested in the form of informal greenery wildly growing and spreading in the abandoned and unused areas. In tandem between time and neglect, the city becomes a reservoir and a receptacle for the action of diverse ecological factors. The railway network and the demarcation line, both of a linear morphology, constitute two distinct urban moments, reminiscent respectively from the 19th and the 20th centuries. Their abandoned condition turns them into urban sediments subject to the potential expansion of ecological factors. This case study is centered on these spaces in their potential of acting as reservoirs for urban ecology, however it also enumerates the different categories of existing green areas (Figure 1).

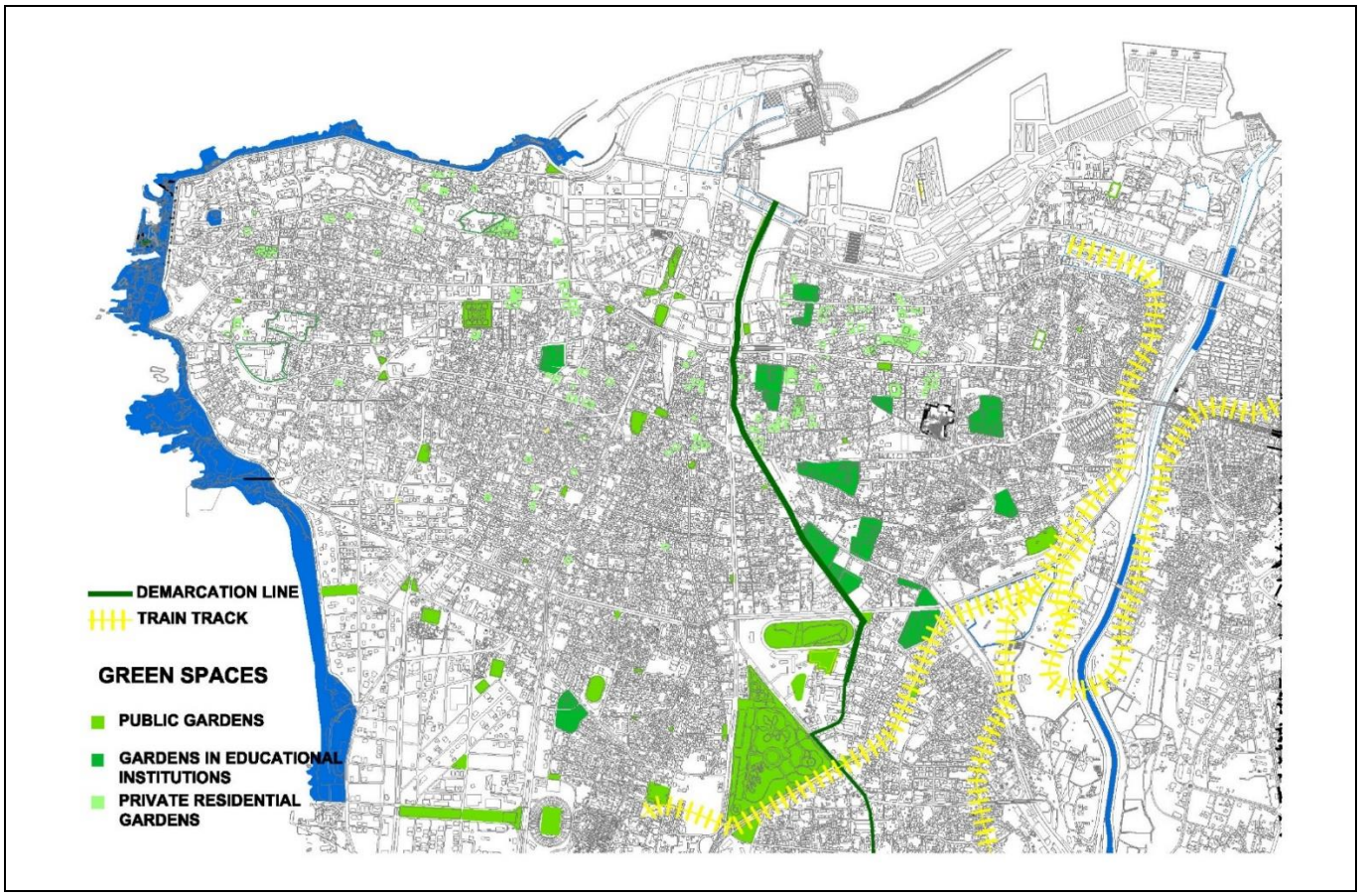

Figure 1. Map of Beirut showing the demarcation line, the train track and the different green spaces – (Developed by Author).

3.2. Potential ecological reservoirs

These two linear urban strips, related to two different urban moments, constitute the backbone for this case study in Beirut. The following sub-chapter will unfold a spatio-temporal narrative for the natural and formation of green areas along each one of them. The gradual and informal growth of nature ultimately led to their consequent transformation into natural reservoirs for urban ecology. The elaborate train network constitutes in Lebanon one of the main legacies of the industrial area and the late Ottoman period. During the 19th century, the expansion of the railway system deeply marked Beirut's territory, connecting it to Damascus and to other cities of the Ottoman territories[1]. With the announcement of Greater Lebanon in 1921, the Lebanese Railway network was reorganized in 1960 by CEL, (*Chemin de fer de l'État Libanais)* and lies on public domain. The train remained operational within the state borders until the early years of the civil war when most of the railway tracks were subject to the vandalism of the armed forces and militiamen. They remained under-maintained and neglected ever since they stopped operating. In the absence of a constant maintenance from the municipality, their status as public domains and state-owned land plots accentuated their neglected condition. Nature recovered slowly but surely, as shrubs and green patches grew all along the train track traces and

[1] Inaugurated in 1895, the railway linking Beirut to Damascus formed part of a larger train network implemented during the late Ottoman period to connect the Empire territory. This inauguration placed it along Al-Hijaz railroad network, the larger Muslim pilgrimage.

within every building along its path, which was abandoned and deserted by its original occupants. The increasing neglect to these trails, over the past decade and a half, accelerated the process of natural ecological recovery (*Figure 2*). Consequently, the potential of this urban slice could be seen in its actual neglected condition. The informal and contagious spread of urban ecology, brings in a natural balance between urban spread and the absence of it. The informal growth of nature on this public domain, rather represents a real opportunity out of this actual urban threat for transforming it into a green corridor. Observed from that angle, the detrimental effect of time in abandoned areas, acts as a metabolic agent for a natural recovery and the basis for providing linear public space in the city.

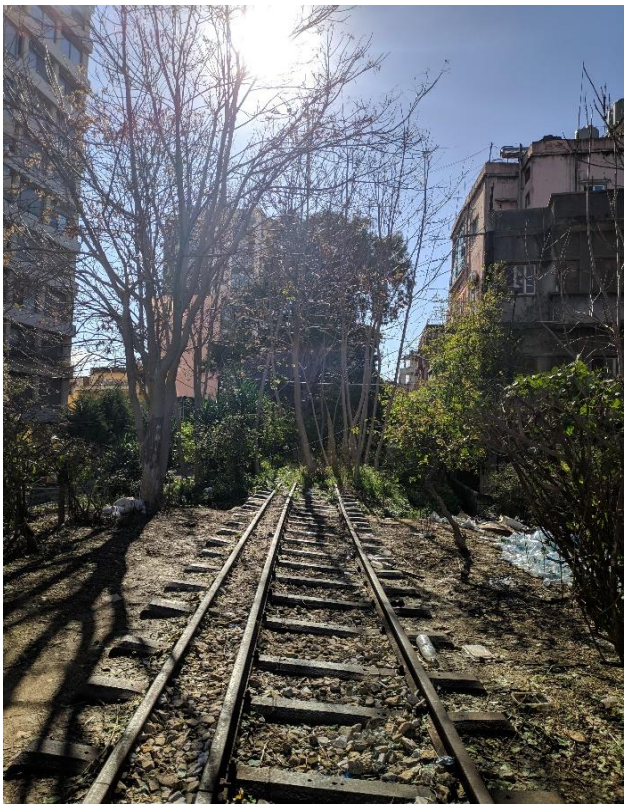

Figure 2. Nature resurgence on train track remains in Beirut – Photo Credit: Students ARP 556 - March 2019.

Figure 3. Nature recovers a war-damaged building along the demarcation line – Photo Credit: by Author – Jan. 2020.

Viewed from that same perspective, the demarcation line, commonly known in Arabic as *Khatt al-Tamass*[2], which divided Beirut into East and West fractions, constitutes another potential receptacle for an urban green corridor. The demarcation line was not a wall, but rather a space with no physical boundaries which persisted as fighting grounds, during the civil war. While it caused the displacement and almost desertion of the first row of buildings of both sides, nature resurged over time, and accordingly was referred to as *Green Line* in some academic literature. In the absence of residents living in the buildings or passing in the streets, nature was emerging in the midst of empty streets and within the nearly demolished and destroyed buildings. Time during war acted like an accelerator to the natural processes, just *'like cancer makes cell-formation visible'* (Moystad, 1988, p. 421). All along it,

[2]Khatt at-tamas which literally means: 'contact line' is the Arabic term for the front line, confrontation or demarcation line.

empty plots of land and abandoned buildings as war remnants constituted the receptacles for wild greenery to grow during the years of civil fighting and for decades after the conflict is over (*Figure 3*). Even though the demarcation line, was dissolved by the end of the war, some green patches remaining in empty plots lands, took over the war-shelled buildings.

In addition to the potential urban reservoirs, the train tracks and the demarcation line, other forms of greenery and ecological receptacles are identified in the city as follow. The identified green spaces consist of public gardens and parks, private ones, and the green spaces within the educational institutions. Several cemeteries along the demarcation line, contain a significant green area. The location of several cemeteries, dating back–to the 19th century, along the demarcation line[3] further fostered the spread of the green ecological system during the wartime. Last and not least, the grain silos of the port, which were partially demolished during the August 2020 port explosion, could be considered from this same lens, as potential urban containers for the spread of urban ecology. The remaining standing silos still containing grains, ironically blossomed and flowered in the seasons subsequent to the tragic port explosion.

4. Discussion of results

As its name suggest, urban ecology consists of this symbiosis between *ecology* and the *urban environment*. This symbiosis informally created between nature and the urban sediments, forms the basis for an inter-disciplinary study of urban ecology based on the existing urban elements. In their book on ecological urbanism, Mostafavi and Doherty highlighted an approach for an urban ecological balance based on the existing urban resources, in the form of traces and remnants from previous eras. Their reference to '*an urban recycling of the remnants of the industrial city*' (Mostafavi and Doherty, 2010, p. 28) brings the attention of urban designers to consider urban traces remaining from the last century, as potential reservoirs and receptacles for the urban ecology flow. Inspired from this perspective of urban sediments' recycling and far from the mainstream principles of urban ecology, the objective of the studied cases in Beirut is to highlight the tools which acted as receptacles for a natural ecological formation. The urban receptacles are identified into the following six points:

1- War-damaged buildings: the remaining war-damaged buildings along the demarcation line were subject to a gradual natural recovery. While the majority of the war damaged buildings were either restored or demolished in favour of newer construction, nature found its way into the remaining ones. Abandonment coupled with a lack of maintenance gave ground to the green foliage growth. Holes resulting from war shells, and factors of neglect like broken glasses and doors allowed nature to infiltrate inside them (*Figure 4*). This can fit under principle 78 (Forman, 2016, p. 1659), in relation to biodiversity in informal spaces.

2- Unused train tracks: laying on public domain, construction is prohibited on the train tracks plots, including a setback limit for construction on both sides[4] (*Figure 5*). This was a key factor for the return of nature along it. Furthermore, the neglect of the authorities in maintaining the tracks, rather constituted an opportunity for an ecological growth. In line with principle 72 (Forman, 2016, p. 1659), this train railway represents an opportunity for a continuous *vegetated corridor*.

3- Private gardens: their presence in adjacency to the demarcation line and the train track domain, facilitated pollination between the different florae species. Pollination introduce a variety of plants and flowers to the privately inhabited properties. This aligns with both the

[3]Beirut intramuros city had its cemeteries outside the walls. Located accidentally along the war demarcation line, those cemeteries once existed outside the city walls boundaries. The demarcation line is partially along Damascus Road, a major road which connected intramuros Beirut to Damascus, since the 19th century.

[4]As per Decree Law No. 148, dated 16/9/1993, the setback from the train track lot property (Chemins de Fers Libanais) is a minimum of 2 meters from the lot limit, from each side, unless another law determines a higher setback.

principle 16 under the *Plants and vegetation* category and principles 68 and 69 of the urban *Greenspaces* category (Forman, 2016, p. 1657).

4- Vacant plots: dispersed vacant plots and unbuilt stretches of land constitute receptacles for plants and vegetation seeds. Regardless of their size, their condition and the connection between them, these disconnected patches of land allow the natural and informal growth of shrubs and vegetation without maintenance all year round. This point aligns with Forman's principles 68 and 74.
5- Existing green patches: of different forms and categories, the identified urban green patches could be categorized as private and public plots. Different green patches were mapped in form of public garden/park (mainly Horsh Beirut and the Sanayeh Garden), and the adjacent several cemeteries pertaining to different religions and sects located along the demarcation line. On the other hand the green spaces within the educational institutions and the planted ground floors of the heritage buildings constitute the main components of green areas in private plots (Forman principles 67, 68).
6- Vacant grain depositories: inspired from principle 90 (Forman, 2016, p. 1660) with the following description, *Major natural and human-caused disturbances are often ecological and human disasters, due to intensive development plus limited resistance and resilience of a large dense population,* the port silos which were partially destroyed during the 2020 port explosion are currently being reclaimed as a heritage place all the whilst they still contain the wheat grains.

Figure 4. War-damaged building on Beirut's previous demarcation line – Photo Credit: Author N. Hindi – Jan. 2023.

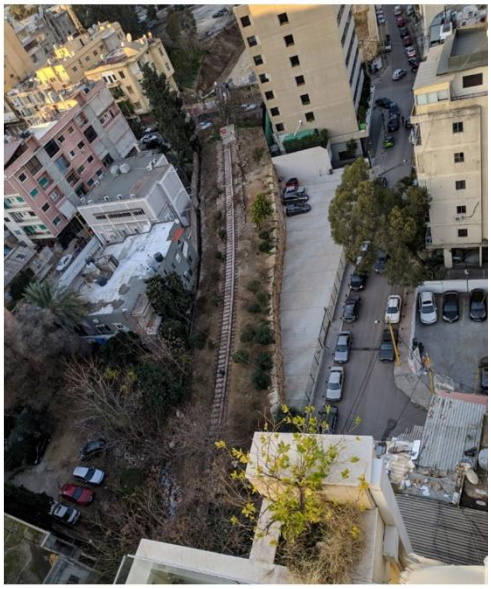

Figure 5. Train track remains in Beirut – Photo Credit: Students ARP 556- March 2019

As different city sediments represented opportunities for urban ecology to find its way without previous planning, three urban attributes can be identified as result of this work:

1- Identify the existing ecology that grew informally and without maintenance. This represents an opportunity for learning lessons and categorizing the flora type which grows with the least maintenance in the city's coastal Mediterranean weather. The wind direction, seasonal growth are factors that further give indications on the naturally growing ecosystems in densely populated urban areas.

2- Both the war demarcation line and the train tracks represent linear forms as a case study with all the potential they represent to become green corridors and linear urban public spaces.
3- The presence of some identified spaces, like the train tracks, on public domains is an asset at the scale of the city. This represents an opportunity for the planning and a step forward in the implementation process.

5. Conclusion

The article identifies the traces in the city from different periods as *urban sediments* and considers them dynamic layers which were subject to the informal interaction of the ecological systems over time. Slowly but surely, nature recovers its original territory, and time constitutes a key factor in this process. The urban sediments highlighted in this article date back to the late nineteenth century and the recent urban history, including the traces of the industrial age, the civil war traces and recipients of the urban violence, i.e. the port explosion. Those latter spaces represent the most neglected part of the city. Following the methodology of mapping and identification of the urban sediments, it was important to understand, identify and categorize the urban receptacles which acted as tools for the nature recovery and the ecological system flows in a dense inhabited environment. The urban attributes highlighted in the discussion of the results, provide a conclusion on the qualities inductively observed in the case studies. As a result of the case studies mapping, the descriptive enumeration of urban receptacles and attributes aims at learning lessons for future planning to accelerate and organize the urban ecology flow and balance. The planning of urban ecology has the possibility achieve a certain level of territorial cohesion in traumatized and under-managed contexts by creating green linear corridors and public spaces across the city and along post-war areas. Though not in the scope of this article, this last point opens the brackets to unravel the potential of highlighting urban ecology in co-relation with the urban history specificities.

Acknowledgements
This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

Conflict of interests
The authors declare no conflict of interest.

REFERENCES

Beck, T. (2013). *Design, Principles of Ecological Landscape.* Island Press.
Corner, J. (2006). Corner, James Terra Fluxus. In C. Waldheim, *Landscape Urbanism Reader* (pp. 21-33). Princeton Architectural Press.
Forman, R. (2008). *Urban Regions: Ecology and Planning Beyond the City.* Cambridge University Press.
Forman, R. (2014). *Urban Ecology: Science of Cities.* Cambridge University Press.
Forman, R. (2016). Urban ecology principles: are urban ecology and natural area ecology really different? *Landscape Ecology, 31*(8), 1653-1662. https://doi.org/10.1007/s10980-016-0424-4
Hindi, N. (2020). The Last Train Traces in Beirut: Towards an Ecological Urbanism Perspective. In S. Kamel, & al. (Eds.), *Architecture and Urbanism: A Smart Outlook* (pp. 357-367). Springer, Cham. https://doi:10.1007/978-3-030-52584-2_25
Mostafavi, M., & Dohorty, G. (Eds.). (2010). *Ecological Urbanism.* Zürich Lars Müller Publishers.
Möystad, O. (1998, December). Morphogenesis of the Beirut Green-Line : Theoretical Approaches Between Architecture and Geography (note). *Cahiers de géographie du Québec, 42*(117), 421-435.
Niemelä, J., & al. (Eds.). (2011). *Urban Ecology: Patterns, Processes, and Applications.* Oxford University Press, Incorporated.

Palazzo, D., & Steiner, F. (2011). *Urban Ecological Design: A Process for Regenerative Places.* Island Press.

Pickett , S., & Cadenasso , M. (2017). How many principles of urban ecology are there? *Landscape Ecol, 32*, 699–705. https://doi:10.1007/s10980-017-0492-0

Tainter, J. (2019). Scale and Metabolism in Ancient Cities. In M. Hall, & S. Balogh (Eds.), *Understanding Urban Ecology: An Interdisciplinary Systems Approach* (pp. 85-100). Switzerland: Springer Nature. Retrieved from https://doi.org/10.1007/978-3-030-11259-2

UN. (2018). Retrieved from https://www.un.org/development/desa/en/news/population/2018-revision-of-world-urbanization-prospects.html

UNEP. (n.d.). Retrieved from https://www.unep.org/explore-topics/resource-efficiency/what-we-do/cities/cities-and-climate-change