

CHANGING CITIES

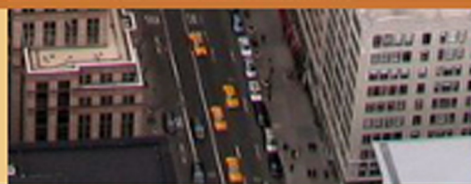


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Landscape and sustainable design in urban open spaces

A.M. Ippolito

“Sapienza” University of Rome – (DiAP) Department of Architecture and Design
(www.diap.uniroma1.it), Tel. (+39) 06 4991 9286 – segr. (+39) 06 4991 9284

Corresponding author: E-mail: achille.ippolito@uniroma1.it, Tel. mob. (+39) 3356792654

Abstract

The first moment of reflection and debate needs to clarify on the meaning of the terms through which it is possible to identify the research fields and their interrelations: landscape, environment and sustainability. Dealing with the first of them, the definition was clearly illustrated within the *European Landscape Convention*, despite the different meanings related to the linguistic differences. In many languages, instead, the origins of the term *Environment* evokes the idea of circularity. The environment itself represents, indeed, what an organism is surrounded and dealing with. The concept of sustainability is specifically linked with the skills of the ecology science, and expresses the main characteristic of an ecosystem: keeping alive the biodiversity and all of its ecological processes. Practically, it is possible to define a process as a sustainable one if it is able to exploit the natural resources, which are eventually naturally renewed. As a consequence, the community must control the consumption of the resources within the sustainable development. The relationship landscape environment is narrowly intertwined and interrelated. Concerning the architectural design, it can be argued that in the latest years the ecological principles for the sustainable development got familiar with the green building asset. The main goal, for both the design and the construction process, dealt with the energetic containment in particular, and more generally with the limitation on the environmental impacts. Even if, it is necessary to be aware that this is no longer possible nowadays. It's essential redirect towards wider and detailed cultural and scientific fields; moreover it is not even longer possible to conceive working only on the building itself. It could be necessary moving from the building to the whole city perspective, gathering the entire urban landscape. It's the right time. The *city* is going through a period of both crisis and evolution, sometimes involving severe, random and sudden transformation and variations. Actual transformations are enabling changes into functional assets and roles and pointing out new programmed and not connection nets. It is within this specific context, a very analytical and intentional one, that the public space gains a strategic key role for the urban planning, management and redevelopment. Independently from the functional aspects the public space, with all the different community places, gains fundamental position because of the place where they are located, the use of them, and because of the important contribute they share with the social and economical relationships. Day by day they are turning into reference points of the urban landscape. The themes connected to the sustainability, mostly related to the environmental issues, are actually present on the urban landscape and trying to recover lost elements and to provide new sources of innovation. Among the main factors, some of which need a deepened lecture and tests as well, on the front page stands the relationship between architecture and nature, taking charge of the role of the vegetation and the water above all. Considering this profile, trials on buildings have already provided a contribution to the tests on the effects they have on the environment. It can be useful to remind even in this case the necessary walk from the building to the city, but considering eventually a parallel approach: studies and researches on buildings and urban interventions. Coming to the open urban public spaces the procedures are now even more and more different. Every kind of intervention needs to be compared and integrated within the ecological system to be finally called “sustainable” and to reach the aim of contributing and collaborating for the completion and the whole working of the environmental system.

Keywords: Landscape; Environment; sustainable design; urban open spaces.

1. INTRODUCTION

The premise is first of all in the nomenclature that fixes the circles of search: landscape and sustainability, but first of all landscape and environment.

As it regards the definition of landscape, by now, since over one decade the point of reference for whatever definition springs from the European Landscape Convention.

As urban landscape we intend the whole city territory:

- historical,
- consolidated,
- periurban

and everything else definable and discoverable: the architecture, the full and the voids ones, the whole context.

The architecture, in the humanity history, at times in symbiosis, sometimes also in opposition, with the natural elements it has constituted landscapes to be represented, remembered, symbolized.

Many urban realities are represented by their more representative architecture. The concept of urban identity renders in a complex circle, with different meanings and finality, inserting to its base the concept of perception, also brought by the European Convention.

Kevin Lynch has written: "At every instant, there is more than the eye can see, more than the ear can hear, a setting or a view waiting to be explored. Nothing is experienced by itself, but always in relation to its surroundings, the sequences of events leading up to it, the memory of past experiences." [1]

The historian Antonello Folco Biagini has written that: "The landscape is an integral part of the history of a country and a population because its image describes the fundamental characters both as it regards the physical-geographical aspect that as it regards the economic-productive level and the social component." [2]

2. EUROPEAN LANDSCAPE CONVENTION AND PERCEZIONE

Coming back to the European Convention, we must bring the other fundamental concept that has been introduced: the perception one, that directly connects the man to the landscape.

A man considered as single, as a member of a collectivity, protagonist of the urban landscape, of whatever natural or anthropologic landscape.

The definition inserted in the article 1

"Landscape means an area, as perceived by people, whose character is the result of the action and interaction of natural and/or human factors" [3] clearly introduces the concept of perception.

2.1 The Perception

The perception is not circumscribed to the images, but it is actually the whole of all the perceivable data to appraise the individual and collective quality comparing the perception of the comfort in base to the individual and collective expectations. The landscape therefore it is a priority factor for the comfort and the quality, surely reporting itself to the physical aspects, but also cultural ones.

To clarify the amplification of the concept of ample, articulated and complex perception is necessary to recall the Gestaltpsychologie, [4]

inside which also reenters the visual perception, suitable as first moment of the Landscape reading.

The visual perception theory that imagines itself as the result of a process of unconscious inference, with structural descriptions of the external world, has been developed by Irvin Rock, adjunct professor of psychology to the University of California, Berkeley, until his death in 1995.

"The environmental image is the result of a two-way process between observers and his environment.

The environment suggests distinctions and relationships, the observer, with great adaptability and specify intentions selects, organizes and attributes meanings to what he sees. The so developed image still, limits and accents what is seen, while it is tried in comparison to the perception." [5]

2.2 The Gestalt Principles

Inside of a same 'scene', the near elements are perceived as unique; the elements among them are similar for form, color and dimension are perceived as connected. Lines and family forms are perceived as dams and complete, even if not graphically.

The usually brought example is a not complete image, perceived as if it were.

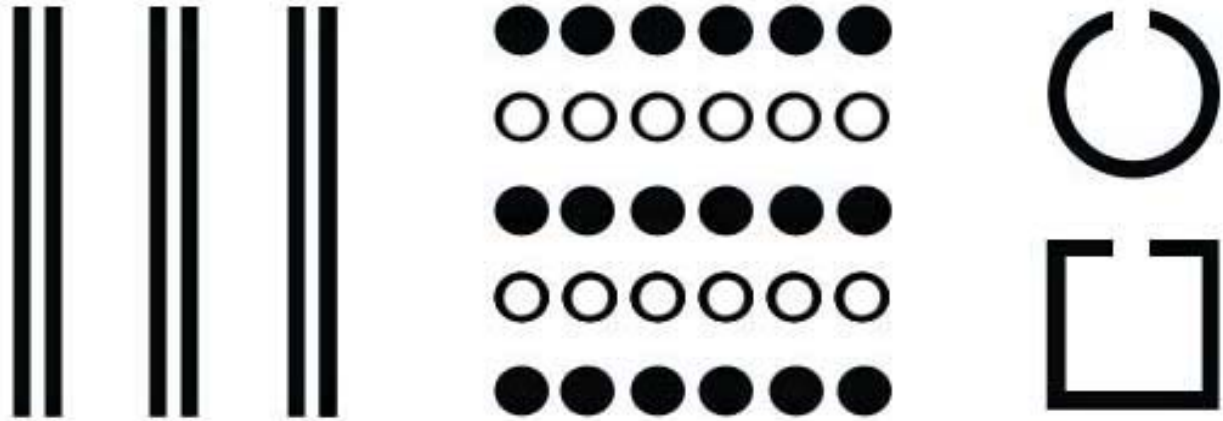


Figure 1. exemplified graphs scenes within the Gestalt principles: proximity, simile, closing

2.2 The runs system

In the landscape, the perceiver, is usually not immovable, but it stirs in the territory. The runs system, therefore has a fundamental role, through the different runs of circulation the different perceptive possibilities spring.

It takes to underline three possible differences of perception: limited and rapids from a speed vehicle, with a sequence of serial images; from a slow vehicle as a bicycle, with an ample and complete perception, that can also stop, to look and to observe. We remember that in Rotterdam, in the fifties of last century, Van den Broek and Bakema planned the first pedestrian island: The Lijnbaan.



Figure 2. the Lijnbaan today

Premising that the perception in urban circle is three-dimensional, the citizen always identifies a spatial circle in relationship to just left one and therefore subsequently in relationship with what is about to go.

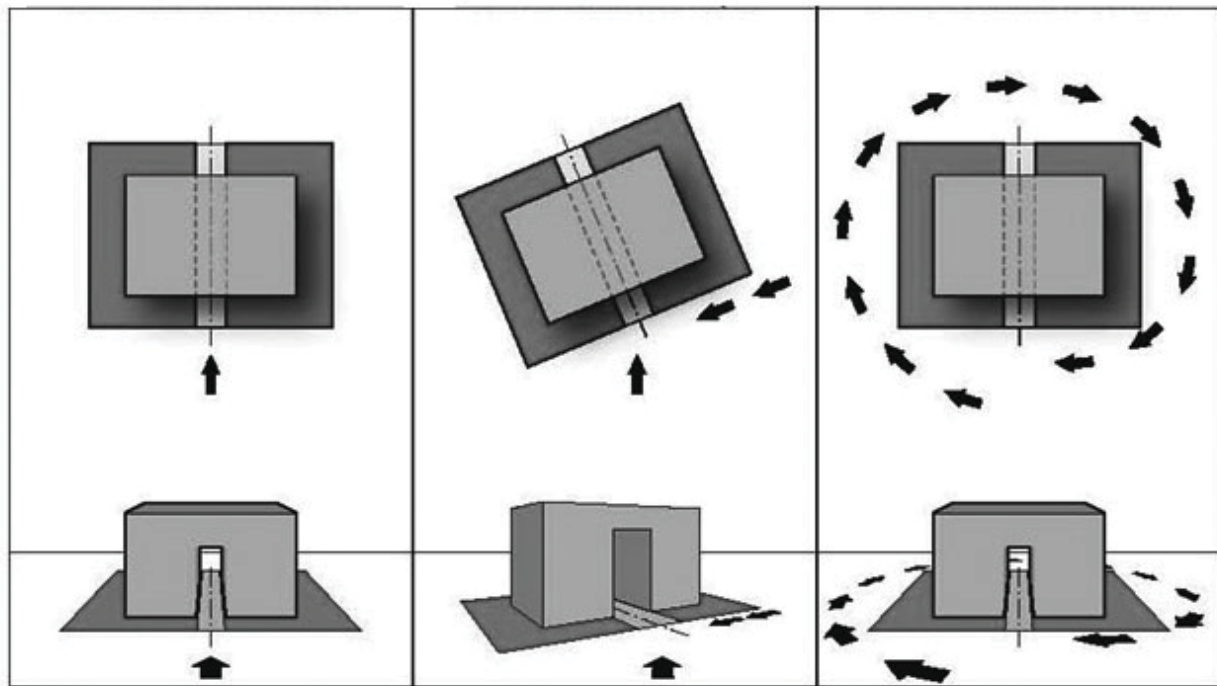


Table 1. building formality approach, with the consequent different perception: frontal, oblique, spiral [6]

3. DEFINITIONS

Before the Convention furnished definitions and explanations, the terms landscape and environment, were interchangeable.

In this optics the relationship landscape environment is tightly connected. Kevin Lynch, surely in a different scientific context, spoke of "environmental images" explaining that "are the result of a two-way process between the observer and his environment. The environment suggests distinctions and relations, and the observer—with great adaptability and in the light of his own purposes—selects, organizes, and endows with meaning what he sees."

Bernardo Rossi Doria has written in 1978: "many people think that landscape is synonymous with aestheticism and evasion and this is the reason that this word is often replaced by <environment> , which is able to remark the concept of globally problem that relocates the analyzes and the insights in a coordinated context , whether we speak of urban areas, or natural areas." [7]

Definitely, especially when we speak about perception, about well-being and quality of landscape and environment there are relationships and connections, but the thematic, scientific and cultural difference is quite obvious.

By the FAI Italian Environment Fund introduction document: "In ecology environment is defined as the set of external factors that affect an organism 's life. The term is also understood as the complex of natural elements and resources that surround a particular organism and, in particular, humans." [8]

The concept of sustainability is within the responsibility specific ecology, denoting the ability of an ecosystem to remain in possession of all ecological processes, purposes, productivity and especially biodiversity.

In practice an ecological process is defined sustainable if it uses the natural resources that are naturally regenerated.

It follows that the community must control the consumption of resources within a sustainable development.

In this framework falls within the architecture, it becomes sustainable when it helps to control the consumption of resources.

In the recent decades, about architecture, the ecological principles for the sustainable development essentially concern the green building, including design and work construction that limit environmental impacts.

The green building, regarding all building types, bases its operation method on the belief that it is necessary to limit the use of energy transformations.

Even the use of renewable resources should be monitored, to avoid their regeneration rate exceeding, while the use of non-renewable resources should be gradually reduced to be suspended and substituted from renewable resources.

4. FROM THE BUILDING TO THE CITY

This science and culture approach, is now no longer possible. We need to move from the building to the city.

It is the right time, because the city is undergoing transformations and radical changes, sudden and often unexpected. They are changing structures and functional roles, creating new connection networks.

It is the time of a no territorial expansion, but of internal transformations. This involves a fundamental change in the internal relationships: between suburbs and central areas, including different fields.

Some parts become nodal, other collapse and need revitalization, redevelopment and reuse.

Putting together these assumptions we further understand how the public spaces take a strategic role of attention and planning transformation, regardless of functional aspects.

The public space, all the new places of urban public, are urban strategic spaces for placement and use, also because they are often the main nodes of the social and economic relationships.

Even in the absence of special symbols, take on a symbolic role.

They become, especially at a time of transformation, the pins of a sustainable planning, expanding the concept beyond the green building.

The assumption is that a new alliance between architecture and nature has to wonder about the future of the city and how to implement a planning program able to generate a systematic set of consistent and sustainable contribution to the city regeneration.

One of the main factors becomes the relationship between architecture and nature, with the role of vegetation and water, in particular.

It deals about works connected to the urban forestry and the ability to insert in a systematic form and therefore to expand the presence of agriculture in the city.

The goal is a substantial demineralization of the urban landscape.

For the first it should be noted that the positive effects are transmitted to the urban environment, improving the microclimate.

"Vertical Gardens: a new challenge for Patrick Blanc. The concept of Vertical Garden: a trend, a fashion or a need for a new sustainable architecture." [9]

The vegetation on the buildings fronts or roofs contributes to the CO₂ absorption, limiting the formation of smog and of urban heat islands, while also reducing radiation received along the roads.

4.1 Positive effects on the environment

The presence of vegetation on the buildings facades improves the microclimate limiting the formation of urban heat islands; contributes to the CO₂ absorption and improves the amount of light perceived along the roads.

The energy savings also leads to lower pollution released into the atmosphere. The use of parietal vegetation can also compensate any lack of urban vegetation.

The main positive effects are: improvement of the building thermal behavior - soundproofing and air purification.

In the winter the screen plant is a barrier to the wind and keeps heat inside. The foliage, finally, is an excellent acoustic insulation and purifies the air both through photosynthesis, CO₂ absorption, and limiting the formation of photochemical smog.

"The energy savings produced by the trees in the urban and periurban environment is a factor that has a higher incidence in the CO₂ breaking, compared to the direct effects of the tree vegetation, as the absorption and the carbon storage". [10]

| | Dollar savings for each tree \$/t | kWh/t spared for each tree | Kg C/t reduction |
|--------------------|---|-------------------------------|---------------------|
| Energy savings | 9 | 92 | 15 |
| Shading | 6 | 60 | 10 |
| Evapotranspiration | 3,2 | 32 | 5 |
| Carbon removal | 0,1 (n/t) | (n/t) | 4,5 |

Table 2. single tree impact on the reducing use of air conditioners and CO₂ atmospheric referring to the carbon removal (by Rosenfeld et al., 1998)

Gas exchanges among Atmosphere - City - Urban Forest: the pollutants produced in the urban environment and the CO₂ located in the atmosphere can be absorbed by the Urban Forest, that could enter VOCs able to interact with the pollutants by increasing the concentration of pollutants themselves.

Coming back to the urban public open spaces, the operations are many and varied.

It is necessary to plan and implement appropriate and functional spaces, maintaining active the relationship with the natural elements.

To be sustainable must be confronted and integrated with the ecological network in order to contribute and collaborate on the completion and operation of the environmental system.

It could be useful to set an example, typical and characteristic, even if not recently, of a city exactly realized on the urban sustainability principles.



Figure 3. Mendoza, Argentina - Independence square

The city of Mendoza, in Argentina, was re-founded, after a violent earthquake, in an arid region, being very careful to environmental requirements favoring the natural elements in the urban planning. Water and vegetation characterize the open spaces and the entire urban layout. It is a unique experience, made to be taken as a reference. There are numerous city parks, realized at the foundation time and recently. The city is designed just like the derivation of a large urban park: the Parque San Martín, designed by Carlos Thays. It is characterized by a vegetation contingent system with particular irrigation channels.



Figura 4 Stockholm, district of Hammarby Sjöstad, Lugnets allé

Another one urban example, but in this case, current and contemporary is the neighborhood model Hammarby Sjöstad in Stockholm, designed just as a sustainable city.

The building doesn't break the connection with the existing environmental systems, from the lake to the inland forests, emphasizing the continuity.

In the setting conceptual operation there is a wide and complete attention about the entire environmental system of the area.

It has also been expected, at the same time for the remediation of contaminated areas from industrial activities and for the purification of the lake water with natural systems, the recovery of wetlands as habitat for native flora and fauna.

Sweden is, definitely, in this area an important point of reference.

Studies and achievements have remote origins, but with a continuous evolution. In the early years of the twentieth century were already made new urban settlements in a direct relationship with diversified presence, attentive to environmental system.

It is a neighborhood based on the integration of environmental strategies at the urban scale.

A compact district based on 11.000 housing for about 25.000 inhabitants and 10.000 workers in productive activities, made with the aim to reduce the environmental impact below the 50% compared to nineties Swedish residential construction.

The closed-loop model of using resource as energy, water and RSU, known as "Hammarby Model" was here experienced as a urban design support that has integrated about sustainability all the various systemic components involved: mobility, green, residences and services.

The fabric is mostly made up of open courtyard buildings that allow the continuity of the urban space and of the green system. The system of public and private mobility, is based on the reduced distances between public transport and residences, as a result the significant reduction of the private vehicles used by road. Internal mobility is essentially pedestrian or bicycle. The connection to the public transport network is entrusted to the metropolitan rail and road lines that run through the

central axis of Hammarby Allee. Within the district the use of private cars is strongly discouraged. Most crossroads overlooked by the residential courtyards are dead-end.

Other basic urban systems, are: the heating system, coming from the central water and waste treatment; the automated recycling system of municipal solid waste; the widespread capillary system of local and commercial production services, and of the public facilities.

The "Hammarby Model" considers the settlement as a kind of ecosystem in which the various components of waste are reinserted in a virtuous cycle that allows almost nothing is lost, and is instead re-used for the support of the district.

The initial waste separation allows that the reusable fraction is sent to facilities recycling (glass, metal, paper) . The not reusable fuel is sent to the incinerator to provide heat and power energy to the neighborhood. Organic wastes are composted to be used as organic fertilizers for crops no food. It can be so produced the biofuel that powers the heat central for district heating.

Hammarby Sjöstad is conceived as a green city where the built doesn't break the connection among the pre-existing environmental systems, the lake in the north and the hinterland woods in the south.

The biological continuity is maintained through several strategies:

- recovery of riparian wetlands as habitat for native flora and fauna;
- decontamination of polluted surfaces by industrial activities;
- purifying lake water with natural systems;
- green corridors and channels network for the rainwater collection running through the public and private neighborhood spaces connecting the wooded areas to the lake moist environment.

An important instrument, established by the Hammarby Sjöstad Management Company is made by the information service to the public which has its headquarters in the prestigious "Glashuset", a glass innovative design building, a true Landmark in the neighborhood landscape.

Some specialized communication experts, provide to the residents and to the visitors all the necessary information on the district services, based on the correct methods for the use of energy and water, waste collection and transports. We organize meetings and events for communication to the public. The building itself is a transparent house where exhibits and interactive installations explain the use of services as a support of sustainable living in the cities.

4.1 Urban open spaces

In this contest we include the urban open spaces. The comparative analysis of other numerous urban cases at different scales, allows to enlarge the issues on environmental sustainability to the more connected ones to the landscape, connoting the elements for a sustainability operation in the urban fabric.

The first step concerns the analysis of the context and thus the innovative relationship that is generated. We mean the environment, anthropogenic and natural, but also the cultural context, with the identity of places to maintain, or to be given in reference to the history and to the characteristics. At the beginning of each operation is, however, the interrelationship among the different systems, in particular: the natural, the functional and the mobility ones; the all in close connection with the different components. Obviously all the parameters that come from green building appear in a field of environmental urban sustainability.

Finally, just for listing, the social and economic contributions, which are often perceived independently, but fall within the scope of the urban landscape planning.

The urban parks, considering they are within the open public spaces, are part of it, but also privileged part. The privilege is in the relationship with nature, even if contrived by man. The privilege is in the differentiation and in the uniqueness of each one, considering the strong relationship context.

In the Rotterdam Museums park, for example, the natural system characterizes it, but the environment system is closely connected with the context and with the social and cultural aspects.

5. CONCLUSIONS: PARAMETERS

Finally, in line between analysis and design are proposed parametric arising by the analysis of various cases. These parameters are examined by different topics relevant to the reading of the urban space, in a planning vision.

- Inclusion strategies in the urban context: the sustainable planning has to take into account the existing structures and to exploit them in strategic terms; the ratio of public space with the urban context, with particular reference to the regeneration to the degraded areas: the access, the interconnections and the relationships between public spaces and urban functions;
- Background and cultural site identity: related values to the memory of the place, to the history and to the ways in which the project has intended to recognize, protect and valorize them, the protection and the construction of an identity character of the site provides greater permanence and acceptance of a new urban intervention by the collectivity;
- Overlapped structuring systems, that can play an important role in terms of well-being and subjective and collective perception, promoting the way finding and the orientation in the site. The natural system includes the role of vegetation and of all the natural elements, water at first. The functional system mainly refers to the ratio among functions that belong to the public spaces. In this area you can also measure the space use level even in quantitative terms: the frequency of people depending on the day or the night, dimensional organization of space for parking, for pedestrian flows in connection with the system mobility, involving all the types of routes, with particular reference to slow, pedestrian, bicycle mobility and public transport. The components system includes all the compositional aspects with specific reference to the flooring, the lighting, the meetings, the furnishing elements, various equipment and urban design components.
- Environmental sustainability, proposed in a physical and wide-ranging planning sense. This parameter may include: the respect and the reconstruction of natural ecosystems, the optimization of the thermal humidity comfort about open and closed spaces; the minimization of energy and materials consumption; the use of renewable energy for lighting and everything else needed, the use of low environmental impact materials, the rational use of water through rainwater harvesting, the noise and atmospheric pollution minimization and mitigation, the optimization of management and maintenance interventions, the waste and emissions management.
- Social sustainability in general terms includes all the other aspects, in a way that a community can't bear the cost of an intervention not properly inserted in an urban context, not sustainable in environmental terms and in which the city does not recognize itself. In particular, however, it has to be considered the participation in planning processes, an appropriate and correct use and the accessibility for disabled and disadvantaged groups in general, including old people and children, with the complete elimination of any possible cultural and architectural barrier. For the participation, overcoming old ideological concepts, it is necessary to involve the community in the identification of needs during the planning phase and to prime initiatives to promote integration and social inclusion.
- Economic sustainability examines the intervention costs, but also the maintenance and management costs. The costs should not be considered in absolute terms, but in a relationship with the intervention size, the economic environment, the use level, at a balance between costs and benefits that could evaluate the economic sustainability in general terms, about the investment proportionality than the objectives. [11]

References

1. Lynch K. *The Image of the city*, 1960, M.I.T. Boston Massachusetts
2. Folco Biagini A. *Paesaggio e politica nell'Europa centro-orientale*, 2012, **19** in AA. VV. *Il progetto di paesaggio come strumento di ricomposizione dei conflitti*, ed. Franco Angeli Milano Italia
3. European Landscape Convention, 2000. About definitions, Article 1, paragraph a
4. The German word Gestalt, literally translated means form, but also representation, scheme
5. Reference 1
6. Table designed for Ippolito A.M., 2012, *Il paesaggio nella progettazione della residenza*, 246-255, in *Housing, linee guida per la progettazione di nuovi insediamenti*, edited by Todaro B., Giancotti A., De Matteis F., ed. Prospettive Roma, Italia
7. Rossi Doria B. 1978, *Ambiente e Paesaggio*, Enciclopedia Italiana - IV Appendice, Roma Italia
8. <http://www.fondoambiente.it/index.aspx>
9. <http://www.verticalgardenpatrickblanc.com>
10. Rosenfeld et al., 1998
11. Ippolito A.M. 2014, *Paesaggio e sostenibilità negli spazi urbani aperti*, 9-18 - *Spazi Urbani Aperti*, edited by Ippolito A.M. ed. Franco Angeli, Milano Italia