

New Urban Scenarios: Sustainability Tools and Components for the Not-Growing Cities

Abstract

Urban environment is a complex system made by buildings, green areas, empty spaces and city users: this mix through human perception becomes rules, proportions, and spaces. Economic crisis and the phenomena of the shrinking cities push us to face new problems: Is it possible to speak about urban composition without buildings? In addition, in the other hand, can we use un-useful buildings like empty box to build new compositions made by green structures, temporary public spaces and low cost function?

The paper will present new tools and key examples in the field of architecture and urbanism facing the problem of the land consumption, resilient cities for the climate changes, and technical apparel for smart cities. The aim is to support the discussion of the regeneration of neglect urban tissues, through common management of the resources, not waiting for a new economic boom.

Keywords: Préverdissement, pre-greening, shrinking landscape

Introduction

Which is the meaning of growing up for a city?

Like a human, the body of a city grow-up: mature.

Are we sure a growing city is something linked to the tag of enlargement, expand, augment, etc...? Can an Urban form become metaphorically something different from the idea of a built and construct environment, using a different measure meter, more perceptual than numerical.

The new idea of urban development link with the new ideas of sustainability, ecology, green structure are beginning to pervade the scenario of our anthropic environment. Green corridors, green belts, biodiversity connection were the most used word in the Environmental European funded project in the 2000 and beginning of the '10 years.

Asking to the majority of people the scenario of the landscape areas changed from the last years of the past century. The knowledge and perception about our milieu grew up after years of materialism and exploitation of the natural resources. Nowadays nobody should freely speak in public about land consumption and waste of the not renewal energy and materials.

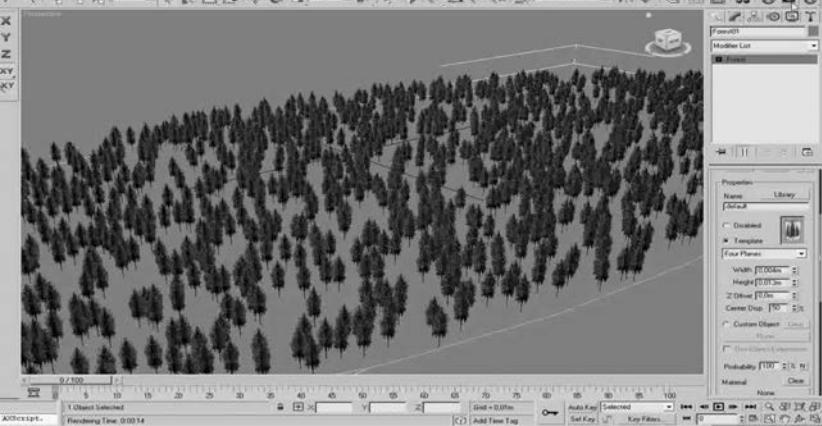
Teaching Landscape in Architectural schools

Thanks to the 'green' idea, we are forming in our course of Politecnico a lot of nature lovers, but Architects. Formed to build and develop masterplan, construction site with walls, fences, and buildings. As we can see in the bibliography of the daily architects, Landscape is something collateral, not well integrated in the project and not correctly managed. In

La Construction en el proyecto del paisaje by Holden and Liversedge for example, all the technics and case are related to landscape fabric in an architectural way. Stone and concrete, gravel and wood are the materials to create forms and buildings in the landscape. In another's books, like Spazi pubblici contemporanei – Architettura a volume zero by Aymonino and Mosco or Archistar del Paesaggio the green part are not considered at all and, if not proposed like part of the city. Forest, shrubs, hoods are only a background where bridge, art installation and module take place.

Students normally think about the green material like something fixed, like a desiderata from the owner or quantity of square meter. It is a challenge to solve the enormous question that are dividing Architects and engineer from landscaper and environmentalist. I think we have to create a sort of syllabus about the instrument to compose the spaces.

The normal urban process are reflected in the order panels are present to the municipality or for academics thesis. It starts from the urbanistic 'inquadramento' of the buildings passing through study and drawings to the last panel: the render in the Landscape. Few people are



il. 1. Plugin for the forestation of 3d images [credit – Itoo software]



il. 2. Préverdissement in Segrate (ediesse.net)

capable to mix this concept. We start as Romolo with a cut in the ground, dividing areas, after we begin to sum elements and forms, and only at the end trees and shrubs arrives.

Also new technology like 3D and parametric design and rendering programs are proposing mathematical algorithms to put green in the drawings. Forest pack for example, useful in all the mayor modelling software let you decide the species, the seasons and the dimension of the trees, and the percentage of each of them. After the set of the parameters, the software create the landscape and the quality of the environment. This is the reason why a lot of renders and projects present the buildings perfectly conserved in 100–200 years from today. What happen if we try to mix the order of the addendum and begin to give a multispectral education to the future Architects, Landscaper and Urbanist? Like sponges, students need to find examples and process to take methods like examples to solve a problem. There are some projects capable to prepare the environment facing multiple scenario very useful for teacher to present the composition of a place without build it. Starting the design by construct the environment and after the creation of the genius loci to insert the buildings. This preliminary phase function as the composing technics of the subtraction of the volume, whit the main difference in the idea of restore an environment before the transformation of it.

“Origins and meanings of préverdissement in the European context”

During the last decades, deep transformations of European rural territories into urbanized and infrastructural areas motivated some experimental applications to safeguard and improve the status of environmental soils in urban and regional planning processes. Even in Italy, territorial government instruments are being integrated with some good practices, such as the préverdissement widely diffused in many European countries for its suitability in new urban landscape design and its versatility in different territorial contexts and planning processes. In this perspective, this paper focuses on these experiences in order to highlight the outcomes and above all the potential in land take control processes, with a particular attention to Italy where an overcoming of actual compensatory function of the préverdissement seems necessary.

The landscape approach of préverdissement assumes different names at different geographical circumstances. The set of methods and techniques used is always plant new vegetation (herbaceous, shrub, tree) oriented towards environmental rehabilitation and protection of soils in areas to be re developed or in derelict industrial areas (Desvigne and Dalnoky, 1998-1999).

The préverdissement could be translated, therefore, in a practice capable to aid planning process in those areas in which the future intended use is not yet clear when it starts the re-functionalization (Bodurow Rea, 1991). It can be previously drawn a draw with vegetation outlining the key elements of the project. Therefore, through the application of préverdissement we tend to pursue genuine processes of regeneration and conservation of soil and re-integration of marginal or brown-field sites. In order to accommodate and harmonize by new urban landscape evolved forms of residential and productive development. It is in this perspective that Donadieu (2000, 2009) defines the préverdissement as a tool for urban landscaping can anticipate the arrival and effects of new destinations and social uses (housing estates, facilities, parks). To encourage the process of re-appropriation of the territory by the public and private entities. In France, the practice of préverdissement dates back to the 60s of the last century and the end of the 70s. It has been actively promoted by the Institut pour le Développement Forestier (IDF), the Comité Interministériel à la Qualité de la Vie (CIQV) and the Ministère de l’Equipement, du logement, de l’aménagement du territoire et des transports, under the Programme d’actions expérimentales, started in 1979 (Roger, 1995; Poulin and Klouche, 1998). The operational approach of préverdissement was then extended to many other areas of urban national and then successfully applied to former industrial sites in Europe, first of all in France, Germany and England, selected generally near the most populated towns, transport infrastructure, areas of recreational value and quality with particular visual (Bodurow Rea, 1991).

With reference to the terminology used, it can be seen in the context French préverdissement is also called préverdurisation, prépayagement (Perrault, 2002) or revégétalisation temporaire (Dubourguier et al., 2001). In An-

glo-Saxon countries appear rather popular terms preplanting (Craul, 1999) and advance greening (Desvigne, 2009; Craul, 1999), which together designate the techniques of inspiring landscape urbanism of American landscape architects (Donadieu, 2009).

Net of different denominations, the practice of *préverdissement* was used mainly in the preparation of a substrate, physical, and social space for creating new landscapes in the making, affected by projects urbanization of medium and long term (Donadieu, 2000). Thanks to *préverdissement*, therefore, landscape planning has already begun working with the previous stages in the activities of urbanization, allowing greater integration between the practices and the landscape of urban and regional planning (Bouraoui, 2000), reversing the traditional tendency to insert only green spaces in the residual areas compared to infrastructure and buildings (Hertzog, 1992). From this perspective, there is more and more conscious attention to the quality of the landscape and for the *préverdissement* which has become in a few decades, a practice that can change gradually (according to the time of their vegetation) of the image places and their perception. Thanks to the possibility of modulating the project appropriately between forms of *préverdissement* stable or temporary, and to respect the next destination to different uses (Richards et al., 1993; Dubourguier et al., 2001).

A preliminary overview of some application cases, emerge no advantages peculiar application of *préverdissement*, among which are particularly evident as the increase in value of the spaces, the self-protection of pre-greened land by degradation and vandalism. In addition, during the construction phases of new construction projects, the presence of vegetation contributes to mitigate the perception of the construction sites, mitigating the impact on the surrounding areas and facilitating their acceptance by the parties involved, in a more or less direct (Craul, 1999; Daubner, 2011). Thus, the practice of pre-greening has taken over the years a particular importance also for the purpose of financial investment and the increase of the appeal of pre-green areas, increasing the overall value through the landscape quality (Guinaudeau, 1987), environmental remediation, and the inclusion of new natural assets, or en créant a paysage du symbole renouveau (Šimenc, 1995).

Several positive effects have occurred, even in terms of capital, to the benefit of local governments that have had the opportunity to reverse the trend of neglect, loss of value and attractiveness of public areas of their competence. In this context, pre-green areas have improved the city's image and quality of life up area surrounding and increase the degree of integration between the built environment and green spaces, becoming a new pre-condition necessary for the subsequent urban transformations.

In terms of economic sustainability, the application of the *préverdissement* can also be achieved by resorting to limited investments for the planting of species resistant and do not require excessive management fees and maintenance. In particular, the cost of such interventions it is most evident in areas where pre-exists a plot vegetalized, deemed useful and easily

integrable for the purposes of subsequent developments design (Legaye et al., 2002). In all those cases in which they will reveal the most appropriate forms of intermediate nature, as defined Desvigne (2009), which inserts temporary vegetation and, where necessary, removable to make room for new realizations (Donadieu, 2006).

In addition, it makes clear the benefits trees and shrubs, herbaceous as the degree of vitality of the soils involved, especially in areas subject to extensive chemical pollution and industrial processes where interventions overlap with new organic soils and new plant cover made it possible to reduce and stabilize the harmful components.

Looking at the variety of experiences already concluded and still in progress in the French context, emerge interesting insights on the current application of the *préverdissement* part of town and country planning. Ideas initially underlying the first case apply *préverdissement* were developed later by Desvigne also around the concept of pro-*pré*paysagement place (Desormaux, 1984), both in contexts of suburban brownfields, and in design experiences related to sectors of the consolidated city, as in the case of Greenwich (Palazzo, 2010).

Overall, the *préverdissement*, the *pré*paysagement, the preplanting and advanced greening contribute fundamentally rethinking and reformulation of urban landscapes, through the specific capacity of the substrate préparer sur lequel le bâti evening installé and facilitate the different local actors learning a common language needed to design concerted their city (Donadieu, 2000). To this is added also the ability to integrate harmoniously the proposed intervention than the surrounding tissues, while ensuring the mutual recognition to be able to discover the physical relationships, spatial and semantic; and, finally, to create, through green landscapes, new connections between areas to be redeveloped and the different functional areas of the city (Donadieu, 2006; Kipar, 2011)."

Préverdissement in practice

The approach is to plant before developing an urban plot. The *Preverdissement*, made the evidence of his interest through many uses experimentations conducted since the 60s in France and others countries. One of the oldest and best-known achievements remains the subdivision Riverside. Set up in the late nineteenth century in the suburbs of Chicago, on a grassland site.

The establishment of the subdivision was preceded by planting 102.000 trees, shrubs

bordering the roads. In France, the Grande Motte site on the Languedoc coast was highlighted in the same way since the sixties. A very generous planting frame. Seine-et-Marne Bussy-Saint-Georges, district of golf. Part of the plant frame was put in place since the mid eighty years before the construction of the first houses. This frame, which had been the object of a very detailed study, should develop the land to, allowing a better consideration of the plant in planning parties proposed to create the new inhabitants a richer living environment, more attractive and better established than is often suggested.

Préverdissement in France consists particularly to proceed with the planting of trees and shrubs that are well ahead of the constructions companies (5 to 15 years before operations) to save time on the natural plant growth. A tree reaches full volume in 20 years on average. By planting cogently early, are obtained satisfactory size of plants and a big volume of green areas. We created this way plant frames over which will "to stall" of future infrastructures for future construction.

It is common for land in future development areas on which urban development operations are planned at more or less long term (housing development, area of activity etc.) are available. For various reasons, the proposed programs may be modified, delayed or called into question. In this context of uncertainty, we must manage the land, ensure they do not become fallow (which would be detrimental to the image of the municipality concerned), or find them a temporary use which can be helpful, and prepare the landscape of tomorrow.

The examples of the Carré Senart:

Green spine of the new city

Hedgerows, groves, tree lines, malls were planted in an historical landscape. Some of these plant structures are so well developed that they seem to belong to the rural past of the site. At the root of this success: the quality of project, planting techniques, maintenance.

The approach of the 'to the establishment of the plant frame Carré Senart, which ultimately will be the central area of the new city, is part of the same concern: to benefit the future inhabitants of the established plantations .

The Royal Driveway is one of the elements of the plant notables' frame. Traced in the eighteenth century to link the forests of Sénart and Rougeau, this alley has a total length of 6783 meters including 1688 in the forest. Integrated into the future urbanization plan, it will offer soft links between forests and peripheral neighborhoods. A plantation projects bilaterally alignment over the full length in the study.

The designer's choice fell on redwood, which can reach 50 to 60 meters tall with a life span of several centuries, to obtain a remarkable effect on the scale of the landscape and the future town center: 1300 sequoias should be added to the thousands of trees constituting the vegetable frame on the perimeter and inside the Carré Sénart.

Beyond the RD 50, the site clean pass west side position at the crossroads of Servigny Farm to join the Carré Sénart. In Carré Sénart, the site clean inserts in axial position in the North Boulevard / Avenue south of Hyphen. Indeed, the current positioning lines of trees includes the ability to insert a pin in the center position T Zen and restore the traffic roads

for private vehicles (PV) on either side of the median. This pre-integrated into the greening project to its original Carré Sénart allows for the realization of the project T Zen trees tall stems that have already a strong development. Roadside trees will be supplemented in order to have a quadruple row of trees continuously over the entire route of the T Zen. A median is equipped to accommodate Zen T. The pedestrian traffic are also separated from the street by a landscaped fringe.

Prévégétalisation as part of a real estate operation of the regional council: the Kyoto school of Poitiers

The construction of this school designed to accommodate 2 establishments around the business of restoration (capacity: about 500 students and apprentices), pursues the ambition to be exemplary in terms of environmental excellence, particularly from the energy point of view by aiming the aim to be a "100% clean energy" school. Moreover, in order to open this high school in 2009 in a framework already planted, the development project has also integrated a step of prévégétalisation. Spring 2006: The phases of study and general design work of the Lyceum are advanced enough to know the general layout and buildings and allow launching studies on the general landscape project. June 2006: The site landscaping is defined and explained the various components retained. On the global landscape project, geographic locations can be a prévégétalisation without hindering the works of construction of buildings without being endangered by work. Of all the structural elements of vegetation (hedges / bushes / orchards), 80% of plantations can be undertaken (over 1300 plants). July 2006: The tender documents for the prévégétalisation is prepared and includes several lots that match the setting profile of the site by land use before planting and etched in the provision and implementation of plants.

Indeed, we must know that the purchase price and the cost price of planting a tree or shrub increase considerably with its size and age ("development" in the nursery, the importance of soil preparation, scale plantations holes need staking). For example, against € 1.20 for a young maple plant setting, a tree of the same species stem cost average of 25 €. Thus, using seedlings and adding the cost of the plantation itself (preparation of plant, soil preparation, proper planting, establishment of a biodegradable mulch and protection against game), estimated by € 5 per plant, planting 100m simple return hedge approxi-

mately 620 € (corporate rate). On the same basis, planting trees of the same species stems 100m it will cost at least € 3,000.

It is thus almost 3 seasons of vegetation, which have been earned at the time of the opening of this school in fall 2009.

The example of the Municipality of Segrate

The policy of preventive planting areas of transformation proposed by the new Plan are together with the other actions of environmental compensation provided by the PGT (Territorial General Plan). It is essential to ensure sustainable development of the city contributing to maintaining the balance between conservation value areas and avoid pressure on territory. The valuations contained in the Environmental Report of the PGT in fact clearly shows that the urban project planned by the PGT requires a parallel process of improving the ecological value of the total urban system.

The policy of preventive planting, that the project is briefly referred to *Préverdissement*, involves the construction of a woody vegetation of the land included within the areas of processing referred into the Plan already in the earlier stages of implementation. The qualification and quantification of the intervention of Pv (surfaces, types of intervention ecosystem) is defined based on the change in the ecological value consumed by the intervention; is this value that must be regained with the interventions.

The extent of the ecological value of the areas affected by the intervention of the fund and then to regain, is obtained by taking as a general model STRAIN of the Lombardy Region (interdisciplinary study on relations between nature protection and Infrastructure) product of the law call Quality of Environment adequate and integrated to the local conditions.

The whole industry is affected by the action of *Preverdissement* within six months from the final approval of the PGT: the areas that the future implementation plan will allocate the execution of construction projects will be affected by temporary Pv, while the remaining areas will be covered by final pv project.

The purpose of the temporary Pv is protection and / or production allowing better management of areas awaiting processing by counteracting the potential degradation and reducing the critical project implementation. In relation to the size of the fund and the wait time (if predictable) before construction, it may be identified different types of temporary Pv according to the specific conditions (coverage woody, herbaceous).

Where the size and timing permit a portion of the surface of the compartment subject to temporary *Preverdissement* it can be planted even with material that can also have an economic role (biomass). The subject area for the temporary *préverdissement* although it can act as a hedge of a portion of the ecological value to be recovered. (Value that can be

fully satisfied only with actions of a permanent nature) It is because of its temporary nature, it can take on a role more properly maintaining a "good ecological status" of the areas until the start of their transformation. As regards the intervention of Pv as a whole, the identification of the route to be taken will necessarily vary depending on the peculiarities of the territory of insertion, that is the context.

The case of Treviso

A forest of 1 million meters. The new building in Treviso.

In planning commission arrives the example Segrate: "You want to build? Before it, you plant trees". This requirement shall cover areas of future Masterplans.

Landscaped in the designated areas to accommodate subdivisions not yet built, those who today, collected together, employ more than 1 million square meters of the municipal area. This plan that fascinates Ca'Sugana. Politicians push to make it one of the implementing rules of the new urban development of the city. The project is ambitious, innovative, but not experimental because follow the already successfully adopted in Segrate.

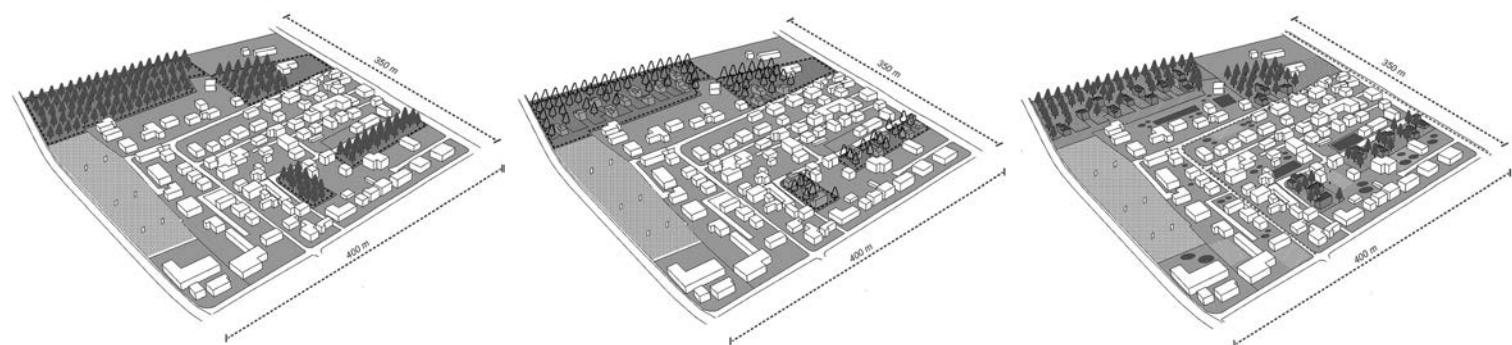
In Ca 'Sugana are all with ears pricked. The project in fact could radically change the face of the city (and its outskirts especially) thus boosting the real estate market and while helping to improve the environment. How does it work? This will retrain areas," explains the architect Giuliani, immediately giving the city a new image and a new forest that secondly helps make the most pleasant neighborhoods reassessing the appeal of future buildings. The city earns the green; the company can beat the crisis and reactivate the market. Pordenone going to do the same, to have instructed the architect to design the future of the city General Plan entering the same rule of Segrate.

Pordenone

Préverdissement for the transformation areas

The building permits of the transformation areas are confirmed only through a advance planting of the areas. Projects are selected by competition mechanism which, by means of

il. 3. Urban strategy in Pordenone (Credits – Municipality of Prodenone)



specific criteria, identifies the most sustainable and innovative solutions for the city. Planting in advance, made by different actions than green urban areas, lets immediately raise the value of the overall ecosystem of Pordenone.

Completion of the areas not implemented the old master plan, with the exception of the areas subject to constraint. The transformation of the areas takes place with competition mechanism with implementation of advance planting.

Growing of the city

The method allows competition to select the best projects to be put into implementation. The new volumes are placed within the areas of transformation after the controlled thinning of the forest produced by the policy of *préverdissement*. Mechanism competition is open to all owners of the areas of transformation planned by the scenario with a project proposal that will be evaluated according to the close examination of indicators contained in the regulations of the Plan.

Accompanying policy

The controlled extension of urban fabric allows a consolidation of its central points and the regeneration of urban areas. The common space between buildings becomes a place of relationship and experimenting place where new techniques for energy production.

The SWOT analysis evaluates the impact on the economic and social sustainability in particular:

Environmental sustainability:

- Increase in the overall ecosystemic value
 - Ability to increase the welfare of the citizen
 - Prompted on multifunctionality of the areas not built
 - Influence on the overall energy system and air quality
- Economic sustainability:
 - Capacity for the City Council to implement interventions
 - Ability to relaunch the economy
 - Economic framework of the sustainable intervention
 - Ability to ensure positive effects on urban system in the short term
- Social sustainability:
 - Influence about welfare
 - Raise the attractiveness of the local increase homeland security

Conclusions

The research about green in the city are a lot and reach all the part of the architectural disciplines. This paper want to give a fresh view about a method to think about design in Italian University interacting with Landscape.

Genius Loci are in the people's *immaginarium* something just in the site, thanks to historical value of lands built centuries ago. Indeed the last 50–60 years transform so radically our landscape all around cities, that genius loci is more and more

find in derelict areas, abandoned buildings and polluted areas. Green thinking, new sensibility about landscape and the economical crisis give us the opportunity to insert in the city natural areas. This sort of islands are so important, not only for leisure of the citizens. They are fundamental for the control of climate change in the city like the water storms and Heating Island that are transforming our cities in bad place for living.

ENDNOTE

¹ M. L. Scaduto, *Il préverdissement nella regolamentazione del consumo di suolo: prime riflessioni*, in: *Reticula* n.7/2014 edited by ISPRA, ISSN 2283-9232.

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ii. 4. Controlled Expansion (Credit – Municipality of Pordenone)

SCENARIO 02

