

DO WE REALLY NEED TO CHOOSE BETWEEN NATURAL, HORTICULTURAL AND AGRICULTURAL PLANTS FOR OUR CITIES?

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Abstract

Green is beautiful, ecology is smart and horticulture is the past? Two housing projects developed in Grenoble, a French city located in the Alps, offer a unique opportunity for a cohabitation between endemic local plants, with fruits and vegetables, and horticultural bushes and flowers. Both of these projects are telling: we don't need to choose between ecology and gardening to be sustainable!

The first project is located in Seyssins, a small city in the Grenoble suburbs, between the river Drac and the Vercors mountain foothills. The project includes 55 flats, among which 30 are dedicated to social living, rented flats comprised mainly of families, and 25 flats sold to individual owners. Overall, there are over 150 adults and children living in this housing project. Together, they share a vegetable garden, an orchard and a collective roof garden. In addition, each family is given a small private garden or a large terrace. The top roof is covered with extensive meadows mainly constituted of the identical plants found growing in the rocky soil of the mountain adjacent the apartments. Rainwater is collected in tanks and used for watering the vegetable garden and the roof garden. The gardeners are themselves the residents, some of them owners, others tenants. All together they manage the vegetable garden with the residents' association, which also provides and takes care of the gardening amenities (equipment and locale), the citrus trees integrated in the mail box room used as greenhouses, the watering installations and the orchard. Four years after the residents' arrival in their new flats, this project is a success, putting forward its multilayered biodiversity (an influx of birds and insects) and its social development.

The second project is still under construction in the south of Grenoble, near the city's main ring road. 150 flats will be built, among which, 20% are reserved for social housing families, 15% for student housing and 15% for retired residents. The housing is organized in terraces from the 4th floor up to the 11th floor. It integrates a large roof garden with a greenhouse, a vegetable garden and a small orchard. The rain water used for watering the roof garden is collected in a succession of extensive roof gardens with dry meadows. A wet forest garden is planted in the heart of the housing project. It is also the final area to collect and infiltrate all the rainwater, coming from each successive terrace, the water circulating from terrace to terrace, partly hidden in the roof structure, partly left to trickle down in the open.

Both of these projects are resilient in the face of climate change. They participate in mitigating the climate change impact in city housing, for summer comfort, as well as for winter wellbeing, with the added bonus of minimizing flooding risks and protecting the ordinary biodiversity of our cities.

Keywords : climate change resilience; green cohabitation; multilayered biodiversity; wellbeing

Introduction

At a time when sustainable development is at a high, how can we concretely integrate environmental, socio-economic and heritage aims, on one hand, in our daily private practice and, on the other hand, in our confrontation with an educational and teaching practice among students in universities or other. The educational experiences hereafter concern mainly the thoughts and reflections experienced at the Grenoble School of Architecture, Grenoble “capital” of the French Alps. And it is particularly on the questions that address biodiversity, stemming from the experience in our planting choices, tested through our agency’s landscape projects, that on this occasion, the Singapour IFLA Congress, we wish to take stock of the reflections on this matter, as a professional and a teacher.

In Europe, wilderness, in the ecological and scientific sense of the term, has almost disappeared. Today, there is almost no territory left anymore where man has not intervened in the last 300 years. There are, however, “some” natural spaces, in the common sense of the words, that we know, are not managed either by man, nor by farmers, forest rangers or gardeners. In France, if these spaces are still relatively numerous on faraway mountainsides or certain islands, agriculture and forestry, more or less intensive, widely dominates our territory.

At the same time, biodiversity has never been so much in danger, including the ordinary urban biodiversity such as insects, birds and small mammals. As an example, in 2018 the Paris Natural History Museum and the French League for the Protection of Birds issued a report revealing that a quarter of all breeding bird species, are today in danger in France, their population decreasing around one third these last fifteen years.

Among the many explanations that are put forward, there is the major decline in insect numbers and the evolution of agricultural practices that are leaning evermore towards intensive or industrial methods. Moreover, Europe in general and France in particular, have observed that the new fauna biodiversity refuge are actually becoming our cities. Foxes, wild boars and other small mammals have turned into a common sight in our urban spaces, cities adapting to new forms of cohabitation. More recently, a wolf even returned into Berlin.

In this context, every new project comes with newfound responsibility for our society to develop new shelter spaces (without losing sight of improvements to agricultural methods). It is also urgent to change our methods and approaches to the project in matters of landscape design.

We created our landscape agency over ten years ago, and for the equal amount of time we have searched to develop our approaches, and our ambitions for the project, making them continually evolve. Whether in our studies or in project management, each of our projects aim to protect not only the local biodiversity but also aim at develop it further. This also includes any concerns in the preservation of plant substrates and stormwater management.

Our design practices and methods must continue to accompany our environmental ambitions, improving them, especially in matters of spatiality, space ambience, function and use comfort, all in the name of general interest. Throughout our studies and projects, plants and flora in general remain “the raw material” at our disposal. But beyond the preservation of regional endemic flora and fauna, we refuse to have to choose between local flora and horticultural and productive flora.

And so, at our small scale level, we continue to test plant associations, stemming just as much from field observation as from literature research. We proceed to follow their evolution, with fauna and flora considerations, but also in matters of functions, uses and esthetics. There is for us a form of filiation with the landscape architects', Piet Oudolf and Noel Kingsbury, ecological and phytosociological approach.

For now the reality is other. After our projects are completed, the biodiversity set up, we, unfortunately, remain unable to set up scientific follow-up protocols, having no internal scientific expertise. We simply wish to participate in the collective ambition to create more sustainable living spaces, with conditions allowing our fellow countrymen to live a more sustainable life these spaces. This is the type of experience we wish to share with the 2018 Singapore Landscape World Congress and most especially through the displaying of two of our recent projects

Living within a kitchen garden, a co-ownership project in the heart of a garden in Seyssins

Seyssins is a small municipality in the suburb of Grenoble, itself a metropolis of about 450 000 inhabitants. The city launched a housing project, comprised of 55 intermediate flats, at the heart of what used to be a large garden, complete with orchard. It was partially constructed on an underground concrete parking structure. The site was previously occupied by community and family oriented, allotments and represents a difference altitude of approximately 8 500m².

Oriented due west, the project stands at the foot of the Vercors Mountain, a vast calcareous and jagged mountain range. The

region benefits from a continental climate, with a high level of exposure to sunlight (approximately 2066 hours/year) with heatwave summers and an average rainfall level (approximately 934 mm/year, including a few days of snow) stretching out over the entire year, with more intense rain periods in the spring and the fall.

1.1. Architectural and landscaping project

The project is organized around five buildings each arranged perpendicularly over a shared underground parking (see ground plane, fig.1 and section, fig.2). Among the 55 flats, 30 are dedicated to social housing and the other 25 others were meant for property owners. The social real estate developer, after construction, kept on managing 30 social housing flats and sold the others, social housing in France needing to be overseen by appointed public bodies. In this case, the city of Grenoble named "Grenoble Habitat" as developer and administrator.



Fig.1. Ground plane



Fig.2. Site section

Each flat has a direct access (like a house as the housing building is a so-called « habitat intermédiaire ») to a large terrace or a private garden, while smaller flats can use a bigger collective terrace.

The building constructions are organized in a staircase profile that allows magnificent point of view on the three mountain ranges surrounding Grenoble.

The architectural and landscape design was developed in association with GTB the Grenoble architectural practice.

All the tenants and inhabitants can share and manage collective spaces such as vegetable patches, fruit trees (including citrus trees), the gardening tool shack and rainwater tanks (see technical cross section fig. 3) as well as a fully equipped common open air space with tables, benches, playgrounds, Bicycle storage and the parking lot.

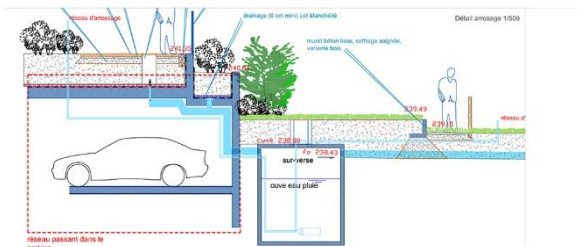


Fig.3. Detail section – cross-section through parking and cistern system

Gardens are located whether on the concrete structure or on the original topsoil (re-use of the former topsoil, carefully stored while construction was underway). All rainwater is stored in 4 tanks for summer use and specially directed to the kitchen gardens and the collective terrace (see hydraulic principle, fig.4). The excess water is collected in a wide ditch located on the property limit.

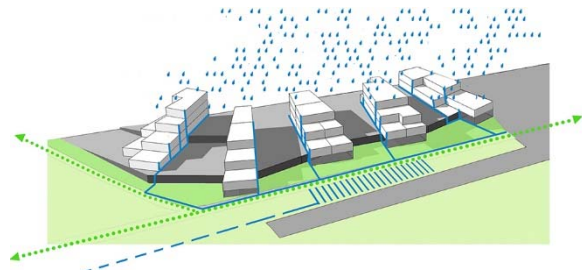


Fig.4. Stormwater management

The project also hosts about ten birdhouses for common birds and three bat houses (pipistrelles) (see picture, fig. 5 and 6).



Fig.5. Birdhouse



Fig.6. Bat houses

The project is situated near a tramway station that puts the inhabitants at a 25 minutes ride from the city center.

There is also a shared vehicle in the car park. The housing complex is itself at the junction between the city and a vast urban park, a natural urban reserve, the green Alley of Seyssins.

Pedestrians and bikes access to the different buildings is situated along the park pathway. Public limit is put at a fair distance by small vegetable patches terraces.

The project design stage was from 2011 till 2013. The construction itself was between the end of 2013 in 2015 spring as the plantations were completed.

1.2. Plant selection

The project propose various plants selection, ranging from endemic dry meadows of Vercors plateau, the mountain closest to Grenoble city, to vegetable plots of land and more classic horticultural selections.

We propose, from top roof to ground level the following plants selection :

- On the invisible technical top roof, a extensive vegetation of sedum.
- On the collective roof garden we develop a traditional intensive roof garden, of melliferous long-lived flowers, of bulbs and small shrubs. This terrace garden is cultivated upon 60 cm quality topsoil and a drip irrigation system connected to one of the water tank(see picture, fig.7).



Fig.7. Collective roof garden

- In Continuity with the flats wooden terraces, a semi intensive vegetation of dry meadow is planted on a 25cm substratum (70% volcanic rock 30% compost) and limestone mulching. The plants selection (46 species of long-lived flowers, annual flower, bulbs and grasses) was chosen among floral statements of the Vercors natural protected zones, the closest mountain, in 3 or 4 km radius (see photos, fig. 8 and 9). Each terrace of the housing itself integrates a large pre-vegetated planter containing aromatic herbs and vines climbing on the sun shades designed by the architect.



Fig.8. Extensive green roof after plantation



Fig.9. Extensive green roof after one year

- The main terrace, over the parking lot, is also a roof garden. There is at least 1m²0 of topsoil reused from the site. Every inner gardened courtyard in between buildings is divided between small private gardens and a collective orchard (see picture, fig.10),



Fig.10. Hedge and private gardens

- Planters as well as the carpark walls, east of the building, are planted with shrub trees and vines, on at least 80cm topsoil. (see sectional drawing before).



Fig.11. The carpark “green wall”

- The low level terraces, propose vegetable gardens managed by the inhabitants. The surrounded hedges are planted with small flowering shrubs and fruits (currants and blackcurrant mainly).
- Small scale squares and accesses to the collective mailboxes are designed to become drier and brightened environments, and thus are planted with Mediterranean species and by fruit trees.

- The wide dyke collecting rainwater is planted with shrubs, grasses and long-lived flowers, supporting vast amplitudes of hygrometry, from temporary submersion to temporary drought (to see picture, fig. 12).



Fig.12. Wide planted gap separating private ground and public path rainwater dyke.

- The vegetable plots of land were sowed with a “green fertilizer” (*Synapis arvensis* and *Phacelia tanacetifolia*) in waiting of the gardeners.
- The mailboxes are designed as cold greenhouses, everyone of each planted with a citrus tree.

Counting trees, shrubs, climbing, long-lived, bulbs and grasses, about 212 different species were planted. Amongst them 19 different trees species and 15 fruit trees varieties.

1.3. First feedbacks

The Seyssins project reflects, on the one hand, the research and the observations in regards to a typical plant project and, on the other hand, the experience in regards to a

social project. It was the object of intense public consulting and inquiry beforehand, a request strongly driven by the municipality and the real estate developer. The aim was double.

The first goal to achieve was to allow future residents, homeowners and leaseholders, with low income, to get to know each other before having to share common spaces in the same building. Several information meetings were then organized in order to present the project as well as a visit, in situ, during construction.

The second goal aimed to further implicate future residents in the green space management. Indeed, the real estate developer was investing on large amounts of plants (over 14 000) that would become each and everyone's responsibility whether caring for or only watering them. The challenge was won and the residents up to par. Around 150 people took the gardening project in hand, terraces and gardens alike, even going to the extent of adding new species.

According to all, numerous insects have invested the gardens and the first birds, and even some bats, have also started to call Seyssins home. It is necessary to note that certain residents seemed cautious in the beginning, maybe even frightened, at the idea of cohabitating with bats.

We estimate today that approximately 70% of this initial biodiversity is still present on site, and this, nearly 3 years after having planted. In order to paint a full picture, we must also state that ruderals (notably the *Docus carota*) have slowly started to dominate rooftop intensive plants

The more shaded areas (northern face) have had greater difficulties developing to maturity. Certain plant replacements were made, introducing, at the same time, various new varieties.

The garden management in general has been put into the hands of a non-profit association comprised of a group of residents (homeowners and leaseholders). This association is the privileged speaking partner with the residents for all site management

questions. Every aspect of management is maintained without any chemical products – see Fig 13.



Fig.13. Vegetable patches

2. A garden building

The second project is in Echirolles, a southern suburb of Grenoble. The building construction only just started in September of 2017. The project provides for 150 flats, partly designed for low income social housing, homeownership, housing for seniors and student housing, and was the brainchild of the SCAU Architects agency. The Safilaf was the developer.

2.1. Architectural and landscaping project

The housing project took on a triangular shape, closed on all three sides, the southern side consisting mainly in parking facilities. These facilities are used as an acoustic barrier for the adjacent beltway.

On the remaining sides, the flats are layed out in stairway fashion, going up to eleven floors. The center part of the housing project is reserved as a common space, an interior yard garden, a small, rather shaded, forest. It is also the final water collection and infiltration point for all rainwaters. The parking facilities' roof accommodates

community shared equipments: a cool greenhouse, a vegetable patch, a green grass space, complete with fruit trees, allowing for picnics and calm relaxation. Fig 14 through 17.

An intermediate terrace acts as a liaison area, linking the upper functional parking terrace to the street level interior garden. From the 11th level down to the 5th level, the flats open up to the South onto terraces, terraces extended further by semi extensive dry meadows. The rainwater collected from these terraces cascade down from storey to storey. It is then recuperated into cisterns in two gardener's sheds, each of which are located on the parking roof's extremities. Fig 18 and 19.



Fig.16. Illustrated general view
 (illustration: SCAU Architects)



Fig.14. Ground plane



Fig.17. Illustrated interior view as seen from the community shared terrace (illustration: SCAU Architects)

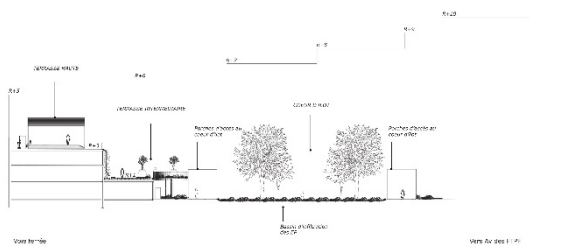


Fig.15. Project section

2.2. The landscape design

This project is the logical follow-up to the previously cited Seyssins project. It draws lessons from Seyssins, all the while introducing new methods of experimentation or testing.

One can then see, from the ground up:

- Dry meadows on impoverished substrates planted on semi-extensive green roofs. Contrary to the previous project, the more vivacious ruderals

were entirely eliminated from plant lists.

- A garden roof atop the parking facilities, both horticultural and productive. It is the future playground and resident gardening area. Fig.20 and 21.

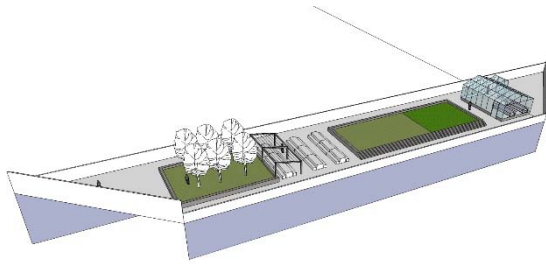


Fig.20. 3D view of the community collective terrace

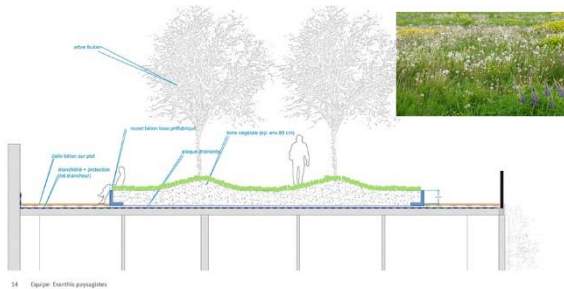


Fig.21. Section illustrating the terrace orchard

- Potted multi-trunk trees, ground covering plants but also climbing plants on the parking wall on the intermediary terrace. This terrace has the distinctive feature of leading overhead rainwater from summit terraces to the interior central garden below.
- An interior central garden, « a small pièce of wilderness »: a number of trees, green spaces, understory plants (a collection of different ferns).

Accumulated, there are more than 13 500 plants, from more than 65 different species.

Conclusion

We have researched varied sources, studied many works, all in order to verify if any information existed concerning horticultural plants that would attract less wildlife in general, and insects in particular, than endemic plants. There are notably several studies on green roofs and green walls, which prove that a flora offering food, in particular flower or fruit nectar, indeed attracted fauna, and that insects and birds that are dependent to a unique species of plant were rather rare. Our own project feedbacks seem to confirm these studies. Floral diversity, including horticultural, favoring melliferous and/or fruit species, is the key. Sterile horticultural species without nectar, which would disorientate some insects, in particular bees, have been eliminated from all our floral assortments/palettes. It is also necessary to note, that in these urban environments, more or less windy, strongly allergenic plants were avoided.

So, whether it be the Seyssins project, where regular visits allow us continued observation on the evolution of plant diversity, or the Echirolles project, soon to be constructed, or any other future agency projects for that matter, we realize more and more that we are but at the beginning of our comprehension and mastering of these complex living environments. This is also the reason that makes our profession so enthralling and captivating.

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Echirolle Eranthis design team : Emma Boutot – Client SAFILAF / ALAMO

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