

# URBANBEES, Providing a refuge for bees IN THE CITY



With around 80 % of the European population now living in cities, green spaces in urban and peri-urban areas have become vital in ensuring people a healthy quality of life.

Simultaneously, and even paradoxically, the city today is also proving to be a refuge for certain wild plant and animal species which can no longer thrive nor even survive in farming areas with intensively treated crops. The fact is that biodiversity decline is now a scientifically recognized truth, and its impact on the healthy functioning of natural ecosystems and agroecosystems is the source of extreme concern (lack of pest control, insufficient pollinating services and subsequently insufficient fruit and seed yields, and a drop in soil fertility and the amount of organic matter being recycled).

As a result, green space management, in both the city and the countryside, must branch out from its role of providing mere decoration, and be made a vehicle for reviving the age-old concept of sharing space with other forms of life, namely sharing with Nature. This is why it seems so imperative to introduce differentiated green space management systems in urban green spaces as well as in peri-urban agricultural areas, to make room for habitats where biodiversity can thrive by offering food and lodging to wild species, but also by protecting the green lungs in the heart and on the edge of cities.

All of these actions taken together serve to naturally reinforce the coherence and impact of ecological corridors (green and blue infrastructures), which are instrumental in maintaining the natural balance of flora and fauna and enabling them to move about. Therefore, preserving the environment in urban and peri-urban areas could play a major role in protecting Nature as a whole, while also responding to a growing expectation in society today.

This is the reason why citizens, companies and local authorities alike can and must all play their part, in whichever way possible, to reduce this loss of biodiversity, and even make active steps towards helping to maintain it. To start the ball rolling, simple initiatives can be put in place to raise awareness, set up installations and adopt new management practices so as to bring about this critical and necessary change in the portrayal and uses of Nature, as well as public attitudes towards it.

The aim of the LIFE+ **URBANBEES** programme is to target urban areas across Europe to disseminate the key elements needed to introduce ecological green space measures, using an approach especially focused on wild bees. The Rhône-Alpes region is fully aware of the global issues at stake in biodiversity decline, and especially the concerning matter of bee decline and the need to maintain high-quality farming and recreational areas, and therefore it has offered continued support to this pro-Nature project since 2008. Having initially concentrated on Greater Lyon and the Rhône-Alpes region at large, the **URBANBEES** programme is now turning its attention further afield and spreading out towards the rest of Europe.

Nature knows no bounds, but neither does pollution. Therefore, from now on we should be tackling this issue on a European-wide scale, to pull together and take action to safeguard our natural capital, for future generations to lean and thrive on.

**Jean-Jack QUEYRANNE**  
President of the Rhône-Alpes Region  
Former Minister

The realm of bees is both manifold and fascinating!

Manifold in that there are over 20,000 different species across the world, spanning solitary, social, wild and domesticated species. Modern society traditionally associates bees with honey, and yet what we commonly fail to realize is that the honey we eat in Europe is made by only one species of bee, and kept by beekeepers for that very purpose: the honeybee.

Fascinating because as bees fly from flower to flower they help with plant pollination, which in turn plays a large part in farm production, explaining why it is so vital for us to protect them.

To tackle this major issue Greater Lyon decided to become involved in the European **“URBANBEES”** project. The initial aim was to gain deeper knowledge of wild bees, a subject still then under-researched, so as to develop a series of measures that would have a real and effective impact on their protection, and finally to disseminate these findings throughout Europe.

In practical terms, the **“URBANBEES”** programme has led to 16 sites being set up across 10 local districts throughout Greater Lyon, all with specialized installations designed to encourage bees to nest and feed: bee hotels, insect spirals growing aromatic plants and wildflower ‘meadows’ ... As a result, more than 300 different bee species have been identified in our area. Moreover, the project has made advances in understanding the behaviour and needs of wild bees, as well as recommending appropriate measures to ensure they can thrive fully in all their diversity.

Organized walks, workshops, conferences, events in schools and exhibitions have been put on throughout our area, meaning that elected officials, professionals and some 20,000 inhabitants of Greater Lyon have all been made aware of the issues surrounding the protection of wild bees.


The task now is to continue spreading this knowledge, and let it “swarm” across Europe on a grand scale; the entire purpose of this work. Meanwhile, in Greater Lyon we will obviously go on working tirelessly towards helping to maintain biodiversity as a whole: systematically protecting ecological corridors in urbanization; weaving our natural areas into a network; building partnerships with institutions and associations specialized in environmental protection to help launch initiatives to protect species and create natural habitats; expanding our knowledge of different species by carrying out inventories of flora and fauna, and finally publishing works for all sectors of the public. In effect, biodiversity is a treasure trove, and we will never be able to measure the full extent of its wealth.

**Gérard COLLOMB**  
Senator and Mayor of Lyon,  
President of the Greater Lyon Urban Community



Wild bee hotel on the URBANBEES site in Bon Pasteur, Lyon

<b>Background</b>	<b>6</b>
What is a bee?	6
Little-known diversity	7
Essential Insect Pollinators	9
Bee decline and threats	10
Providing a home for wild bees in the city	11
A favourable legal and political context	12
<b>URBANBEES: 5 years of positive action to help wild bees thrive</b>	<b>13</b>
1) Goals	13
Without them, <b>URBANBEES</b> would never have been possible	14
2) Helping wild bees find a home in the city	16
Unusual installations	16
Which form of urban green space management is best suited to bees?	18
Raising the awareness of elected officials	18
Training up green area operators	19
3) Gaining a deeper understanding of wild bees	19
4) Introducing the general public to wild bees	20
Raising the awareness of young children and teenagers	21
Explaining, raising awareness, getting involved	22
A wide range of tools at your disposal	26
<b>Findings</b>	<b>27</b>
Broadening our scientific knowledge	27
Raising the awareness of the general public and professionals	27
Endorsing an action plan to create favourable habitats for wild pollinators	28
Disseminating the research findings across Europe	29
<b>After 2014, the action won't stop there!</b>	<b>29</b>
<b>Glossary</b>	<b>30</b>



Wild bee belonging  
to the genus *Colletes*

## >> Background

*Apis mellifera* is the scientific name of the honeybee that we keep in beehives, and which is widely known to most people, especially for its role in producing honey, royal jelly and propolis .... This particular species is the focus of extensive scientific research, yet it counts as only one of 20,000 bee species identified to date across the world. Its more unassuming cousins, wild bees, cause much less of a stir. As a rule, people don't know very much about them, and yet these unsung heroes play a vital role in maintaining the natural balance of **ECOSYSTEMS**.

### >> What is a bee?

Like all insects, bees have 6 legs, 2 antennae and a body divided into 3 distinct parts: head, thorax and abdomen. They have two pairs of membranous wings and as such are classified as belonging to the order Hymenoptera. Their "wasp waist" classes them as belonging to the group of insects called Apocrita, and it is their sting that affiliates them to the Aculeata lineage, alongside ants and wasps.

Yet nearly all bees stand out from a number of their cousins thanks to their herbivorous diet. Adults and larvae feed exclusively on pollen and nectar. In most cases, the females are equipped with an apparatus designed specifically for gathering and carrying pollen. But the unique character that identifies them is that all bees have ramified bristles called 'branched hairs' that help them collect pollen in their hair coat, but these are only visible at high magnification.



Branched hairs Electron microscope  
(magnification: x 2,000)

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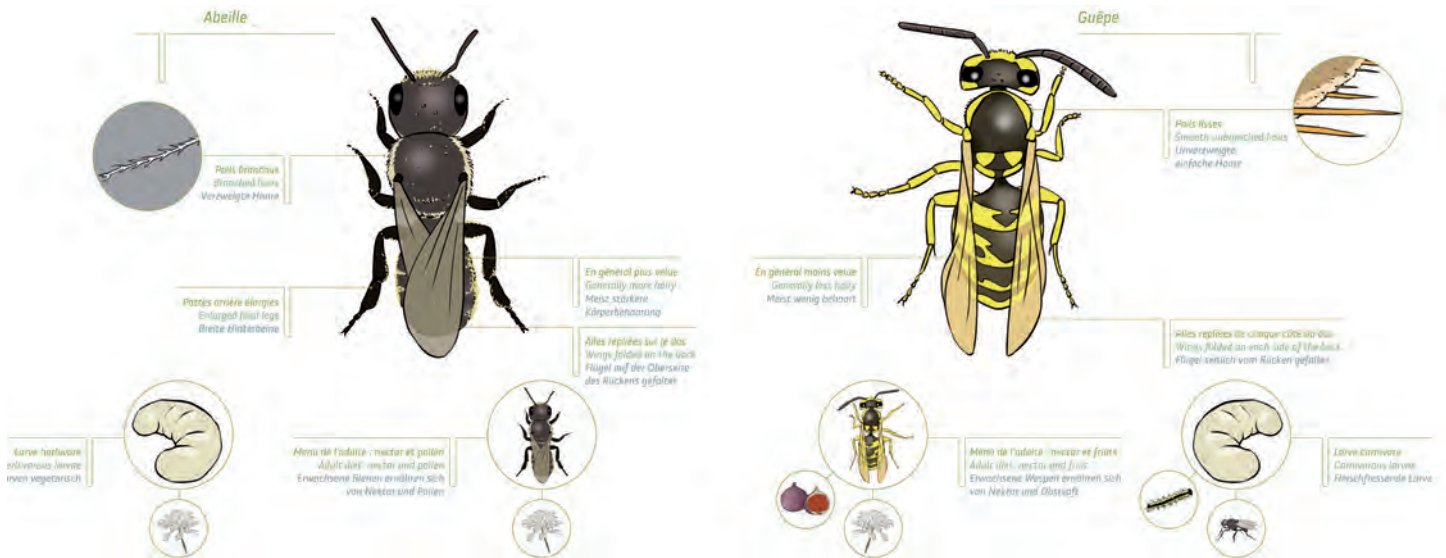
1 A constricted narrow part between the thorax and abdomen, giving a pinched waist



# Make sure you identify them properly...

**BEES FOR WASPS:** certain bees are black and yellow, such as those belonging to the genera *Anthidium* and *Nomada*, and can sometimes be mistaken for wasps. The best way to distinguish them is to look at their wings when at rest: whereas bees fold their 4 wings across their backs, wasps fold them lengthwise, and hold them in parallel along each side of their backs.

**BEES FOR SYRPHID FLIES:** Syrphid flies **MIMIC** bees and wasps, yet it is relatively easy to tell them apart. As flies, they only have two wings, and also very short antennae and large eyes. Furthermore, they have the distinctive feature of being able to hover in a perfectly stationary position.



## >> Little-known diversity

The 2,000 different bee species that are found in Europe are classified into 6 families – Melittidae, Andrenidae, Halictidae, Apidae, Megachilidae, and Colletidae – and further divided into genera, which are primarily distinguished by the length of their **TONGUE**, the shape and size of the cells on their wings, or, in the case of females, the position of the pollen gathering structures.



**Hoverfly,**  
a fly that mimics hymenopterans



**Xylocopa, carpenter bee**

**These 6 families boast a large morphological diversity:**

➤ The smallest bees belong to the genus *Nomioides*, and they are only 3 to 5 mm long; in other words, they are the same size as the eyeball of the largest bee species, *Xylocopa* bees or carpenter bees, which are black with iridescent wings in purple and blue, and are 20 to 30 mm long.

➤ Female bumblebees, belonging to the genus *Bombus*, and the honeybee (*Apis mellifera*) gather pollen in «baskets» on their hind legs. Bees belonging to the Megachilidae family store the pollen in the brush of hairs set underneath their abdomen. Andrenid bees (*Andrena* spp.) not only have pollen-gathering hairs on the tibial scopa of their hind legs, but also flocculi (arched hairs) at the base of their thighs. Finally, bees belonging to the genus *Hylaeus* carry the pollen and nectar mixed together directly in their **CROP**.

➤ As for **CUCKOO BEES**, they do not have any apparatus designed for gathering pollen. The females of the species lay their eggs at the entrance of the nests of other bee species. They therefore do not need to gather pollen or nectar because their larvae eat up the food reserves stored by the host bee.

Also, not all bees have yellow and black stripes. Far from it! You can find them in all colours, shapes and sizes: hairy, glabrous (hairless) on most of the body (cuckoo bees), red, yellow, black, blue, small and large, stout or thin...

Beyond these morphological differences, bees also have a highly diverse range of behaviours as well as biological attributes and food preferences. **SOCIAL** species, such as the honeybee or bumblebees, live in colonies and are relatively few in number. Most species are solitary: each female builds its own nest to lay several eggs. Each egg is enclosed inside a larval cell that contains enough food reserves for it to reach full adult growth. The sites and materials used for nesting vary depending on each species. As a result, you will find that more than 70% of bees nest in the ground (dirt tracks, sandy soils and roadside embankments...), while the remainder nest in a variety of other forms of cavity (hollow plant stems, cavities dug out of wood or walls, and empty snail shells) .



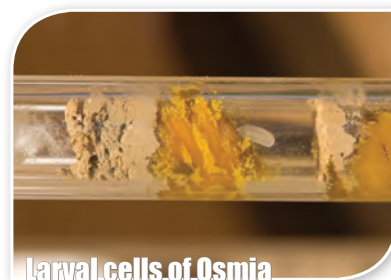
**European honeybee**



**Solitary bee**  
*Hylaeus* sp.



**Cuckoo bee**  
*Sphecodes* sp.



**Larval cells of Osmia**



Maturing honey

## Did you know?

**WILD BEES DO NOT PRODUCE HONEY AS WE KNOW IT.**

The 'honey' that honeybees produce is in fact made out of floral nectar that is transformed, dehydrated and stored once its sugar content is high enough to make it imperishable. Therefore its primary use is as a food reserve for the adults in the nest (hive) during the months of dearth (the cold season in temperate climates or the dry season in hot climates) when bees cannot stock up on nectar. Only social species whose colonies can survive the winter season produce honey; here in Europe, only the honeybee fits the bill and it is kept in hives by beekeepers. Also legally speaking, only the honeybee produces what can be called 'honey'.

The life cycle of a wild bee lasts one year for most species, and it is divided into 4 different stages of development, with each phase varying in length depending on the species. The egg hatches a few days after it is laid. Then the larva emerges and takes only a few weeks to eat up all of the pollen and nectar reserves before metamorphosing into a pupa, whereupon it stays enclosed inside its chamber without eating for several months. The adult bee finally emerges between the start of spring and the end of summer of the following year, depending on the period of activity of each species. Therefore, most wild bees spend the winter in the larval or pupal stage, when they do not feed and so they do not need to produce honey.

Although bees feed themselves and their larvae exclusively on floral pollen and nectar, different species can nonetheless be distinguished by their food preferences. Certain



species forage a wide range of plants (generalists), whereas other bees only forage one particular species or group of plants (specialists). This specialization determines at which period of the year the bees are actively in flight. For example, the Ivy Bee (*Colletes hederæ*) gathers pollen almost exclusively from ivy (*Hedera helix*), and therefore can only be found in the autumn, when the ivy plants are in bloom.

### >> Essential insect pollinators

The world of wild bees is therefore a treasure trove of outstanding variety. Scientific research carried out in 2013 showed that this diversity provides the key to ensuring effective pollination<sup>2</sup>.

Bees are the undisputed champions of pollination, thanks to their specific pollen gathering structures, and tufts of hair used to trap the pollen grains. They fly about in search of food, and as they go from flower to flower, often of the same species, they take on the task of transporting pollen grains from the stamen (the male reproductive organ of the flower) all the way to the stigma (the receptive surface of the pistil, and the flower's female reproductive organ).

<sup>2</sup> Garibaldi et al., 2013. Wild pollinators enhance fruit set of crops regardless of honey bee abundance, *Science*, Vol. 339, no. 6127, pp. 1608-1611

This foraging process ensures that pollination is carried out, a vital prerequisite to the sexual reproduction of flowering plants, and therefore the production of fruits and seeds.

### **In Europe, 80% of wildflower species depend on insect pollinators.**

Therefore, bees and other wild pollinators help maintain the natural balance and diversity of different environments. The decline of these **KEYSTONE SPECIES** would have widespread impact on the entire ecosystem. Therefore, we have no other choice but to be acutely aware of the current decline of insect pollinators, and remain alert to the potential catastrophic consequences. Indeed, this invaluable service is also extended (and free of charge too!) to agricultural production, on which human beings depend. For example, it plays a direct part in the production of most fruit and vegetable we consume, as well as oilseed crops and seeds for sowing, as 70% of cultivated plant species depend on pollination by insects, and mainly by bees<sup>3</sup>. Therefore, insect pollinators play an indispensable role in agriculture, but their contribution is even more far-reaching than that because of their essential role in insuring the reproduction and evolution of wild flora and, by extension, wildlife, through fruit and seed production.

### **>> Bee decline and threats**

Close monitoring carried out by beekeepers and scientists has brought to light an alarming decline in honeybee colonies. Several research findings have confirmed that this decline also extends to wild bee populations. In 2006, figures revealed a distressing 52% loss of diversity in areas studied in the U.K., and 67% in the Netherlands, compared to figures recorded prior to 1980<sup>4</sup>. In certain areas of Europe over 65% of the wild bee populations were reported to be in decline<sup>5</sup>.

#### ***There are several reasons to explain this decline:***

➤ **THE DESTRUCTION AND FRAGMENTATION OF HABITATS** caused by intensive farming, urbanization and building road infrastructure lead to genetic erosion and isolated populations. Destroying hedgerows, bocage and natural meadows, draining wetlands, over-mowing or cutting roadside embankments, and impoverishing soil due to the increasingly artificial state of the landscape: all of these elements conspire to create a deficit in food and nesting resources for bees.

➤ The widespread use of **PESTICIDES** in conventional farming, but also by local authorities and private gardeners, can lead to deadly behavioural disorders in bees (especially insecticides). It can also cause disruption to their immune system, which makes them more vulnerable to parasites and disease and often leads to death.



<sup>3</sup> Klein et al., 2007. Importance of pollinators in changing landscapes for world crops, Proceedings of the Royal Society B: Biological Sciences, Vol. 274, pp. 303-313

<sup>4</sup> Biesmeijer et al., 2006. Parallel declines in pollinators and insect-pollinated plants in Britain and the Netherlands, Science, Vol. 313, pp.351-354

<sup>5</sup> Patiny et al., 2009. A survey and review of the status of wild bees in the West Palaearctic region, Apidologie, Vol. 40, pp. 313-331



➤ Over the last few decades, we have seen our crops become increasingly **UNIFORM**, and we have witnessed the drop in crop rotation and the practice of growing legumes. Furthermore, natural meadows have been gradually replaced by vast cereal fields, even though these areas are devoid of any interest for bees and a large part of wildlife. Cities take a tough line on self-seeding plants, preferring **EXOTIC** species and horticultural plant varieties that have been highly modified,

and are often ill-adapted to the local fauna with poor supplies of pollen and nectar. These trends also end up interfering with the food supply of insect pollinators.

➤ Further causes of this decline which are specific to the honeybee include the worldwide spread of invasive parasites such as *Varroa destructor* (an Asian species of parasitic mite that targets adult bees, larvae and pupae) or *Nosema* (a fungus genus which includes certain parasitic species such as *N. apis* and *N. ceranae* that live in the gut of adult honeybees) and invasive predators such as the Asian predatory wasp, also known as the yellow-legged hornet (*Vespa velutina nigrithorax*).

## >> **Providing a home for wild bees in the city**

Considering the destruction of habitats in agricultural and semi-natural zones, coupled with the pesticide contamination of our environment, urban and residential areas can provide a welcome refuge for numerous species. And this applies to wild bees in particular. So far, 262 different bee species have been identified in Berlin<sup>6</sup>, 110 species in residential gardens in New York<sup>7</sup> and 293 species in Greater Lyon<sup>8</sup>.

### ▪ **Indeed, urban and peri-urban areas offer several advantages to wild bees:**

- The use of fewer pesticides than in conventional intensive farming areas;
- Cities are 2 to 3 °C warmer than the surrounding countryside. Bees, which are thermophilic insects, are attracted to warm environments for building their nests;
- An abundance of flowers can be found in parks and gardens, spread throughout most of the year;
- Our cities also provide surprising nesting opportunities: cracks in uneven walls, piles of wood or sand, patches of exposed earth and trampled ground...
- Yet these advantages need to be further reinforced by implementing an ecological action plan for green space management that stops the use of pesticides, as well as introducing appropriate measures for enhancing biodiversity and wild bees.

<sup>6</sup> Saure, C., 1996. Urban habitats for bees: the example of city of Berlin, in *The Conservation of Bees*, Aca, London, pp. 47–52

<sup>7</sup> Fetridge et al., 2008. The bee fauna of residential gardens in a suburb of New York city (Hymenoptera: Apoidea), *Annals of the Entomological Society of America*, Vol. 101, pp. 1067–1077

<sup>8</sup> Fortel, L., Henry, M., Guilbaud, L., Guirao, A.L., Kuhlmann, M., Mouret, H., Rollin, O. & Vaissière, B.E. (2014) Decreasing abundance, increasing diversity and changing structure of the wild bee community (Hymenoptera: Anthophila) along an urbanization gradient. *PLoS ONE*.

## >> A favourable legal and political context

In 2012, 76% of the European population lived in urban or peri-urban<sup>9</sup> areas. Therefore, taking a sustainable development approach to land planning, and keeping up the fight against urban sprawl are both major issues in French as well as European politics today.

In France, the Grenelle Environment talks that opened in 2007 triggered a drive towards a more ecological approach to land planning, most notably through the commitment to renew the country's **GREEN AND BLUE INFRASTRUCTURE NETWORK**. In 2009 came the launch of the «Urban Nature» programme («Nature en Ville») alongside the «Urban Green Infrastructure» research programme («Trame verte urbaine»), with both projects making urban spaces the focus of this new approach. The challenge in the upcoming years will be to increase city density, and at the same time enhance citizen wellbeing, while actively working towards protecting biodiversity. This requires a whole rethinking of our model of the ideal city, whereby urban spaces are brought back into harmony with the ecological network, and biodiversity is placed at the heart of our parks, gardens and buildings.

The Grenelle also helped to launch the Ecophyto action plan that is aimed at reducing the use of pesticides in France. In January 2014, the French parliament passed a new law<sup>10</sup>, that will come into effect on 1st January 2020, and which will set a ban on the use of **PESTICIDES** by the French state, local authorities and public institutions in public green spaces. And on January 2022, this ban will also be extended to private spaces, excluding farmland.

Insect pollinators certainly have not been left out of this drive: the French Ministry of Ecology is currently overseeing the drafting of a National Action Plan to protect wild pollinators. Therefore it was natural for the **URBANBEES** project to focus its efforts on urban and peri-urban habitats, which are also ideal spots for raising public awareness.

<sup>9</sup> Eurostat, 2012. Urban-intermediate-rural regions. Around 40% of the EU27 population live in urban regions... and almost a quarter in rural regions. News release 51/2012, 30 March 2012.

<sup>10</sup> Law n°2014-110 of 6 February 2014 aimed at providing a better framework for pesticide use on French land.

## **5 years of positive action to help wild bees thrive in the city**

### **1) Goals**

The Life + Biodiversity **URBANBEES** Programme (2010-2014) aims to develop a validated management plan to conserve and enhance wild bee abundance and diversity in urban and peri-urban habitats by gaining a more solid understanding of their biology, and by raising awareness about them. This ultimate goal has been broken down into a set of individual objectives:

✚ Boosting the number of wild bee-friendly areas in the urban community of Greater Lyon, the area where the programme is anchored;

✚ Adapting conventional green space management practices in urban areas so as to encourage native flora and fauna to thrive;

✚ Using the theme of wild bees as a vehicle for raising awareness about biodiversity and ecosystem services amongst city dwellers across Greater Lyon, France and Europe and focusing their attention on the vital role played by biodiversity;

✚ Developing and testing a management plan designed to conserve and enhance wild bee biodiversity in urban and peri-urban habitats and disseminating it throughout the population.



## Without them, URBANBEES would never have been possible

### ▪ Partners

This project is built upon a close working collaboration that has united a group of partners over several years, all working together to conserve and enhance urban biodiversity by combining their skills and know-how to put together joint actions.

The scientific and administrative coordination of the project was carried out by the Abeilles & Environnement Research Unit of the **INSTITUT NATIONAL DE LA RECHERCHE AGRONOMIQUE (INRA)** based in Avignon. INRA was mainly involved in setting out the preparatory phase and collecting and identifying the bees, as well as analysing the full body of results gathered from the project and validating and disseminating the findings.

The association **ARTHROPOLOGIA** took on the role of operations coordinator, and has lent its expertise and field experience to help with collecting, preparing and identifying the bees and plants for research. It has also taken care of organizing the awareness raising initiatives and professional training, setting up special events targeted at schoolchildren and the general public, as well as developing communication tools and drawing up the management guide.

The green space management teams from the **CITY OF LYON** and **VILLEURBANNE** have put to good use their experience as well as their in-depth knowledge and understanding of the study sites to implement concrete measures for the programme. They have also been involved in drawing up the management plan aimed at conserving and enhancing wild bee abundance and diversity.

In a bid to develop public awareness, the **SOCIAL SCIENCES DEPARTMENT OF THE UNIVERSITY OF LYON** has coordinated the touring exhibition throughout the Rhône-Alpes region, designed a game centred around the theme of nature's place in the city, and rallied together its network of professors, students and other collaborators to help spread information to the general public and school children about the different actions carried out within the programme.

The **NATURAL HISTORY MUSEUM OF LONDON** joined the project to provide scientific expertise, and has been involved in designing and disseminating the management plan as well as the international exhibition.

The **10 LOCAL DISTRICTS** and **INSTITUTIONS** which set up the **URBANBEES** sites from 2010 to 2012 were also key partners to the programme: Collonges au Mont d'Or, the Grand Moulin de l'Yzeron in Francheville, Grigny, Limonest, Meyzieu, Saint-Priest, Sainte Foy-lès-Lyon, the Syndicat Mixte des Monts d'Or, the Syndicat Mixte du Rhône des îles et des Lônes and the VetAgro Sup campus.

▪ **Financial backers**

The **URBANBEES** project was funded by:

- The **EUROPEAN UNION**. The LIFE+ Biodiversity projects are funded in part by the European Commission and aimed towards helping to reduce the loss of biodiversity across the member states. These projects set up a range of new pro-biodiversity initiatives that cover putting measures into practice, testing their impact and then disseminating the findings, all with a view to ensuring that these same projects can be easily reproduced throughout Europe;
- The **FRENCH MINISTRY OF ECOLOGY, SUSTAINABLE DEVELOPMENT AND ENERGY**;
- The **RHÔNE-ALPES REGION**;
- **GREATER LYON**;
- The retail chain **BOTANIC®**;
- The **COMPAGNIE NATIONALE DU RHÔNE** (a French electricity generation company).



## 2) Helping wild bees find a home in the city

The **URBANBEES** programme was masterminded by a team of partners from the Greater Lyon area and beyond who were all united in their concern to reverse pollinator decline, and who have focused their efforts on taking concrete steps to help wild bees thrive on their territory: installing especially adapted nesting structures, and promoting the use of ecological green space management practices...

### Unusual installations

Both within the city and on its outskirts, a number of factors have combined to lead to a severe nesting resource crisis for wild bees, which is only made worse by a deepening food crisis. These factors include the increasingly artificial state of the soil cover, the trend to plant exotic and horticultural species, frequently cutting short areas of grassland and roadside embankments, and regularly pruning or, indeed, cutting down hedges. We therefore decided to design and install specialized structures to provide a welcoming environment for our distinguished guests. We have also examined their nesting requirements, and set up communication tools to keep the general public informed about our installations.

#### ➤ BEE HOTELS

Bee hotels are large, wooden structures fitted out with cavities that are especially designed to serve as nesting sites for certain wild bee species. To cater to the ecological needs of a wide range of species, the separate hotel compartments are filled with either logs pierced with holes, hollow stems, pithy plant stems, all from identified species of local origin inasmuch as possible, or soil. Field research carried out on the various bee species nesting in **URBANBEES** bee hotels helped to reveal their preferences, or lack of, for certain plant species material. In view of these results, we recommend that you use a diverse assortment of wood and stems, and in particular:

- For the logs: elder (*Sambucus nigra*), poplar (*Populus* spp.), sophora (*Sophora japonica*) and plane trees (*Platanus x hispanica*)
- For the stems: elder (*Sambucus nigra*), reed (*Phragmites* sp.), giant reed (*Arundo donax*), bamboo (Bambuseae spp.), *Ailanthus* spp. and *Buddleia* (*B. davidii*).

#### ➤ AN INSECT SPIRAL

This low stone wall built in a spiral shape and topped with lean soil and stones is designed to warm up and dry the soil so as to encourage aromatic plants to grow, as they are a rich source of nectar and pollen for wild pollinators.

A multitude of small animals (bees, ladybirds, beetles, spiders, lizards...) can find room to nest at the base of the spiral in between the stones. Niches and nesting sites can also be added to house hedgehogs, reptiles or troglodytes (animals living underground).



Wild bee hotel on the  
URBANBEES site in the  
Parc Feyssine - Villeurbanne



Aromatic plant insect spiral  
on the URBANBEES site in the Parc de Gerland - Lyon



## ➤ SOIL SQUARES

The goal of the 9 squares of bare soil that were set up at each of the 16 urban or peri-urban **URBANBEES** sites was to attract **GROUND-NESTING BEES**, THAT MAKE UP **70% OF ALL BEE SPECIES** and study their nesting habits.

To gain greater insight into whether bees have a soil preference for nesting, each square was filled with a different mixture, made up of soil combined with varying proportions of sand and / or clay (10%, 20% or 30%).



Soil squares on the  
URBANBEES site in  
IUFM - Villeurbanne



Wildflower meadow

planted near  
URBANBEES installations

## ➤ A WILDFLOWER MEADOW

Wildflower meadows were sown on certain sites. The seed mix used was made up of native flowers that are rich in nectar and/or pollen to attract wild pollinators.



Information panels

put up on the URBANBEES  
site in the Parc de la Tête  
d'Or - Lyon

## ➤ DISPLAY PANELS

To explain our project, all the **URBANBEES** installations were accompanied by special display panels providing visitors with information on wild bees, their different nesting habits and the **URBANBEES** programme.

Between 2010 and 2011, 16 sites were set up across Greater Lyon, each selected in accord with our local district partners. All of the work to set up these sites was carried out by the green space operators from the different local districts on board the project, alongside staff members from the association ARTHROPOLOGIA, the Brigades Vertes du Rhône (a reintegration programme focused on green space projects) and with the help of local volunteers during the eco-volunteer days.

Once the installations were set up, the first bees began building their nests in them with the first signs of spring, gathering pollen and nectar from the surrounding flowers, and laying eggs in the cavities inside the bee hotels and in the soil squares. Then throughout the following spring and summer, different species emerged from the hotels and soil squares. The male bees emerged first and went out in search of females, and then females went out in search of pollen and nectar to feed their larvae.



Insect spiral being built with the help of the  
Brigades Vertes from the Rhône General  
Council - Collonges au Mont d'Or



**Urban grassland area**  
*left uncut - Strasbourg*



**Self-seeding plants**  
*City of Montpellier*

## Which form of urban green space management is best tailored to bees?

Beyond these installations, the **URBANBEES** programme was also aimed at encouraging cities to introduce ecological land management measures that make green space better adapted to wild bees, but also better tailored to conserving and enhancing biodiversity overall. This framework was developed through:

- Stopping urgently the use of synthetic pesticides;
  - Setting up differentiated green space management plans all designed to be adapted to each specific land use, and reducing human interference: spacing out grass cutting work (which is a better alternative to mowing) and stopping systematic tree pruning...
  - Being more tolerant about letting nature takes its course (e.g., allowing self-seeding plants to grow on pavement edges and in parks, giving spaces over to self-management, leaving dead wood and pruning debris or grass clippings on site);
  - Providing varied natural habitats, such as ponds and hedges;
  - Choosing native plants that are adapted to the needs of local bee species as well as the climatic conditions of the surrounding habitats;
- Curbing the spread of artificial environments by limiting impervious surfaces as much as possible and maintaining areas of exposed earth (paths and trampled zones) and roadside embankments;
- Reinforcing ecological continuity between natural habitats.

To encourage people to introduce these management practices, the association ARTHROPOLOGIA and the Bees and Environment unit at INRA took active steps to approach and communicate with the different parties responsible for green space design, planning and management.

## Raising the awareness of elected officials

The success and quality of environmental policies mainly hinge on the motivation and drive of influential decision-makers. Therefore steps were made to raise the awareness of elected officials from all the local districts throughout Greater Lyon, through preliminary meetings set up to prepare and organize the programme, as well as official inaugurations that were staged at each site, and also by organizing discussion forums, all designed to



**Inauguration of an URBANBEES site**  
*- Grigny*

focus their attention on the issues connected to protecting wild bees and the importance of biodiversity and ecosystem services. For example, the «Bees» seminar that was organized in June 2013 brought together a total of around 130 elected officials and technical agents from across Greater Lyon. Local districts that were not able to attend these events were invited to meet on an individual basis.

## Training up green area operators

Setting up an ecological green space management framework first requires land operators to understand the management choices that have been made, and to gain a firm grasp of the methods and new approaches that are to be used. During the course of the **URBANBEES** programme, six training sessions organized by ARTHROPOLOGIA enabled a total of 72 green space managers from Lyon, Meyzieu, Sainte Foy-lès-Lyon and Villeurbanne to learn about the crucial role played by wild pollinators in sustaining ecosystems, as well as the measures to be implemented for their protection. Sixteen 2-day training sessions and 26 half-day training sessions were also organized, bringing together a total of 1,400 farmers, professional trainees, and students from agricultural and horticultural colleges. This training in wild bee diversity and ecology triggered management changes throughout most of the institutions involved, and also inspired them to set up their own specialized installations and monitor wild bee diversity on their territory.



### 3) Gaining a deeper understanding of wild bees

The **URBANBEES** installations were also used for scientific research. Between 2010 and 2013, the teams from the Bees and Environment unit at INRA and ARTHROPOLOGIA monitored the wild bee populations using a standard protocol as follows. Following Westphal et al. (2008), two main techniques were used together for this monitoring:

Westphal C, Bommarco R, Carré G, Lamborn L, Morison N, Petanidou T, Potts SG, Roberts SPM, Szentgyörgyi H, Tscheulin T, Vaissière BE, Woyciechowski M, Biesmeijer JC, Kunin WE, Settele J, Steffan-Dewenter I. 2008. Measuring bee biodiversity in different European habitats and biogeographical regions. Ecological Monographs Vol. 78, pp. 653-671.



Two sets of three different coloured pan traps were placed at each **URBANBEES** site for 24 hours, each filled with water and a few drops of detergent. Three colours are used (yellow, white and blue) representing the most commonly found flower colours to be found in the wild, and therefore the most visited by bees. This passive survey method provided a consistent way to study the bee fauna at each site;

Wild bees were also sampled with insect nets to be able to study the relationship between bees and the flower species they visited. The effectiveness of this method can vary greatly depending on the experience of the net operator, but it can identify the most popular plants visited by bees to help to develop a list of the best plants to choose in order to attract wild bees.



➤ To determine the ground-nesting bees that nested in our soil squares, emergence traps were placed for 30 min on one quarter of each square to trap the bees that came out of their nests as well as those that tried to return to their nests. Finally, to identify the **CAVITY NESTERS** building their nests in bee hotels, a sample of the logs (namely 1/8th of the holes for each log species) and 1/8th of the stems in each

compartment were taken away and placed in emergence traps. The bees that emerged the following spring and summer were collected weekly and mounted to be identified.

The task of identifying the different bee species involves studying a range of precise characteristics under a binocular microscope. In many cases, you may even need to open the mandibles, spread the legs, or go so far as removing the male genitals so as to be able to correctly identify the bee species. And, unfortunately, in order to be able to carry out these steps, the bees that were captured had to be killed. Yet the samples taken as part of this field research did not make a significant dent in the bee populations, especially when compared to the impact of the real common culprits of bee decline (e.g., habitat loss, and road traffic), and the detrimental effects were largely made up by the final measures put in place to provide a better environment for wild bees (recommending better management practices, specific installations such as bee hotels and soil squares, and guiding consumer choices...).



To enable the identification of the different specimens were all prepared in advance for examination, pinned and labeled. They were then examined under a binocular microscope to distinguish the family, genus, and whenever possible, the species. Nevertheless, most species needed an expert eye in order to be identified, and therefore the specimens were sent off to one of the few remaining specialists scattered across Europe who are experts in the particular genus of the bees considered.

All this data was used by a doctoral student from the Bees and Environment unit of INRA for her research into:

- Characterizing the wild bee community and its changes along an urbanization gradient
- Studying the relationships between wild bees and the local and horticultural flora
- Assessing the effectiveness of **URBANBEES** installations and measuring the impact on wild bees of green space management practices in urbanized areas.

In October 2014, these research findings were used to complete a doctoral dissertation, and the core of this work consisted of 3 scientific articles, one of which was published in the open access journal PloS ONE before being presented for defence (Fortel et al. 2014).

Fortel L, Henry M, Guilbaud L, Guirao A-L, Kuhlmann M, Mouret H, Rollin O, Vaissière BE. 2014. Decreasing abundance, increasing diversity and changing structure of the wild bee community (Hymenoptera: Anthophila) along an urbanization gradient. PloS ONE vol. 9, issue 8, article e104679 (<http://www.plosone.org/article/info%3Adoi%2F10.1371%2Fjournal.pone.0104679>)

#### 4) Introducing the general public to wild bees

Insects often get a bad press. Yet if you stop to take a closer look for just a few seconds, you will discover a fascinating world bursting with incomparable diversity that is also essential to our own very survival. And it is this new serious and inquisitive approach towards wild bees that the leading players behind **URBANBEES** were seeking to inspire in others.

# The URBANBEES impact in a few figures

- 40,000 hits on the website [www.urbanbees.eu](http://www.urbanbees.eu)
- 16 official inauguration ceremonies to launch each URBANBEES site
- 68 public conferences attracting 4,500 participants
- 4,000 schoolchildren taught about the key nature issues through awareness raising events
- 180 wild bee hotels built during the nest-building workshops
- 12 evening classes for beginners in how to pin bee specimens and identify a small selection
- 38 discovery trails to explore wild bees in the open
- 14,800 visitors to the URBANBEES regional exhibition
- 6,000 packets of seeds handed out for growing nectariferous wild flowers
- 80,000 information leaflets and 25,000 Best Practice Guides handed out
- 11,500 households made more aware of wild bees thanks to the URBANBEES programme.



## Raising the awareness of young children and teenagers

Since 2001, the association Arthropologia has been working hard to share its knowledge and passion for nature, and more particularly insects, by setting up environmental education initiatives. Thanks to the URBANBEES programme, the ARTHROPOLOGIA team was able to stage free school events and activities focused on wild bees, and targeted at primary and secondary school students. A course of 3 half-day workshops was given to primary school pupils to introduce them to the themes of the sexual reproduction of flowering plants, the key role played by pollinators, the anatomical characteristics of different insects as well as wild bee diversity.

In addition, a whole set of tools was developed as support material to be used by students and teachers.

- The **PUZZLE SET** called De la chimère à l'insecte (Insect Chimera), is made up of cards cut out into shapes to represent the different anatomical parts of various arthropods (insects, crustacean, millepedes and arachnids), and can be used as a way of getting children to learn about insects and bees;
- The **BOARD GAME** called Alimentation (Feeding) explains the vital pollination role played by bees in the human food chain;
- The **ROLE-PLAYING GAME** called Tous ensemble autour des abeilles (Let's buzz around the bees) puts children in the shoes of various living beings and characters, and shows them the importance and complexity of the interplay between human activities and living creatures;
- Teachers were given an **EDUCATIONAL BOOKLET** which presented all of these different tools together, as well as providing information on the themes addressed during the school events and workshops. This teacher's pack is a comprehensive guide that can be used to take the work a step further, if teachers wish to continue developing activities around the theme of bees and nature.

For the second training workshop, the whole class visited an **URBANBEES** site to go on a walking tour to explore wild bees and their nesting habits. In the final workshop, the children were given the chance to make a concrete contribution to protecting wild bees through activities such as planting pollinator-friendly plants, building bee hotels for outside their classrooms, and raising the general awareness about bees amongst their friends, family and neighbours.

All of the children came out of these workshops armed with enough knowledge and tools to be able to play a significant role in the drive towards protecting wild bees and biodiversity. They were encouraged to continue pursuing their projects, and to bring their families along to take part in other **URBANBEES** events and initiatives.

Outside experts also came in to organize visits in secondary schools. These workshops lasted from a minimum of one hour up to a maximum of a full day, and took on varying forms, such as coming in to give a talk during class, showing a documentary film followed by a post-screening open debate and organizing a visit to an **URBANBEES** site.

## Explaining, raising awareness, getting involved...

Many awareness raising and communication initiatives were set up to cater for all sections of the public: adults, families, professionals and experts as well as complete beginners to the world of creepy-crawlies.

### ▪ *Finding out about the URBANBEES programme*

Throughout the programme, numerous opportunities were created for people to meet at the **URBANBEES** sites, such as at the inauguration ceremony for each of the 16 sites, and the annual open days organized in urban parks, including the Parc de la Tête d'Or and the Parc de Gerland in Lyon, and the Léon Chomel gardens in Villeurbanne. You can also find out more information about the **URBANBEES** programme by visiting our website at [www.urbanbees.eu](http://www.urbanbees.eu) or by going along to take a look at the **URBANBEES** sites that are open to the public during the day. All the specialized structures that were set up have at least one information panel nearby, and copies of the programme leaflet are available on site. Moreover, in 2013 ARTHROPOLOGIA wrote a leaflet presenting the diversity of native wild bees, which was published by the urban community of Greater Lyon<sup>11</sup>.



Schoolchildren visiting  
*URBANBEES* installations  
as part of a school  
awareness raising event

## AN INTERNET SITE TO HELP YOU FIND OUT MORE AND TAKE ACTION

The website [www.urbanbees.eu](http://www.urbanbees.eu) is packed with information explaining the **URBANBEES** programme, as well as outlining the major issues surrounding pollinator decline. In addition you will find a whole range of tools adapted to suit all sections of the public that will show you how to play your part in the drive towards protecting wild bees.

You can also sign up to the website for free in order to share your photos of bees and wildlife, and keep us updated with news of all your projects for creating favourable habitats for wild bees. So far, three annual photography contests have been organized, with the first-prize winners being awarded a year's subscription to *Image & Nature* magazine. 2014 sees the final edition of the photography contest, and this year the theme is «Urban bees».

<sup>11</sup> [http://www.grandlyon.com/fileadmin/user\\_upload/Pdf/activites/environnement/20130425\\_gl\\_guidebiodiversite\\_bees.pdf](http://www.grandlyon.com/fileadmin/user_upload/Pdf/activites/environnement/20130425_gl_guidebiodiversite_bees.pdf)

## ▪ Discovering wild bees

If you want to learn more about wild bee diversity, the vital role that they play as pollinators, and the issues surrounding their conservation, then you can come and join in on the activities outlined below.

### ↳ LECTURES

By the end of 2014, we will have organized a total of 58 lectures, as well as 10 documentary film screenings with public debates, mainly throughout Greater Lyon and the Rhône-Alpes region. As a result, the **URBANBEES** programme will have given close to 4,500 participants the chance to learn about wild bee diversity, the key role they play as pollinators, and the recommended steps to be taken for their conservation. These lectures were led by ARTHROPOLOGIA staff or by members of the Bees & Environment unit of INRA, and all of them provided an ideal opportunity to bring people into a valuable and wide-ranging discussion about bees, nature and biodiversity. So far our lectures have been hosted in Paris, Bordeaux, Brussels and beyond in Switzerland, Ireland and even as far as Canada!



*Grand Parc de Miribel  
Jonage*

### ↳ DISCOVERY TRAILS TO EXPLORE WILD BEES

Naturalists from ARTHROPOLOGIA put on guided nature tours which give members of the public the opportunity to explore the diversity of wild bees and their nesting habits. So far around 40 walking tours have been organized.



*«to explore wild bees»*

### ↳ CULTURAL WORKSHOPS COMBINING WALKS WITH GAMES

These organized tours can be followed by a board game that was designed and is led by ARTHROPOLOGIA staff and the Social Sciences Department of the University of Lyon. At the start of the game, the player is invited to build and landscape a city to suit the interests and needs of the character he or she has chosen to be, such as developer, locally elected official or a farmer, and therefore develop their ideal town planning project. Then



all of the participants take on the role of bees and have to try to move about in this newly built city, on the lookout for food, mating partners, and finally nesting sites.

This workshop has already attracted over 230 people to take part, and is an interactive way of sparking off a discussion about nature's place in the city, as well as the different types of living environments the city can provide. Since 2012, the words and questions that these budding planners have come up with have all been immortalized on the 'Urbantotems'; bee hotels with an artistic twist that have been installed by the association Atelier des Friches. By the end of the project, a total of 21 totem poles will have been erected in Grenoble, Lyon and Villeurbanne.

## 👉 TOURING EXHIBITIONS



Exhibition organized by the  
Social Sciences Department  
of the University of Lyon

**THE URBANBEES EXHIBITION**, coordinated by the Social Sciences Department of the University of Lyon, presents the phenomenon of wild bee decline, its potential impact on our daily life, and recommends the different ways in which we can take steps to safeguard these threatened species. By the end of 2014, the exhibition will have been shown in 30 different venues (schools, libraries, city halls...) across Greater Lyon and the Rhône-Alpes region, and visited by around 18,000 people.

In 2013, an **INTERNATIONAL EXHIBITION** was put together to disseminate the findings that emerged from the **URBANBEES** programme in Europe. Open to those aged 7 and over, the exhibition entitled Urban Bees – Bees in my city (Urban bees – Des abeilles dans ma ville) is designed to be both fun and informative. Inaugurated in Greater Lyon in November 2013 this trilingual exhibition (French, English and German) then headed off to the city hall of Villeurbanne before going on to Ljubljana in Slovenia. It is due to travel on to England, Belgium, Italy, Poland, Switzerland and many other European countries.

## 👉 EVENING CLASSES FOR BEGINNERS IN HOW TO PIN AND IDENTIFY BEE SPECIMENS

Over the 12 evening classes that were held by the association Arthropologia, a total of 95 participants were taught about the basics of pinning bee specimens, as well as how to use identification keys as a means of determining different families, genera and sometimes species. These workshops, which encourage city dwellers to get involved in scientific research to monitor biodiversity, use the approach of participative science.

### >> Taking action to protect wild bees

Several tools have been developed to ensure that everyone can make a solid contribution to protecting wild bees and biodiversity.

## ‘Grow’ biodiversity in your garden!

The task of helping wild bees find a home in the city requires first and foremost that we use appropriate land management schemes in natural spaces and gardens. Therefore two tools have been handed out to encourage private gardeners to adopt ecological and pro-biodiversity gardening practices.

👉 25,000 copies of the Best Practice Guide were handed out to private gardeners, providing them with the tools they need to transform their garden into a true haven for biodiversity



👉 6,000 seed packets were handed out for growing native wild flowers, containing a specially selected mix that provides an attractive food source for pollinators.



▪ **Provide a home for wild bees**



Installing a small wild bee hotel on your balcony or in your garden can sometimes make up for the lack of natural space available for use as nesting sites, especially in cities. Yet, above all it is a fantastic opportunity to take a first-hand closer look at these intriguing little creatures.

Which is why the **URBANBEES** team organized nest-building workshops which are open to all comers: schools, families, community gardens and company staff. During the workshops, participants were equipped with all the materials and tools needed to be able to saw, drill, screw, and cut up the stems and logs, plus they were given coaching by an expert from ARTHROPOLOGIA who was there to give explanations and advice. Everyone went away with their own charming little bee hotel that they could install in their garden, on their balcony, or even on a windowsill.

Since 2011, 16 of these workshops have been organized as part of the **URBANBEES** programme, bringing together a total of around 500 people and producing 180 bee hotels. Feedback on the various communication initiatives carried out during the **URBANBEES** project showed that these workshops are an excellent means of raising awareness, and also help to promote the projects developed by the participants as well as encourage them to continue in the long term to take steps in favour of wild bees.



Instructions are available to download on the **URBANBEES** website showing in great detail how to build a bee hotel tailored to your needs. You can also give free rein to your own imagination, for example, by recycling all sorts of objects such as a wooden vegetable crate, a terracotta flowerpot, an old letter box or a length of pipe...

▪ **Play an active role in the URBANBEES programme**

It would not have been possible to fill all of the bee hotels on the 16 **URBANBEES** sites without the active participation of our team of eco-volunteers. A total of 50 eco-volunteer days were organized, with the time divided up between cutting stems and drilling holes in the logs, with a bit of rest time set aside for going on a walk to discover wild bees. ARTHROPOLOGIA team members were on site to share their knowledge and expertise in exchange for the time and energy offered by the eco-volunteers.



as part of the eco-volunteer days

>> **A wide range of tools at your disposal if you want to...**

## ...Discover

more about wild bees and the **URBANBEES** programme through:

- the **URBANBEES** website: [www.urbanbees.eu](http://www.urbanbees.eu);
- the **URBANBEES** information leaflet;
- Bees, the summary leaflet published by the urban community of Greater Lyon;
- the leaflet 'The wild bees are coming to town' ('Les abeilles sauvages s'invitent en ville') published with the support of Greater Lyon.

## ...Provide

a home for wild bees in your garden

- the Best Practice Guide;
- instructions for building small and large-scale bee hotels;
- the observation sheet to keep us informed about the usage dynamics of your bee hotel.



## ...Introduce

👉 **measures that preserve and enhance wild bees and biodiversity in your city**

- the guide to green space management in urban and peri-urban spaces entitled Helping Wild Bees and Nature Find a Home in the City (Favoriser les abeilles sauvages et la nature en ville);
- the instructions for building nesting walls with single, double or triple columns;
- the instructions for building an insect spiral;
- the information panels on display at the **URBANBEES** sites, available on request and easy to alter to suit your own needs;

*Feel free to contact us about organizing a conference, an open debate or an outing, or to book the international exhibition.*

## ...Set up

👉 **environmental education initiatives centered around the theme of wild bees**

- the teacher's pack, which is available upon request;
- the different teaching tools listed on page p21., also available upon request;
- the **URBANBEES** role-playing game.

*Unless otherwise indicated, all of these tools can be downloaded from our website [www.urbanbees.eu](http://www.urbanbees.eu).*

### >> Broadening our scientific knowledge

The PhD dissertation that was completed within the framework of **URBANBEES** allowed us to examine the structure of the bee populations in Greater Lyon, as well as their nesting habits and food preferences, yet it also provided a way of gauging the real impact of urbanization on these bees:

➤ 293 bee species were captured in Greater Lyon, that is close to a third of the total number of bee species recorded in France;

➤ Bee abundance decreased with urbanization, but species richness reached a peak in peri-urban areas;

➤ Urbanization affected bee species in a selective way. Whereas short-tongued species and ground-nesting species were not affected by urbanization, there were more generalist bee species as well as cavity nesters and long-tongued species in urbanized areas;

➤ Peri-urban areas played an important role, as it was in these habitats that bee species diversity was at its maximum. Lying at the interface between the city and the countryside, these areas offer a wide variety of different habitats, and are therefore good for biodiversity. Indeed, the fact that these zones harboured the highest number of species of cuckoo bees, which are dependent on host species for survival and reproduction, confirmed that these peri-urban areas make stable and healthy functioning ecosystems.

In August 2014, the first research findings were published in the online scientific journal PloS ONE (<http://www.plosone.org/article/info%3Adoi%2F10.1371%2Fjournal.pone.0104679>) and at least two more scientific articles will be published from this dissertation both in open access, with the first one focusing on nesting dynamics in the bee hotels and soil squares, and the second one on the flowers the bees foraged upon and the plant-bee interaction along an urbanization gradient.

### >> Raising the awareness of the general public and professionals

The **URBANBEES** programme stands out from all other LIFE projects due to the crucial importance of its communication and awareness raising campaigns. The Social Sciences Department of the University of Lyon conducted a survey using questionnaires and group interviews targeted at people who were both familiar and unfamiliar with **URBANBEES** so as to measure the real impact of its communication and awareness raising measures.

The findings from this follow-up assessment highlighted the extent to which all **URBANBEES** initiatives actively complemented each other, working together to achieve the various goals:

➤ Raising awareness amongst people who are new to the world of wild bees (**URBANBEES** website; touring exhibitions, the **URBANBEES** sites and leaflets);



Evening class  
in how to prepare and  
identify wild bees

➤ Deepening people's knowledge of wild bees (evening classes focused on techniques for pinning and identifying bees and organized walks) and broadening our understanding of the issues at stake in their protection (conferences, documentary film screenings with public debates and especially designed games);

➤ Starting the ball rolling by putting theory into practice and urging people to take action (eco-volunteer days, nest-building workshops).



on the models available for download on the **URBANBEES** website

It is vital therefore that we tailor our attitude and approach, but also the nature of our actions to suit the needs of our target audience. Indeed, we also need to adapt our actions to the precise objectives we hope to achieve: begin by introducing the general theme, explore further to deepen knowledge, understand the issues surrounding conservation and finally take action...

This follow-up assessment helped us measure closely the real impact of the public events and initiatives that we set up as part of the **URBANBEES** programme. In the future, these findings can also be used as a helpful tool for anyone who is interested in organizing communication and awareness raising initiatives around the theme of biodiversity. To extend the reach and ensure that the results of the project are disseminated as far as possible, these findings will also be featured in the final report that is to be published on the **URBANBEES** programme, as well as being published in various magazines and professional journals.

### >> Endorsing an action plan to create favourable habitats for wild pollinators

The guide *Helping Wild Bees and Nature Find a Home in the City* is one of the major outcomes of **URBANBEES**. The fruit of 4 years of work taking steps to help wild bees thrive, it pools together all of the recommendations that have emerged from the project, plus an extended selected bibliography. It is anchored in the wealth of expertise provided by all of the partners involved in the project, which was further reinforced by the added contribution of some 30 participants, all of them key players in designing and managing the green spaces within Greater Lyon (from local authorities, associations, landscaping companies and environmental engineering and consulting firms). Thanks to their input in explaining the practical nature of their work, these participants were able to help us base the recommendations offered within the guide on a realistic approach, taking into account all of the pitfalls that can arise when working in the field. Furthermore, the results from the PhD dissertation insured that the guidelines provided were also founded on solid science.

This management guide was published in September 2014 and targeted at land planners and green space managers. It will be disseminated throughout Europe, firstly to promote an ecological green space management model for urban and peri-urban spaces that strives to provide a welcoming environment for bees and wild pollinators, but also to provide the appropriate tools for introducing these new practices.

## Disseminating the research findings across Europe

2014 is the year that **URBANBEES** sets out to conquer Europe! The **URBANBEES** international exhibition will be on tour throughout the year and beyond to introduce wild bees to the Belgians, Irish, Poles, Slovenians, and the Swiss... Conferences are due to be organized, led by speakers from INRA and ARTHROPOLOGIA, in an ongoing bid to target professionals working on green space sites across Europe. These conferences will be run in parallel with the task of successfully disseminating the action plan to the widest group of people possible, so as to help wild bees find a home in cities throughout Europe.



### >> After 2014, the action won't stop there!

The funded part of the **URBANBEES** programme will officially come to a close on 31<sup>st</sup> December 2014. Yet we have absolutely no intention of stopping there! The initiatives set up to help wild bees thrive will keep up their momentum:

- **URBANBEES** installations have so far proved to be highly robust, and are set to stay in place and be looked after by the local district green space departments;
- The scientific findings that have emerged from the programme will be most notably used to bolster the National Action Plan to protect wild pollinators, which is currently being drawn up by the French Ministry of Ecology.
- All of the different partners who have taken part in the programme will use the valuable experience that they have gained to pursue their initiatives on a local as well as regional and national level by organizing conferences and holding special events targeted at the general public and schoolchildren amongst others;
- The international exhibition Urban Bees – Bees in my city will continue its European tour throughout 2015;
- The association ARTHROPOLOGIA is currently consolidating a European skills transfer project so as to be able to share the knowledge and experience that was gained during the **URBANBEES** programme. This project will involve sending out fully trained agents to relay all of the information and apply this know-how in several European countries.

Wild bee (*Halictus* sp.) on daisy

**CUCKOO BEES:**

Parasitic bees belonging to several families whose females lay their eggs in the nests of females from other bee species (host species). When the eggs hatch, the cuckoo bee larvae eat up the food reserves, thus killing off the larvae of the host species. These bees are not equipped with apparatus designed especially for pollen gathering, and therefore do not actively collect any pollen.

**BIODIVERSITY:**

The variety of life amongst different species (species diversity), within species (genetic diversity) and the variety of ecosystems.

**CAVITY-NESTING SPECIES:**

Species that nest in hollow plant stems, wood or any other forms of cavity such as snail shells, rock crevices or cracks in walls.

**CROP:**

An organ beneath the oesophagus of a bee that is used to store nectar after foraging. Bees belonging to the genus *Hylaeus* spp., have no particular structure for storing pollen, and therefore transport nectar and pollen in their crop.

**EXOTIC SPECIES:**

Species that are not naturally present in the area under observation.

**GREEN AND BLUE INFRASTRUCTURE:**

A land planning tool, that was officially recognized in France during the Grenelle Environmental Summit in 2010 with the aim of reconstituting a coherent ecological network to preserve or restore the ecological continuity interlinking different natural habitats, so as to curb biodiversity erosion. The term green network is used to refer to the land network (including forests, green areas and hedgerows) and the blue network refers to the hydric network (including lakes, ponds, rivers and streams).

**GROUND-NESTING SPECIES:**

Bee species that nest in underground burrows.

**KEYSTONE SPECIES:**

Species whose contribution to the local environment is disproportionately large compared to its biomass or abundance, and whose removal would have a critical impact on the whole ecosystem. Just like a keystone in an arch, if this species disappears, the whole structure collapses.

**MIMICRY:**

A defence mechanism against predators, whereby certain animals have evolved to take on the appearance of venomous or distasteful creatures. Examples can be found amongst many insects (e.g., butterflies and hoverflies) that look indistinguishable from decidedly more fearsome species of stinging hymenoptera (bees and wasps) when in fact they do not even have a stinger. Other animals manage to survive by developing a close likeness to their environment, blending into the background as a hiding technique (e.g., stick insects and leaf insects).

**NATIVE OR INDIGENOUS SPECIES:**

Species that are naturally present in the area under observation.

**NECTARIFEROUS PLANTS:**

Plants that secrete nectar that attracts wild bees and other foraging insects. We generally focus only on measuring how attractive the plant is for bees, but the impact of the quality of the nectar for larvae remains relatively unknown.

**PESTICIDES:**

Special treatment applied to plants for protection or care. They come under two main categories - chemically produced pesticides, which are generally harmful pollutants with a long lifespan, and natural pesticides, which are generally biodegradable and with a short lifespan. The term covers herbicides, insecticides and fungicides.

**POLLINATION:**

The transfer of pollen from the stamen (the male reproductive organ of a flowering plant) all the way to the stigma (part of the pistil which is the female reproductive organ) either within the same flower, or among flowers of the same plant or among plants of the same species.

**TONGUE:**

A tubelike organ that helps bees suck the nectar out of flowers or extra-floral nectaries when present. Tongue length varies, depending on the species, thus enabling some bees to gather nectar from flowers with both shallow and deep corollas.

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