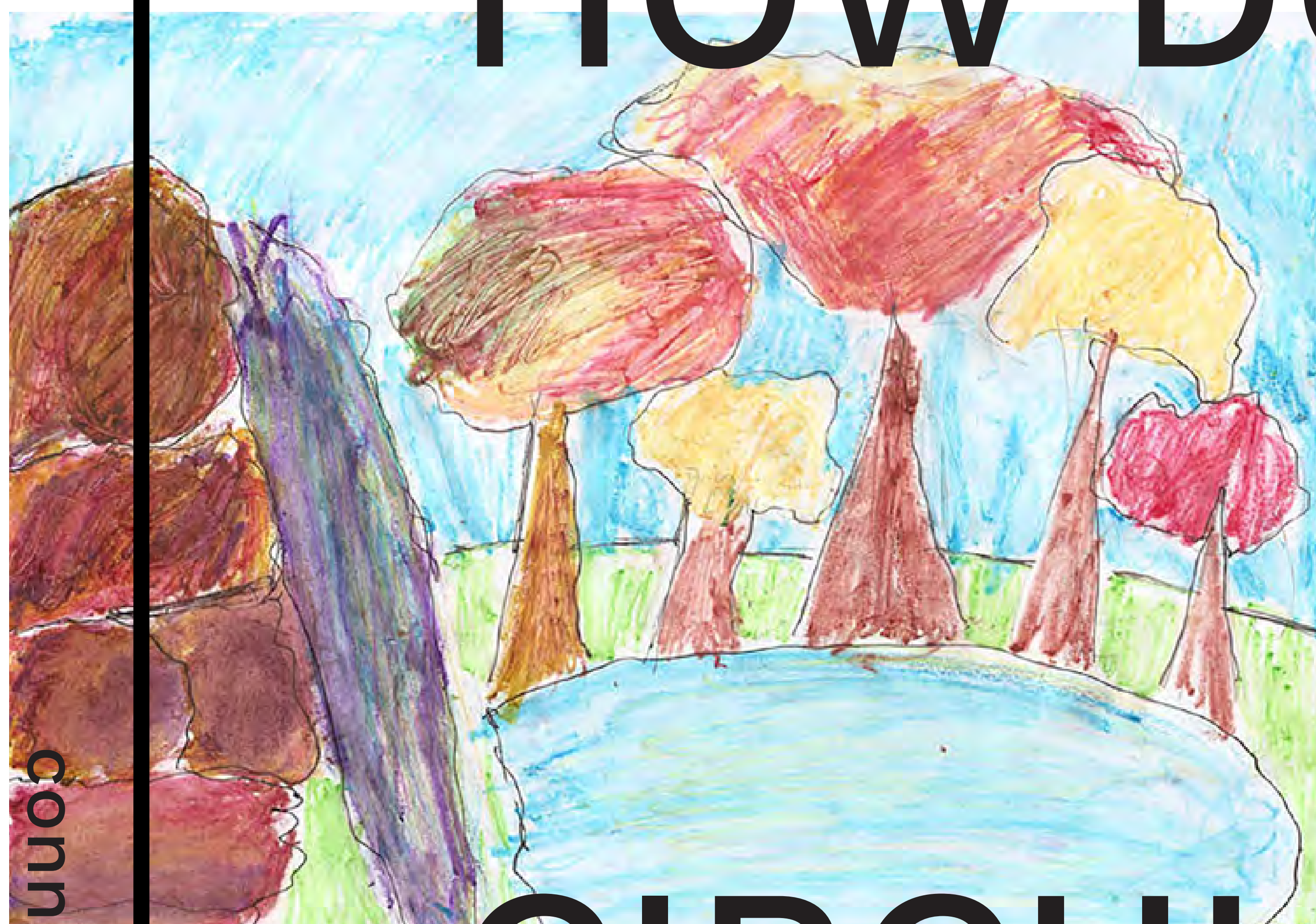
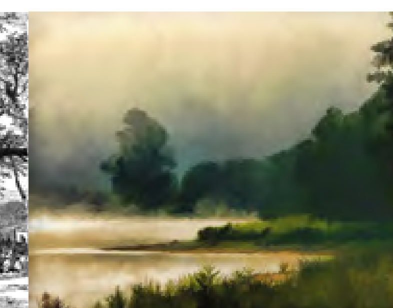
searching for biodiversity in european cities, process and goals

connectivity of green and blue infrastructures:

living veins for biodiverse and healthy cities

HOW DOES





CIRCULATE

THROUGH

?

HOW DOES

CIRCULATE

THROUGH

?

Objectives

The main objective of the BIOVEINS project is to use functional diversity (FD) to highlight the mechanisms underpinning the link between GBI, taxonomic diversity (TD) and ecosystem services (ESs) provisioning. Seven cities were selected along a S-N and W-E gradient throughout Europe allowing to include several climates and different types of urbanization (i.e. Almada, Antwerp, Lisbon, Paris, Poznan, Tartu, Zurich).

Together with local stakeholders, the ecological and interdisciplinary knowledge will be provided to identify the critical features of GBI, to guide the establishment, management and restoration of GBI, and to mitigate the effects of major urban global challenges. This main objective will be accomplished through several specific objectives by:

1.Analysing the actual and planned GBI from an urban planning perspective, and determine sampling plots;

2.Assessing the FD for a variety of taxonomic groups (i.e. woody and flower plants, leaf-dwelling bacteria, herbivorous mites, other arthropods, lichens, birds and bats) to link the considered taxa to ESs (e.g. flood protection, fixation of air pollution, pollination, climate regulation, pest control; etc.) and to determine the importance of GBI connectivity on urban biodiversity;

3.Assessing the impact of proportion, configuration and connectivity of urban GBI on provisioning and regulating ESs by an experimental and modelling approach;

4.Providing tools, best practices, and guidelines about how to improve urban GBI and how to enhance multiple ESs for people and nature.

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Activities

To reach the above mentioned objectives, the following activities will be implemented:

•Selection of sampling sites in each involved city, selected along a S-N and W-E gradient.

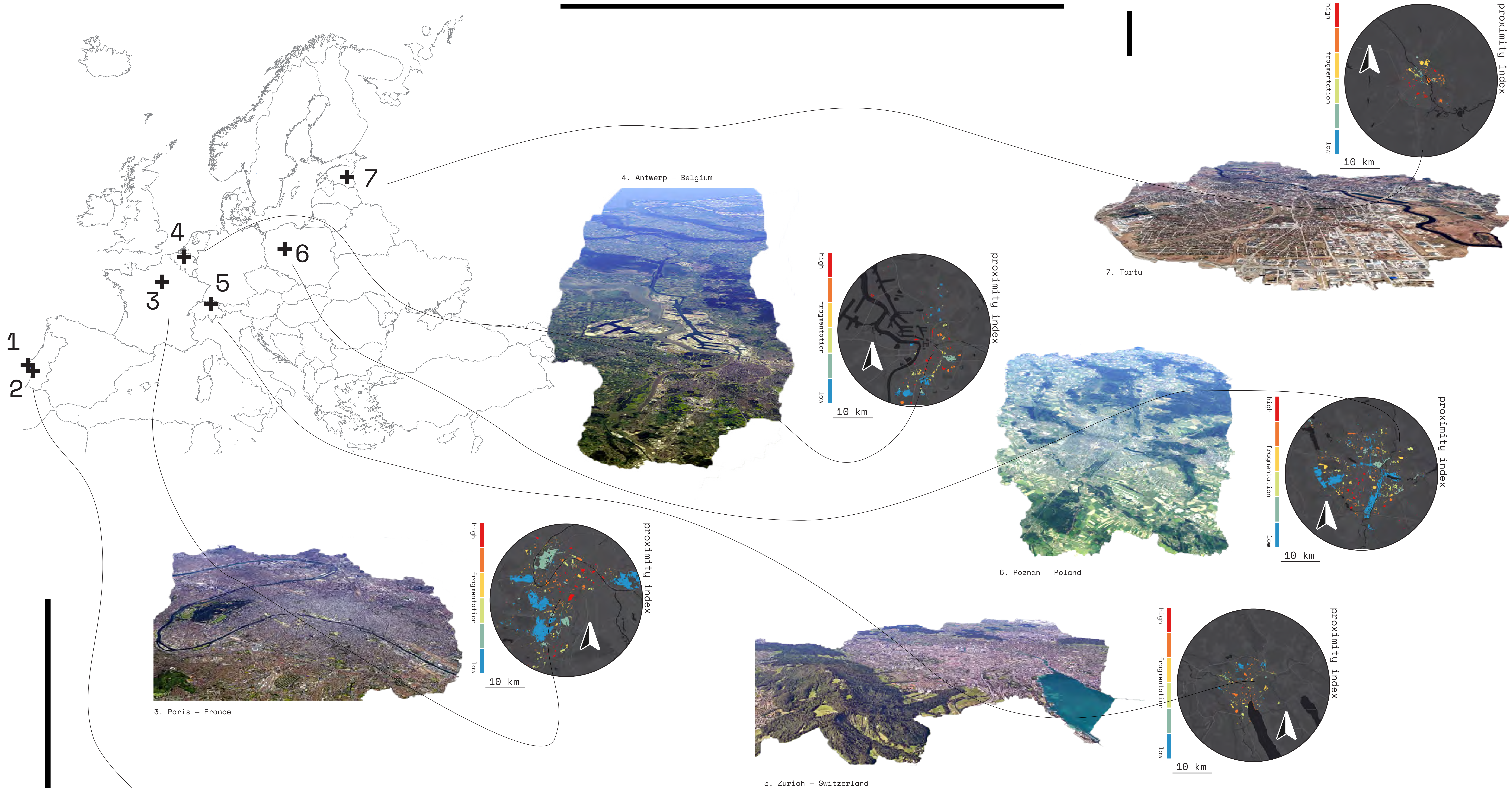
•Assessment of biodiversity and ESs' indicators in these sampling sites for distinctive taxonomic groups of plants and animals differing in their dispersion ability.

•Assessment of connectivity and size effect of urban GBI on the provision of ESs by a three-dimensional microclimate modelling approach.

•Involvement of citizens by several distinctive citizen science initiatives.

•Development of tools to guide the establishment, management, restoration and monitoring of urban GBI by involving local stakeholders.

Regular meetings between local scientists and various stakeholders will be organised during the project, as well as a general stakeholder meeting. Besides the more common scientific output dissemination via publications and scientific meetings, the project also will intensively communicate project results by setting up various citizen science projects.



1-2. Lisbon, Almada – Portugal

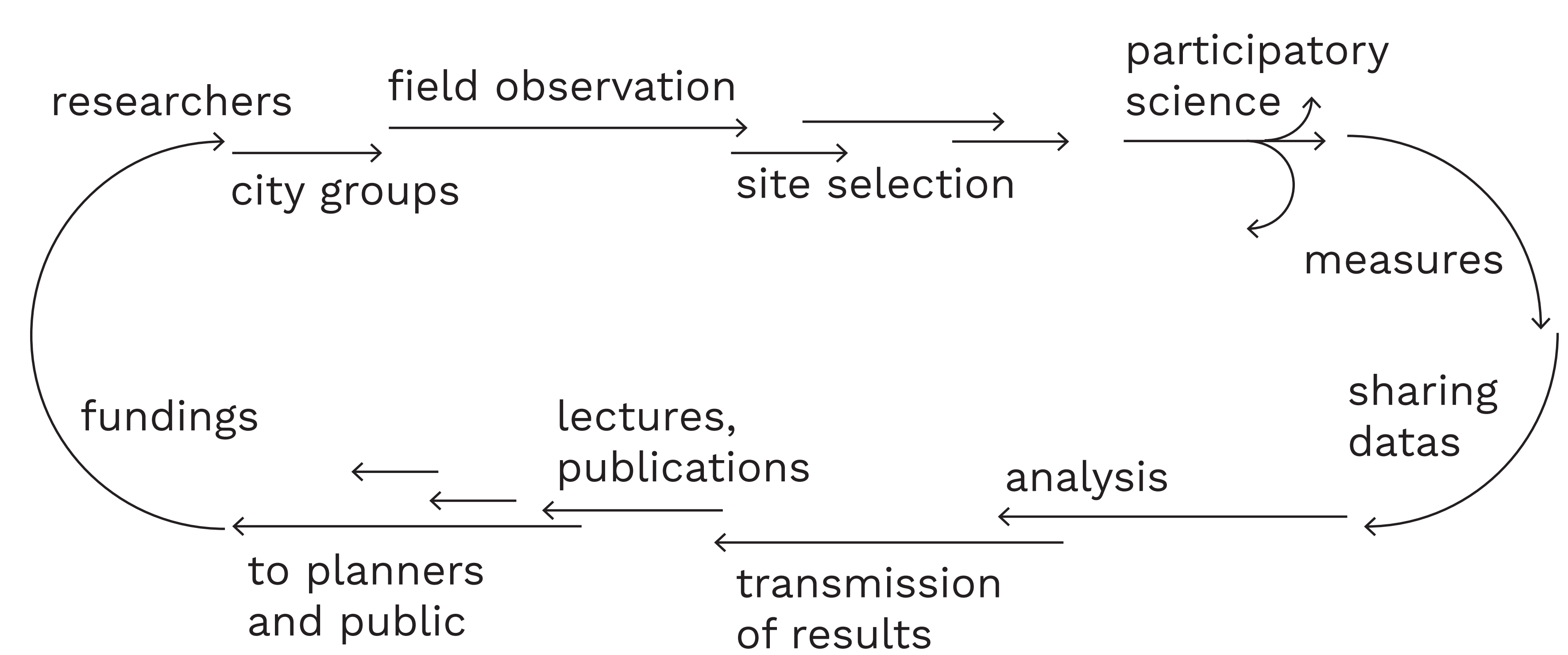
3. Paris – France

4. Antwerp – Belgium

5. Zurich – Switzerland

6. Poznan – Poland

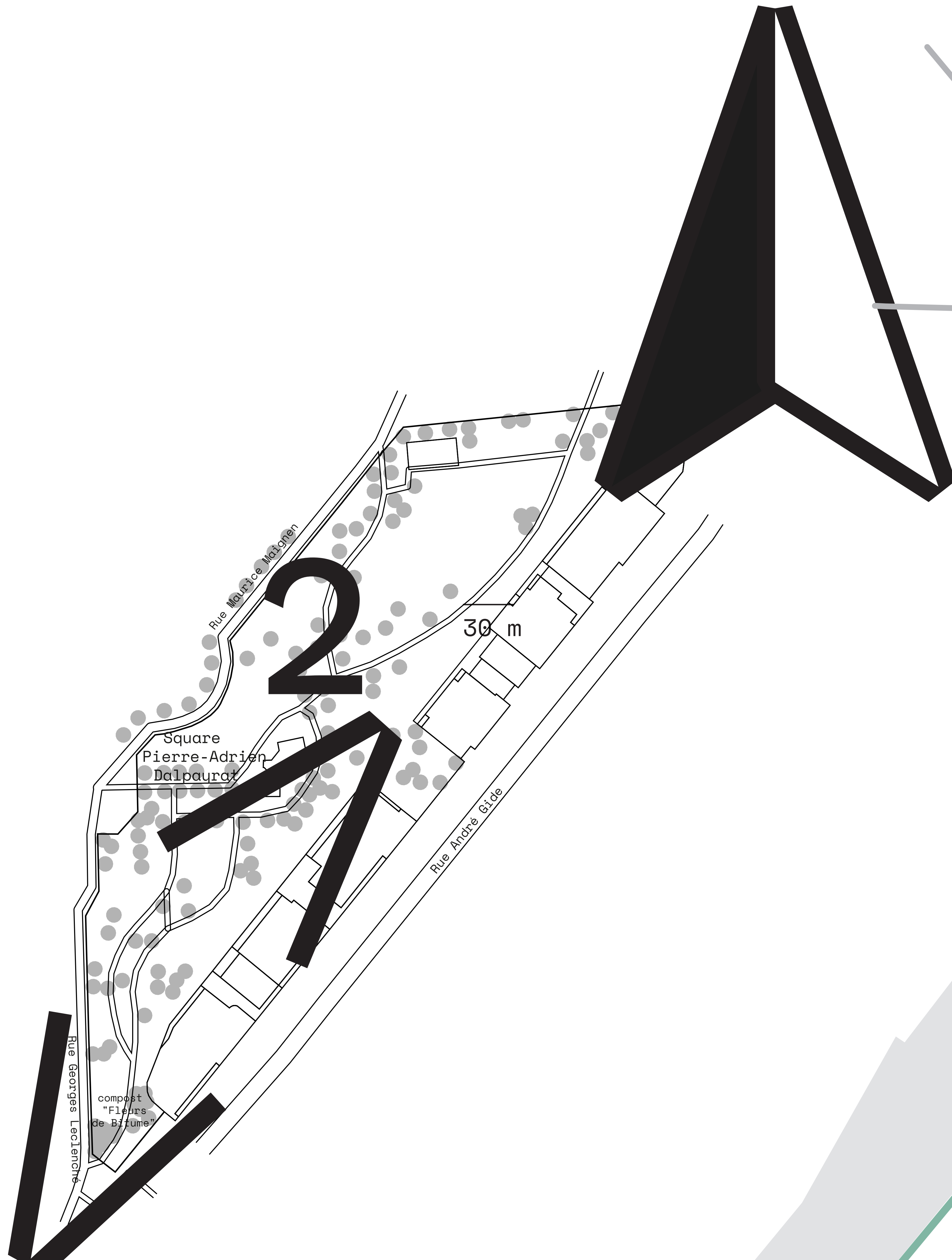
7. Tartu

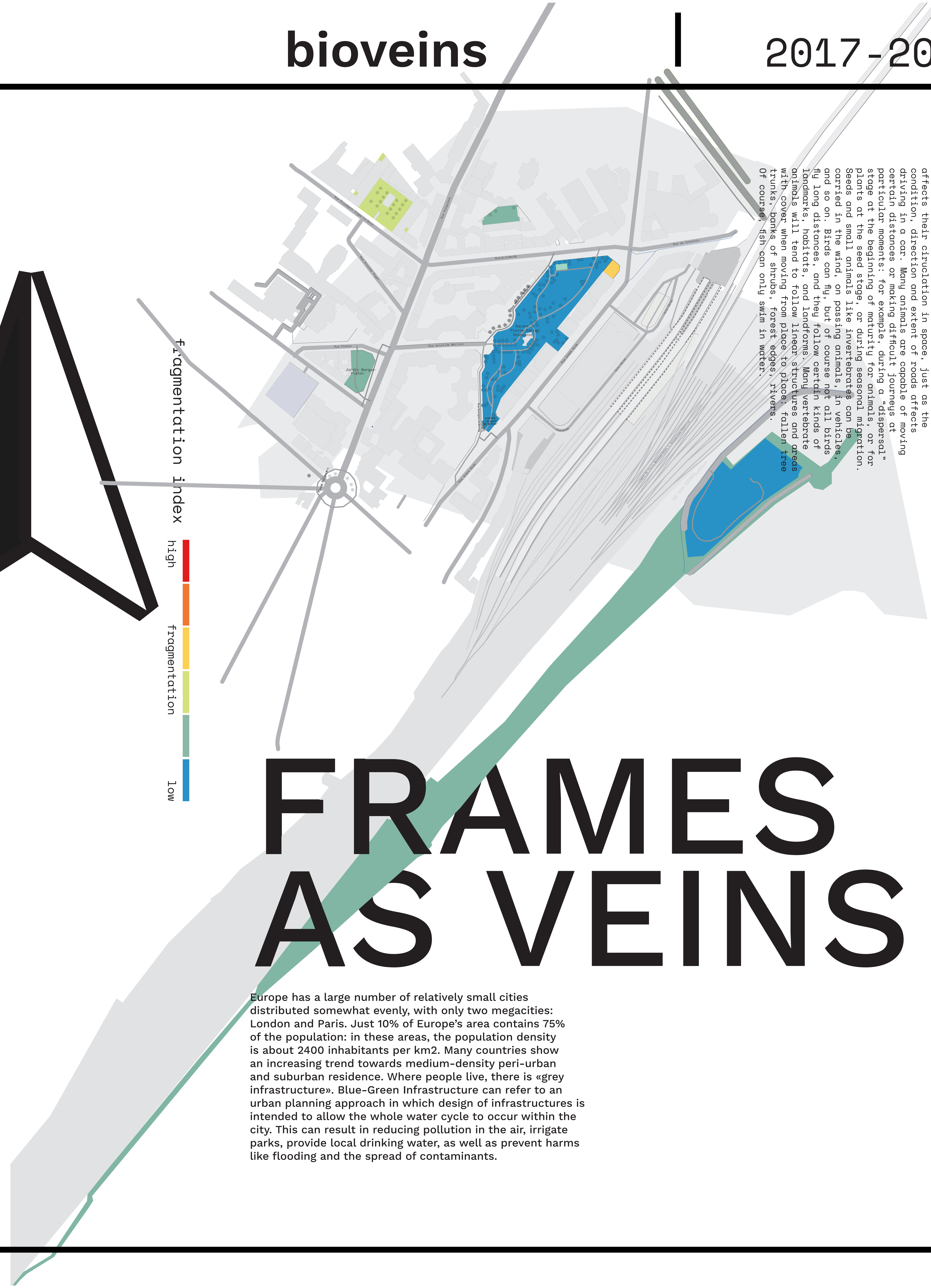


Theoretical representation
of the research process

Image Credits: vykortsmuseum.se – Aschaf / Andrea Schaffer – Martin Zeiller – Pixnio – Map of Zurich, The Street railway journal (1902), archive.org – Children Drawing Lake, torange.biz – Extract from «La Nature» 1873, L. Lhéritier, wikimedia.org frames and framgentation. about blue, grey, black and white

Fragmentation is the breaking up of a habitat into unconnected pieces. So, a forest is logged and we only have small patches of standing forest left. Or, a grassland is cut into pieces by paved roads crossing it. Or, a forest-shrub mosaic is converted into farm fields of various sizes and shapes, leaving small, isolated patches. Fragments are (1) reduced in size and absolutely small, (2) have a high edge-to-interior-area ratio, (3) are embedded in what is usually called a "matrix" habitat highly influenced by humans, which cannot be crossed by other species.





How fragments are arranged in the "matrix" makes a difference to the animals that live there, as it affects their ciruclation in space, just as the condition, direction and extent of roads affects driving in a car. Many animals are capable of moving certain distances or making difficult journeys at particular moments: for example, during a "dispersal" stage at the beginning of maturity for animals, or for plants at the seed stage, or during seasonal migration. Seeds and small animals like invertebrates can be carried in the wind, on passing animals, in vehicles, and so on. Birds can fly, but of course not all birds fly long distances, and they follow certain kinds of landmarks, habitats, and landforms. Many vertebrate animals will tend to follow linear structures and areas with cover when moving from place to place: fallen tree trunks, banks of shrubs, forest edges, rivers.
Of course, fish can only swim in water.

FRAMES AS VEINS

Europe has a large number of relatively small cities distributed somewhat evenly, with only two megacities: London and Paris. Just 10% of Europe's area contains 75% of the population: in these areas, the population density is about 2400 inhabitants per km2. Many countries show an increasing trend towards medium-density peri-urban and suburban residence. Where people live, there is «grey infrastructure». Blue-Green Infrastructure can refer to an urban planning approach in which design of infrastructures is intended to allow the whole water cycle to occur within the city. This can result in reducing pollution in the air, irrigate parks, provide local drinking water, as well as prevent harms like flooding and the spread of contaminants.

connectivity of green and blue infrastructures:

living veins for biodiverse and healthy cities

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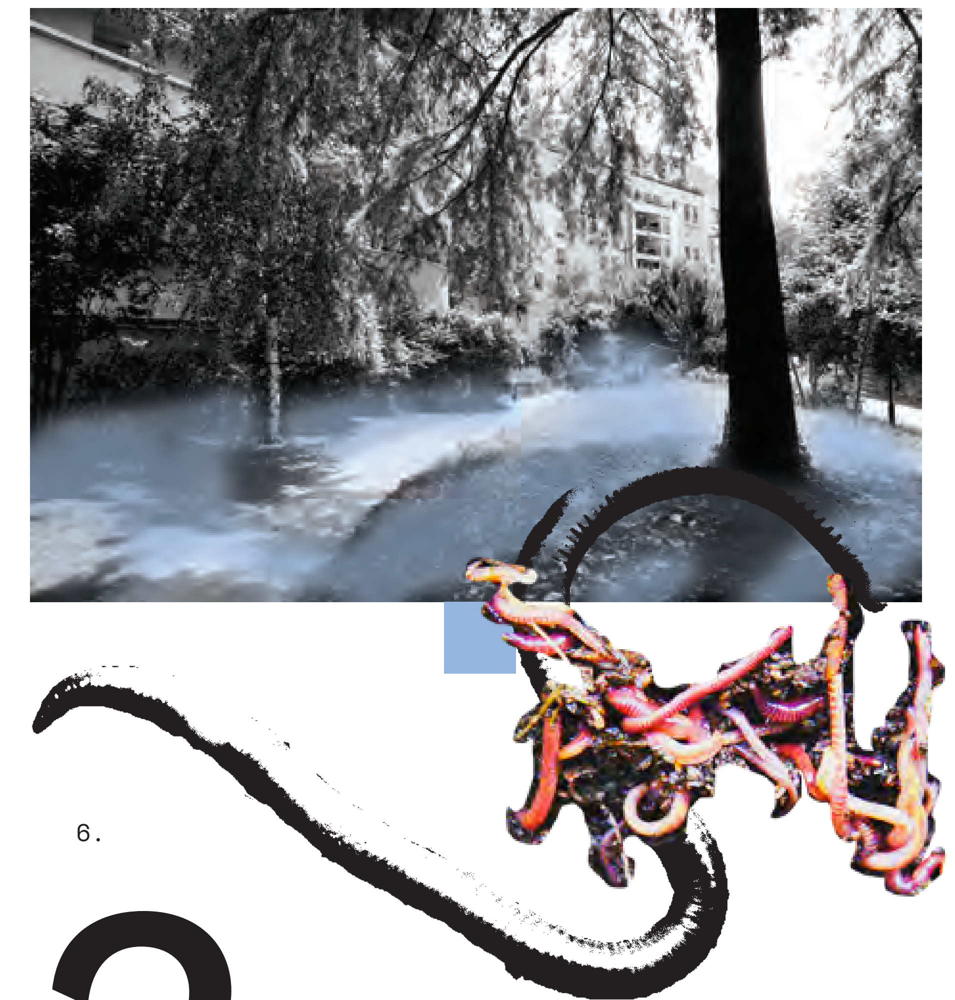

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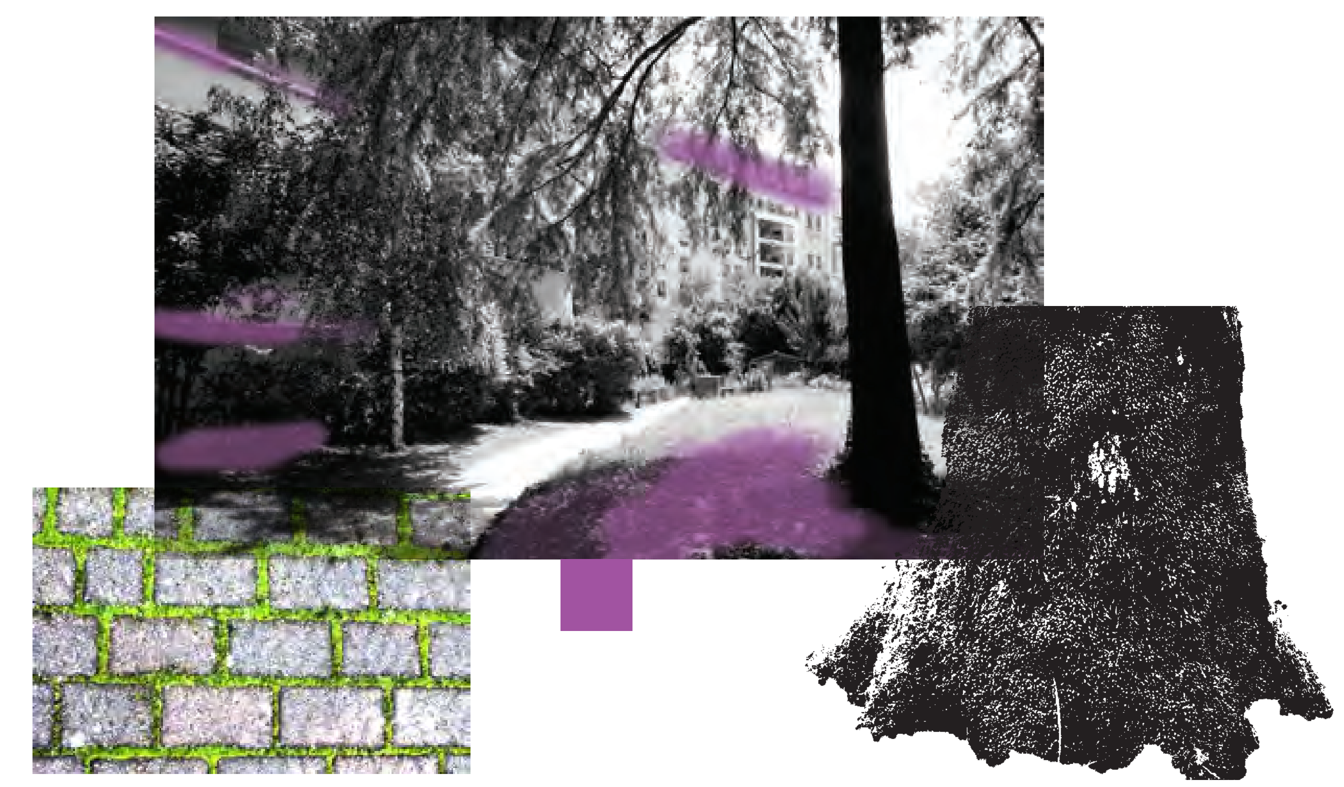

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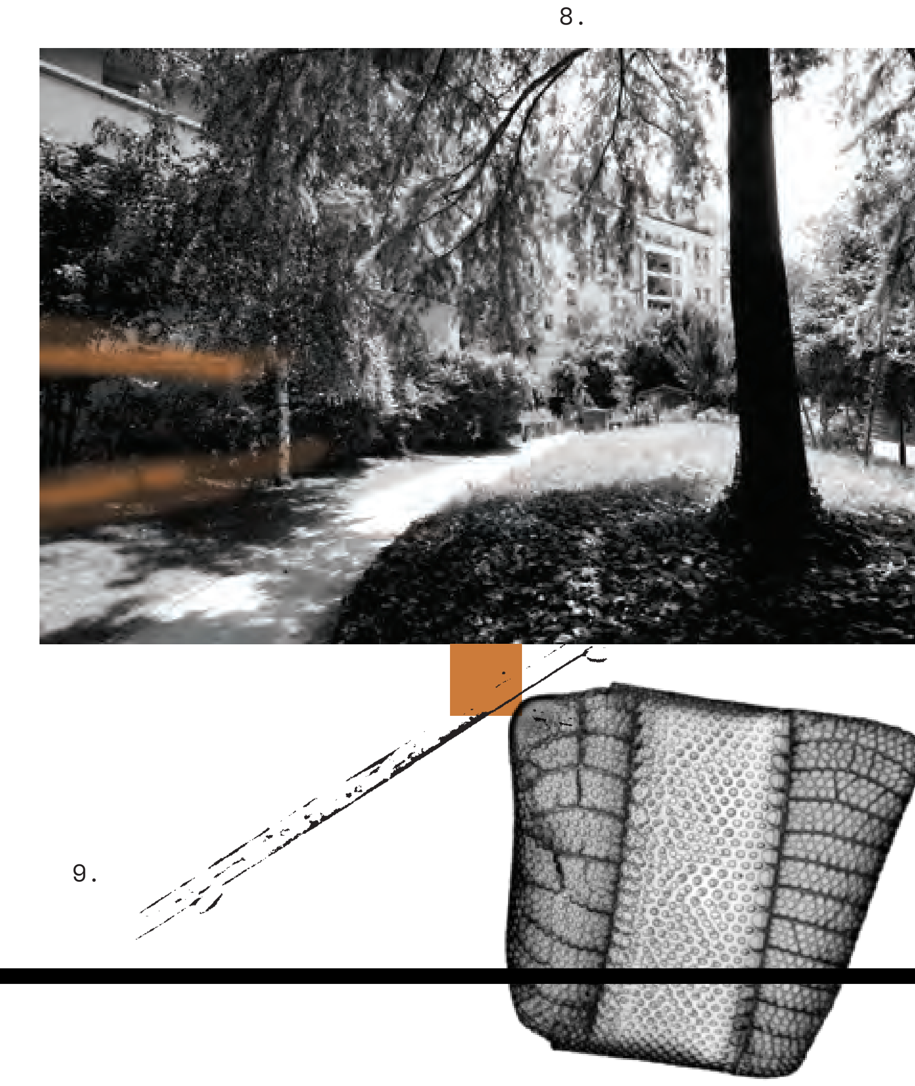

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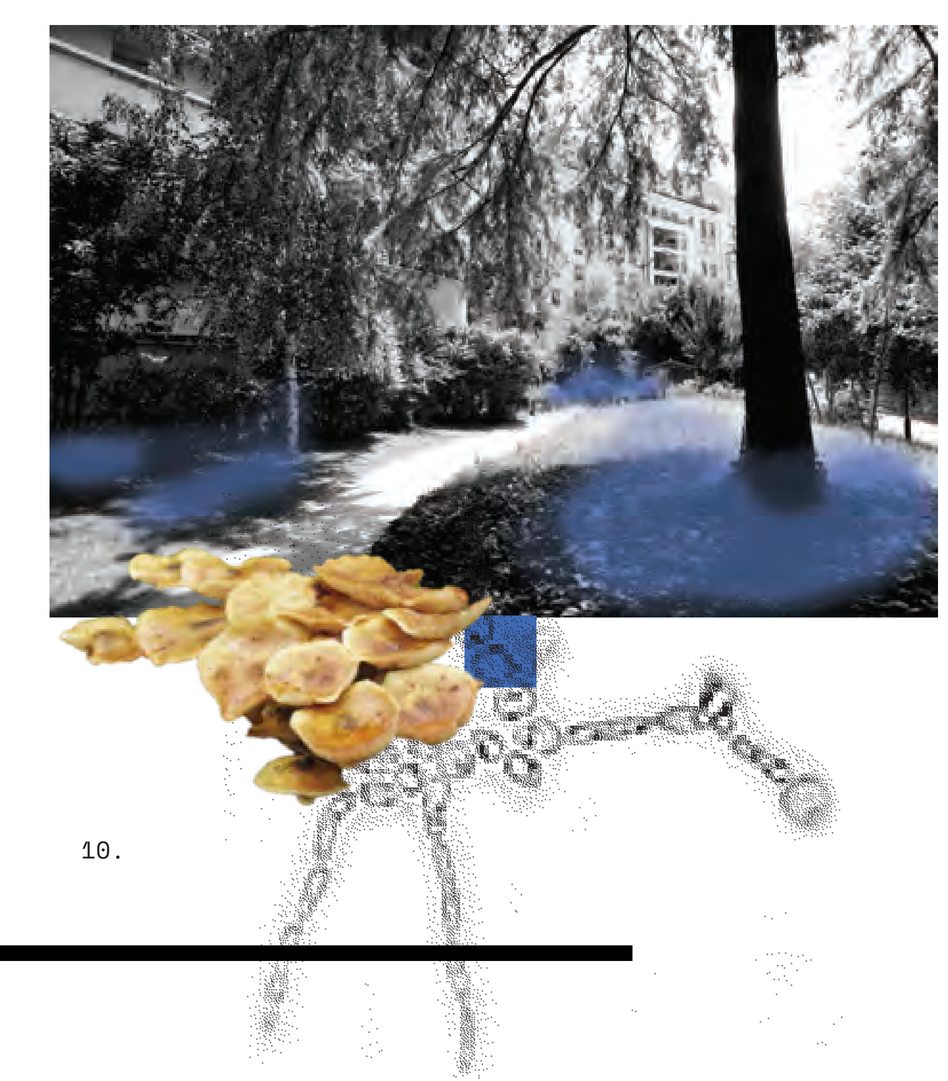


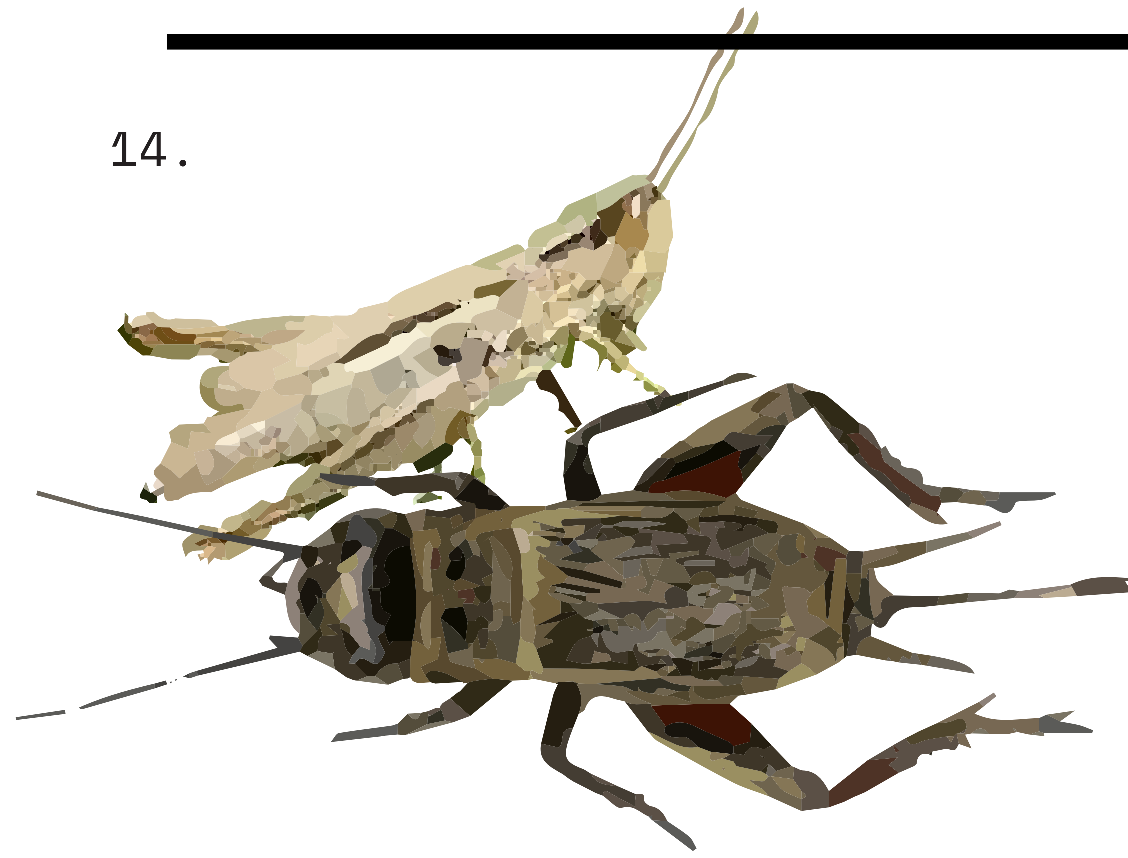
10.

Habitats and potential micro-habitats of life, invisible biodiversity

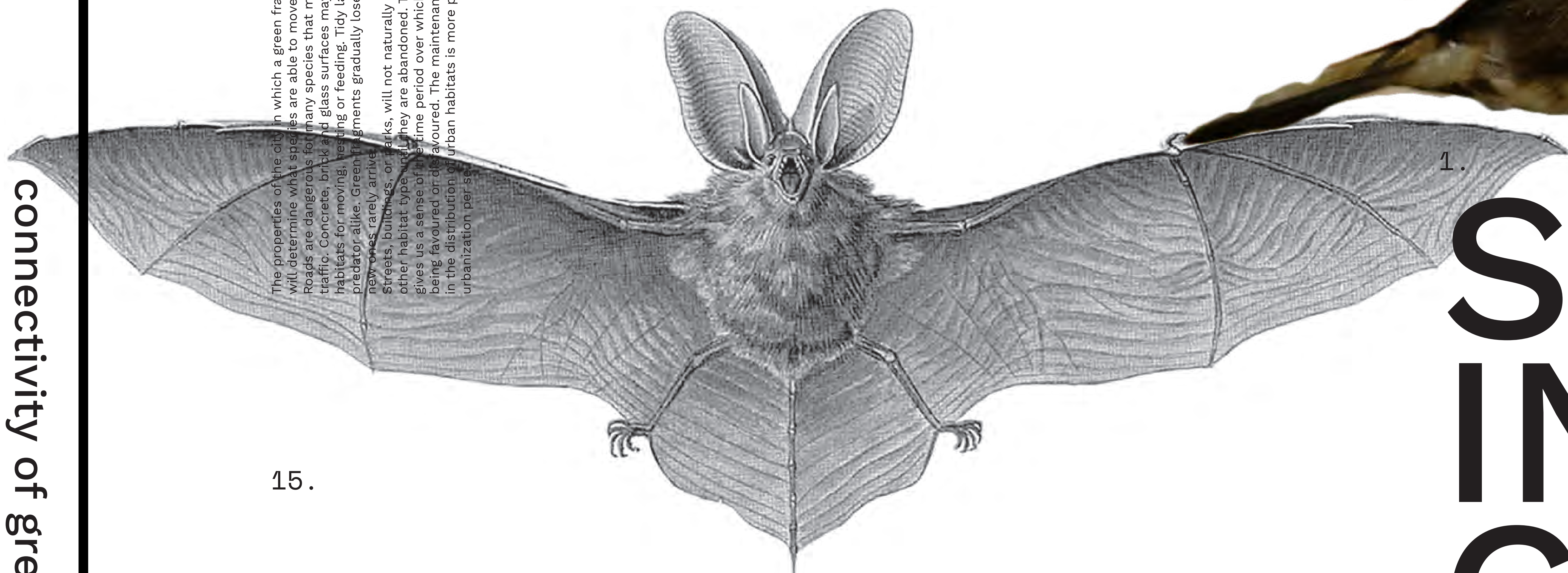
1. Pollinators, hoverfly, solitary bee, wasp, Asian hornet.
2. Bat, common pispistrelle, kulh pispistrelle.
3. Leaf bacteria, single-celled organisms.
4. Lichens, Xanthoria parietina.
5. Birds, blackbird, black swift, swift pup.
6. Earthworms, earthworms, compost worms, Lumbricus castaneus.
7. Molluscs, hedge snail, garden snail.
8. Moss, Bryum argenteum
9. Stagnant water species, diatom, sponge, micro-algae, branchiopod. crustacean, Ephydatia fluviatilis.
10. Mushrooms on dead wood and compost, underground miscellium, witch circles, Crepidotus et Tremella.

Historically, cities were swarming with animals, whether domestic, tamed or wild: mice, voles, shrews, hedgehogs, weasels, frogs, flies, sheep, ducks, pigs, horses...
While the modes of coexistence were much more chaotic than anything a modern European city dweller would expect today, this coexistence was a response to problems we still face: access to land, access to food, and issues of urban planning. Today, urban plant biodiversity is coming back as a response to these issues, in the form of allotment gardens and urban agriculture.

14.



The properties of the city in which a green fragment is embedded will determine what species are able to move in and out of it.
Roads are dangerous for many species that may be run over by traffic. Concrete, brick and glass surfaces may not provide any habitats for moving, nesting or feeding. Tidy lawns kill prey and predator alike. Green fragments gradually lose all their species, and new ones rarely arrive.
Streets, buildings, or parks, will not naturally convert into some other habitat type until they are abandoned. Time to abandonment gives us a sense of the time period over which certain species are being favoured or disfavoured. The maintenance of permanence in the distribution of urban habitats is more problematic than urbanization per se.



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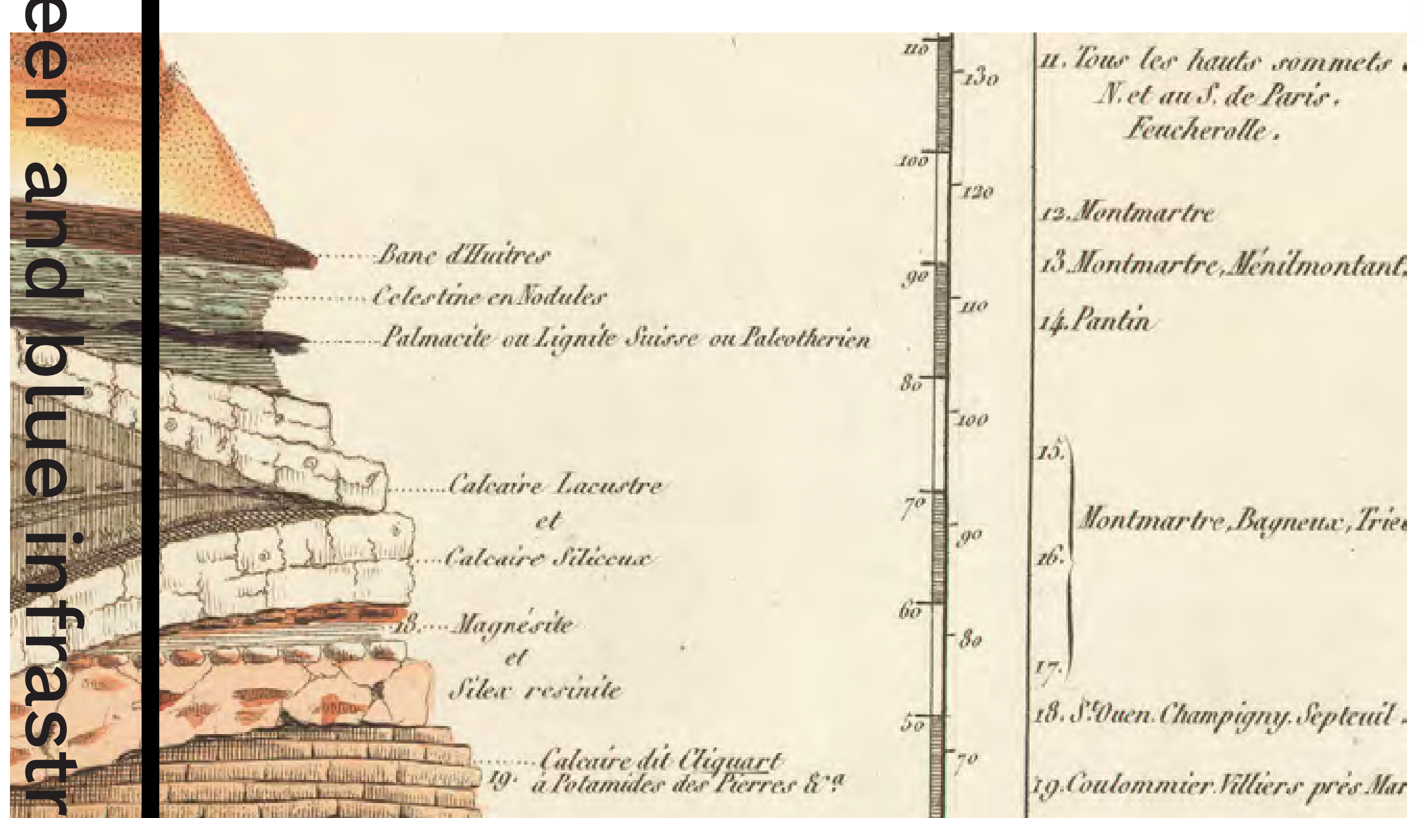
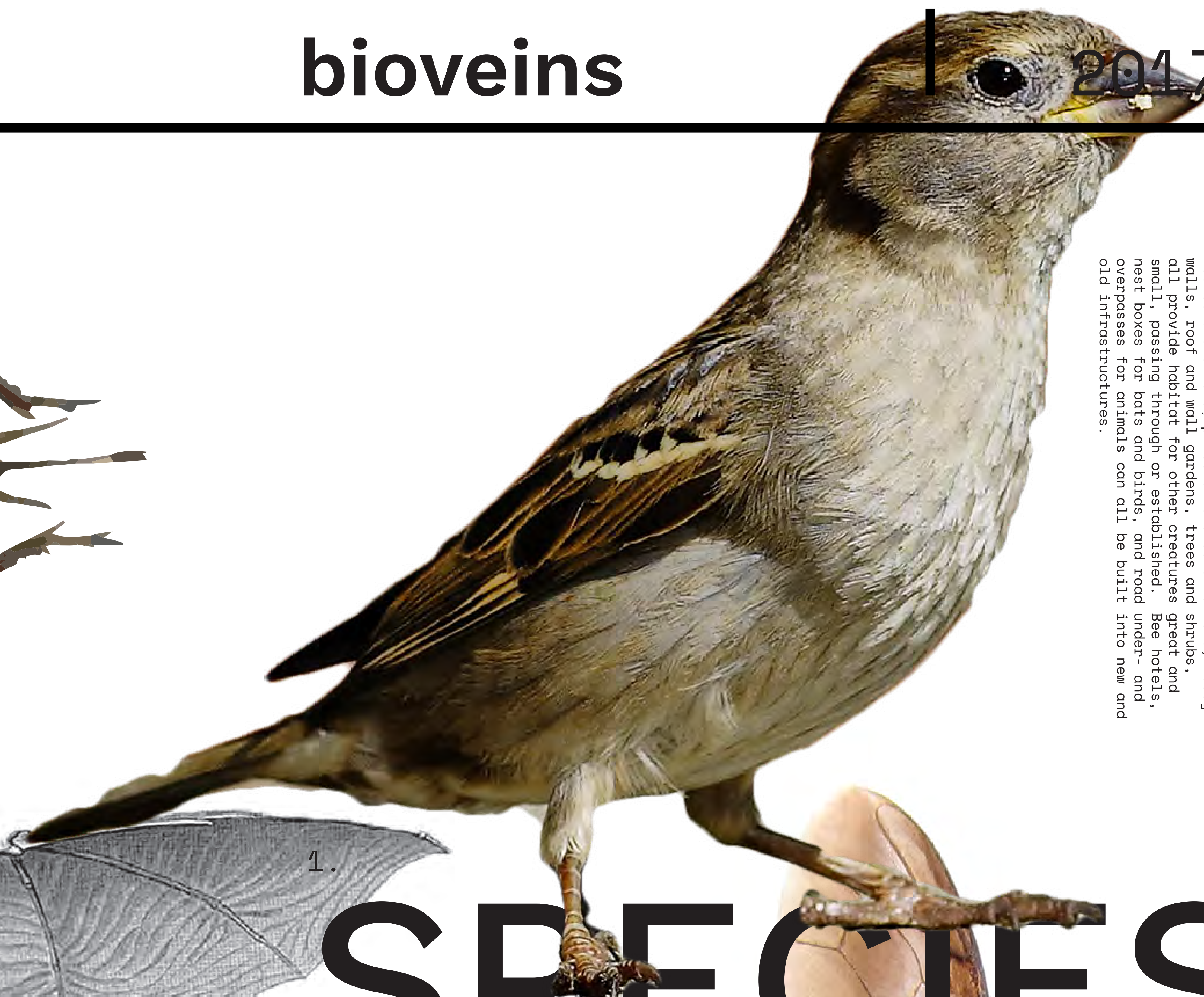


16.

What happens if you have no biodiversity — a simple ecosystem with few species of few kinds? You may be in one of two situations. In some rare cases, your simple ecosystem is almost completely resistant to external shocks (droughts, floods, heat waves, earthquakes, lava flows, and other natural disasters and climate change impacts) — because the species in your ecosystem all have rock-like resistance to the environment (think water bears). In the vast majority of cases, if your ecosystem has become simple, you are in a precarious situation, one or two natural disasters and extinction events away from ecosystem collapse. Humans are not like water bears. We are highly fragile and destructible, dependent on and interlinked with other species.

Plant and animal communities make abandoned lots and brownfields home before they are re-colonized by humans. Some rare and endangered invertebrates are found in brownfields, where they escape from rural agriculture.
The species most common to urban wastelands are plants and animals well adapted to disturbed and early-succession habitats. Parks, urban allotment gardens, rain-fed seasonal ponds, unmowed areas, heaps of leaves and sticks, piles of stones or bricks, mossy walls, roof and wall gardens, trees and shrubs, all provide habitat for other creatures great and small, passing through or established. Bee hotels, nest boxes for bats and birds, and road under- and overpasses for animals can all be built into new and old infrastructures.



1.

SPECIES IN THE CITY

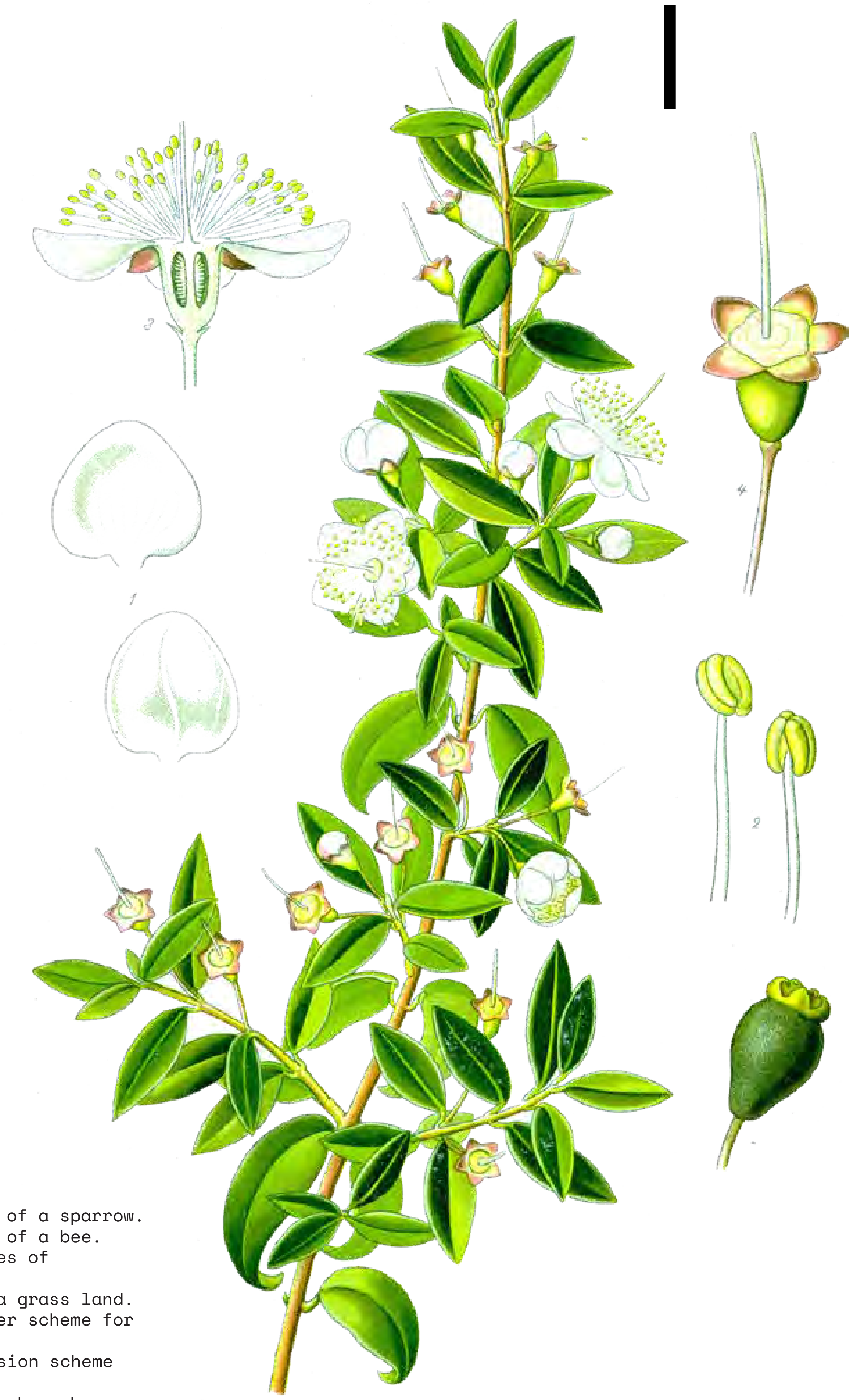
2.

urban nature, urban biodiversity; species and relations

connectivity of green and blue infrastructures:

living veins for biodiverse and healthy cities

3.



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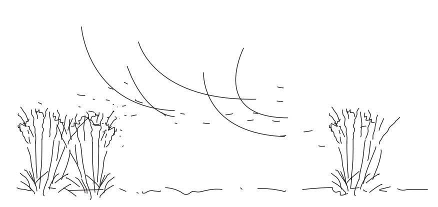

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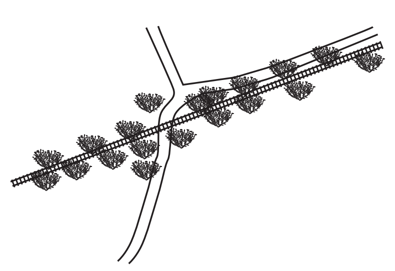

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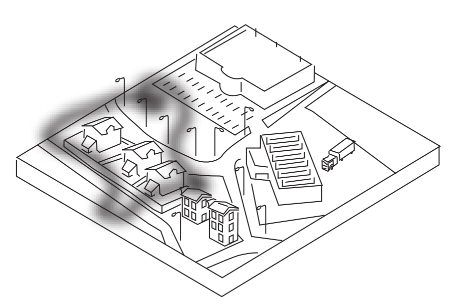

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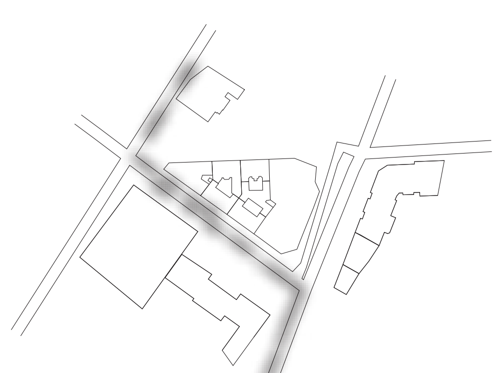

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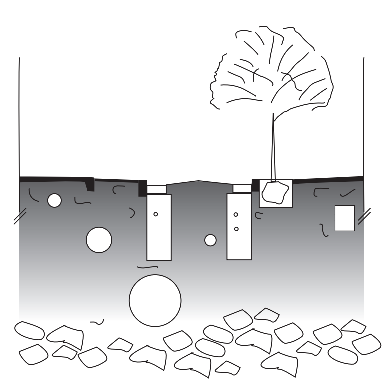
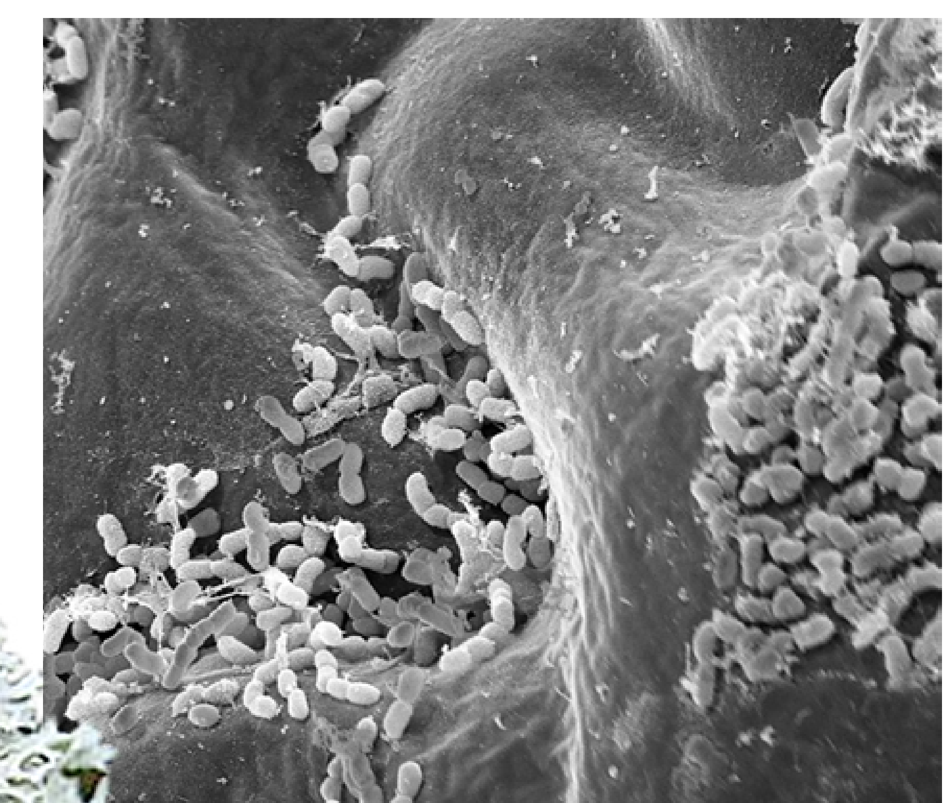


10.

1. Photography of a sparrow.
2. Photography of a bee.
3. Photographies of Phalènes.
4. Picture of a grass land.
5. Light barrier scheme for Black Feronia.
6. Wind dispersion scheme of grasses.
7. Dispersion scheme by anthropical winds of cape serençon. In this situation, trains spread seeds along the railway track.
8. Route, sound barrier and potential housing scheme of pipistrelle.
9. Dispersion scheme of microalgaes through the parisian street gutters.
10. Underground moving scheme of the earthworms under a street. Mostly digging from 10 to 40cm, some can dig up to 3m, meeting on their way obstacles linked to several urban flux.
11. Drawing of Myrtus comunis.
12. Electron microscope image of a leaf surface. Up to ten million unicellular organisms live on every square centimeter.
13. Photography of a lichen.
14. Drawings of arthropods.
15. Engraving of a bat.
16. Fragment of a theoretical section of the various terrains, rocks and minerals that make up the soil composition of the Paris Basin. This illustration is a reminder that biodiversity also depend on the geological diversity.

12.



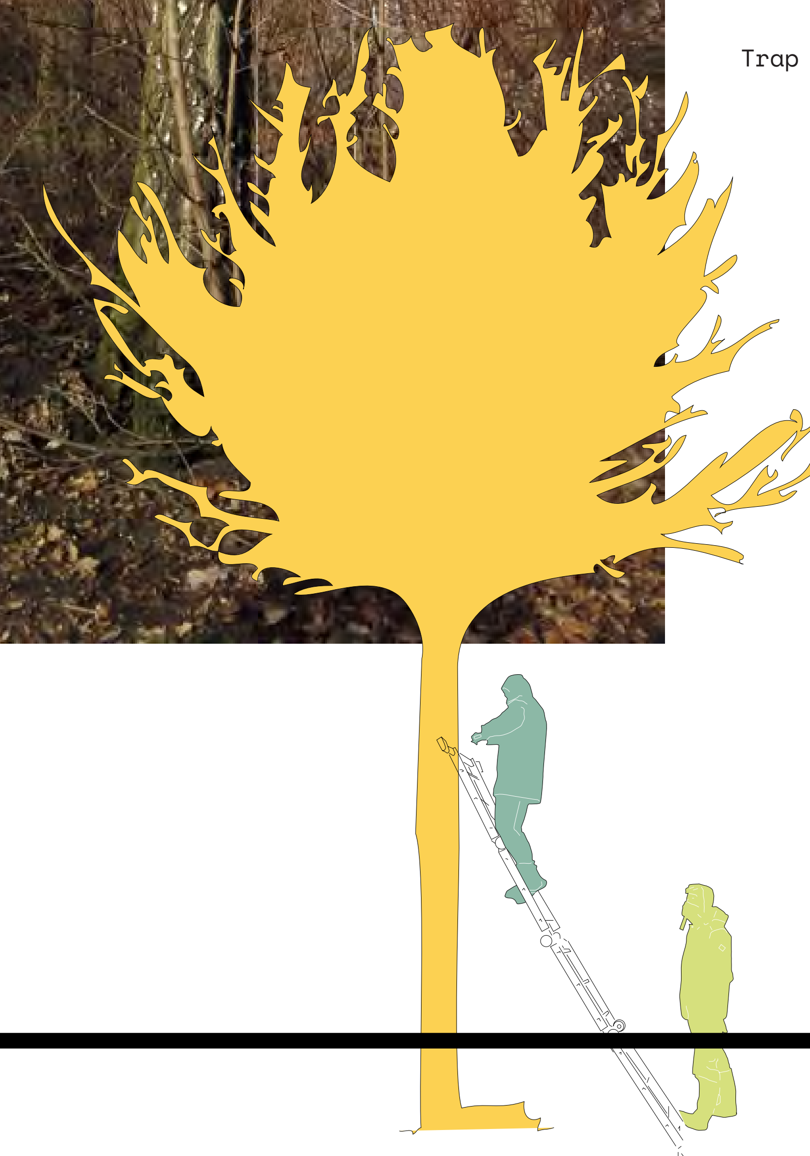
13.

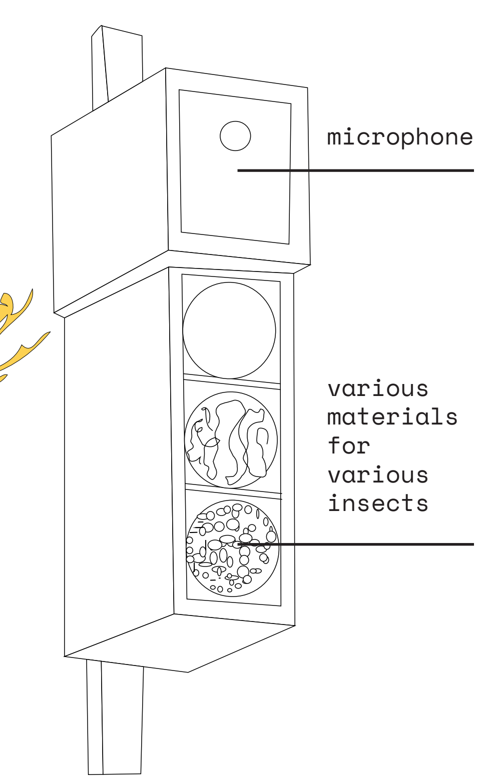
DATA TRAPS IN THE FIELD

There are many ways to generate questions about ecology. You might do things like observe, form a mental image, make an abstraction, recognise a pattern, create a pattern, form an analogy, use your kinaesthetic senses (body thinking), empathise with something in the world, make a model, or just play. Now you have a question in the form of an observation, a pattern, an analogy, a model, or a feeling, for example. Your job as an ecologist is to convert this observation/ image/ speculation into something that can be counted.

Trap nests in Paris

Trap nests in Paris



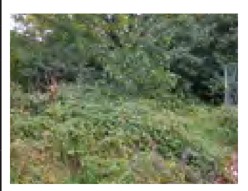
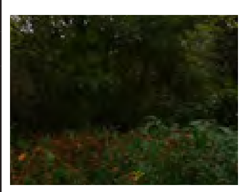


Last spring, the Zurich team's bee hotels were installed in 12 parks in Paris. This involved climbing up ladders and attaching small wooden boxes full of tubes of straw with straps around the trunks of trees. The bee hotels full of straw provide nesting spaces for wild bees. Inside the straws, bees lay their eggs, which will turn into larvae inside the straws, and finally pupate to turn into adult bees. They will be ID'd when they emerge.
Bats will be studied through the recordings of their calls made with the batloggers installed in specific boxes in the bee hotels. The batloggers record the calls of bats. Bats have two kinds of calls—for spotting obstacles, or very rapid, modulated calls for hunting insects. Each species' calls sound different.

Collecting practices

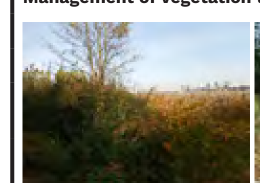
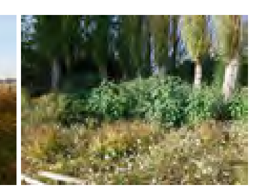
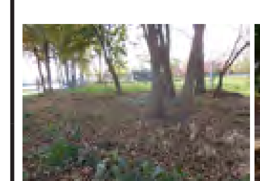
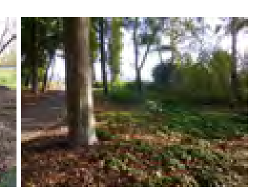
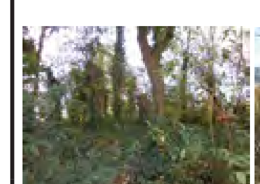
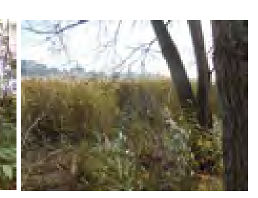
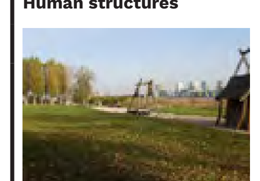
6.

An52: de Boey


Percentage of soil covered by vegetation	**85%, covered by trees: 30%.**	
Prevalent plant species	**Tree species**	**Beech (**Fagus sylvatica**)**
		Sweet Chestnut (Castanea sativa**)**
		Holly (Ilex aquifolium**)**
		Cherry Laurel (Prunus laurocerasus**)**
		Port Orford Cedar (Chamaecyparis lawsoniana**)**
		Northern Red Oak (Quercus rubra**)**
Types of vegetation present	**Running water.**	**C OP: V**
	Still water	**X**
	Grassland	**V**
	Heathland	**X**
	Land dunes	**X**
	Abandoned herbaceous vegetation	**X OP: V**
	Edges between forest and grassland	**X**
	Shrubs	**V**
	Forest	**V**
	Riparian vegetation	**X**
Density of vegetation (measured as the number of trees/ shrubs per 5 m²)	**Shrubs**	**Can't be seen, too dense.**
	Forest	**10**
Mean height of vegetation	**Grassland**	**7 cm**
	Heathland	**X**
	Land dunes	**X**
	Abandoned herbaceous vegetation	**X**
	Edges between forest and grassland	**3 m**
	Shrubs	**1 m**
	Forest	**10 m**
	Riparian vegetation	**X**
Management of vegetation types  **Abandoned herbaceous vegetation.**  **Forest.**	**Grassland**	**Mown every week. Mown grass is left.**
	Heathland	**X**
	Land dunes	**X**
	Abandoned herbaceous vegetation	**X OP: Abandoned.**
	Edges between forest and grassland	**X**
	Shrubs	**Rectangularly pruned.**
	Forest	**Abandoned.**
	Riparian vegetation	**X**
Human structures.  **Retirement home.**	**Concrete streets.**	
	Parking.	
	Retirement home.	
Estimation of visitor number per hour	**Retirement home: 0 Other part of the park: 40 (Rainy)**	
Other	**A large part of the park (the eastern part) seems to belong to a retirement home. It is unclear whether this area is private or not. There is a sign signifying the grounds belong to the retirement home, but signs stating that access is forbidden are lacking. It is possible this area used to be a park, but now, is not anymore. A highway is also nearby.**	
Heavy slopes present? What gradient?	**Yes, next to the highway. 80°.**	
Animal species seen?	**Dog.**	
Water? In what state? 	**No. OP: Yes, but dried up. A small ditch with steep edges is present, completely covered in abandoned vegetation.**	
Trees for insect nests?	**Yes.**	
Structure	**A large part of the eastern part of the park (Near the E34) is built up.**	

1.

An77: Charles de Coster


Percentage of soil covered by vegetation	**90%, covered by trees: 25%.**	
Prevalent plant species	**Tree species**	**Common Hawthorn (**Crataegus monogyna**)**
		Aspen (Populus tremula**)**
		Beech (Fagus sylvatica**)**
		Birch (Betula **sp.)**
		Cornelian Cherry (Cornus mas**)**
		Rowan (Sorbus aucuparia**)**
Types of vegetation present	**Running water.**	**V**
	Still water	**X**
	Grassland	**V**
	Heathland	**X**
	Land dunes	**X**
	Abandoned herbaceous vegetation	**X**
	Edges between forest and grassland	**X**
	Shrubs	**V**
	Forest	**V**
	Riparian vegetation	**V**
Density of vegetation (measured as the number of trees/ shrubs per 5 m²)	**Shrubs**	**20-40**
	Forest	**1-2**
Mean height of vegetation	**Grassland**	**5 cm**
	Heathland	**X**
	Land dunes	**X**
	Abandoned herbaceous vegetation	**X**
	Edges between forest and grassland	**X**
	Shrubs	**70 cm – 2 m**
	Forest	**25-30 m**
	Riparian vegetation	**2 m**
Management of vegetation types  **Type 1 shrubs, by the Scheldt.**  **Type 2 shrubs with herbaceous vegetation on the foreground.**  **Forest type 1, where undergrowth only consists of planted, low herbs.**  **Forest type 2.**  **Natural forest.**  **Riparian vegetation, with trees afterwards.**	**Grassland**	**Mown every week.**
	Heathland	**X**
	Land dunes	**X**
	Abandoned herbaceous vegetation	**X**
	Edges between forest and grassland	**X**
	Shrubs	**Type 1: Planted, but afterwards abandoned. Forming dense vegetations, scarcely containing young trees. Type 2: Consisting of only 1 species, thus planted. Next to it, herbaceous vegetation is planted.**
	Forest	**Type 1: Planted trees. Undergrowth consisting of pruned shrubs and planted herbaceous vegetation. Type 2: Planted trees. Undergrowth consisting of planted, but then abandoned, shrubs and herbs. OP: A naturally maintained or even abandoned forest, containing lots of undergrowth.**
	Riparian vegetation	**Consists mainly of reed (probably planted). Afterwards, sometimes, some trees are present.**
Human structures  **Playground.**	**Playground.**	
	Stone paths.	
	Insect nest.	
Estimation of visitor number per hour	**240**	
Other	**Sea scouts nearby.**	
Heavy slopes present? What gradient?	**No.**	
Animal species seen?	**Dog.**	
	Dove	
Water? In what state?  **The Scheldt, where the shores are made of stone blocks.**	**Yes. The Scheldt. This is a large river, deep enough for boats to sail on. The shores are usually grown with reed, sometimes followed by shrubs and trees. Other shores are made of large stone blocks, sometimes overgrown by herbs. The shore on the other side is made of concrete.**	
Trees for insect nests?	**Yes. 2 insect nests are already present.**	
Structure  **Part of the park behind the sea scouts.**	**The park continues after the sea scouts, despite what the map shows.**	

1.Extracts from site analysis sheets of Antwerp parks, Bioveins.
2.Drawing of leaf picking.
3.Drawing of tree branch picking for bacterian analysis.
4.Pictures from Birdlab, a participatory science app used in Bioveins to collect datas about city birds. BirdLab©L_Brevet-MNHN
5.Drawing of insect trap.
6.Pipistrelle song spectrogram. © http://christophe.quintin.pagesperso-orange.fr/

bioveins

2017-2020

Inspirations, incitations for observations for city dwellers.

connectivity of green and blue infrastructures:

do it with friends,
or invite a group of
strangers.

draw the bacteria
ambassador's timetable
for today.

pick an
ingredient for a
meaning. cook
your message
for a bird and
leave your
talking-meal
where you saw
it. note your
receipe.

at dawn, close your eyes,
and listen to the high sound
of myotis-myotis.

in this street, stop an instant.
from top left to top right, get
the lanscape's silhouette. then
pay attention over and under.

Here are some activities to do in cities and parks, suggested by international artists and researchers. They aim to encourage you to observe your surroundings with all your senses, and to think about cities, parks and the things living in them or passing through them in a wide variety of ways.

put your shoes on.
follow the
bumblebee

spy a vein in
your eye.
it begins with a
clump of grass.
take a picture,
walk 3 or 4
steps, take a
picture. repeat
until the vein
stops.

identity a discontinuity.
look at it deeply
and close your eyes.
imagine a green and blue
playground.
now open your eyes.

watch the creepers.
they may be drawing
a map to follow.
you are here.

do it alone,
or invite a bunch
of friends.

ALONE OR NOT...

while walking,
count the birds,
kinds and numbers.

magnify the tree foot.
meet and greet.

get close to a weed killer.
observe the variation of your heartbeat.

at night, watch the street.
note where it is dark.

living veins for biodiverse and healthy cities

Finding amphibians in your city

This activity may take some time — all spring and summer maybe. Amphibians can live in cities, but they need gently running water or ponds, and connected green areas across which they can disperse when they complete the last stage of metamorphosis. They may hide under rocks and logs, if those are available, and even when they are in the open they are camouflaged. We know very little about the distribution of amphibians — frogs, toads and salamanders — in cities. So this activity will help us learn something.

- How long does it take you to get from your home to see a frog, toad or salamander? Don't count ones in captivity, like a zoo or someone's pet.
- Is it a frog, toad, or salamander? Do you know what species it is?
- Where did you find the amphibian (place name, address or coordinates)?
- Make a map
- Have you seen the same species there before?

Meredith Root-Bernstein researches ethnobiology, ecology and conservation of anthropogenic habitats. She is also BIOVEINS outreach coordinator.

Writing the name of plants with chalk

Observing and body thinking.

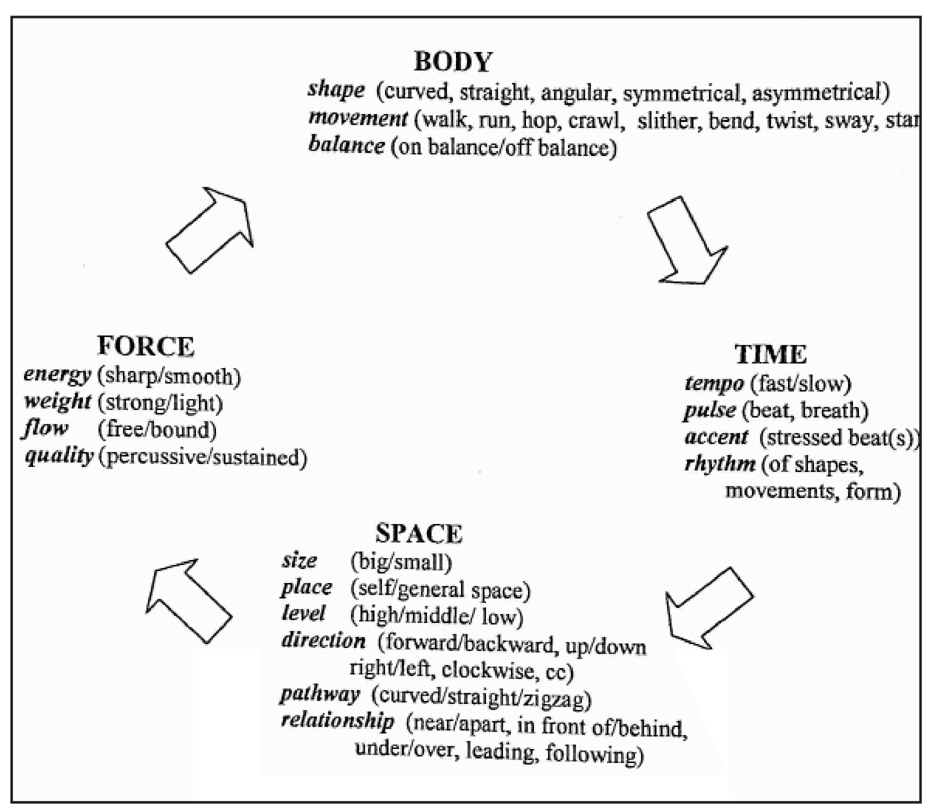
Part 1: Field notes to feel notes. How do we observe? Observing means paying attention to our many senses. It means developing our attention.
Observe — recall — observe again.

Step 1. Observe the landscape or environment. What do you see, hear, smell, feel? Record your observations as completely as possible.
Step 2. Heighten your attention. Observe again and again by:

- Drawing some part of the scene.
- Moving through some part of the scene.
- Recording what else the experience reminds you of.

Part 2: Moving and being moved. How do we think think with our body? How do we empathize? These two thinking tools are closely related. When we use our body to think, we use body movement, body balance, and body feelings to understand and communicate. When we empathize, we identify with another person, organism or thing from their point of view. When we adopt the movement patterns, postures and gestures of other things, we begin to feel our way inside their experience.

Elements of body language and movement:



Step 1: Choose a species you like. A snail, a butterfly, a squirrel, a leopard, a horse, a lichen, a bacteria, a tree! Try to move like that species.

Step 2: Imagine you are that species, where would you go in the green area you are now? How would you get there? Would you follow a path, or leap from tree to tree? Fly from flower to flower? Float in the air? Where would you come to rest or sleep? Now, try to leave the green area. Where can you go, where do you end up? How far can you go, pretending to be and move like this species? Use your imagination if necessary.

Adapted from a Thinking Tools workshop by Robert and Michèle Root-Bernstein. Robert and Michèle Root-Bernstein are a physiologist/historian duo and the authors of Sparks of Genius, about creativity and problem solving tools used by artists, scientists and inventors.

Counting things.

This activity is a challenge! Pick one of the counting scales in the section "I have a question!" Can you find something to count in the green area around you using that scale? Now try with another scale!
Can you count the same thing with two different scales? With all the different scales?
If you can do this, you are well on your way to becoming an ecologist!

By Meredith Root-Bernstein

Imagining other gardens.

Go to a garden or park. Sit down or walk around. What other gardens, parks or landscapes does it remind you of? Why? How does it do this? What spaces, forms, colours, textures, sounds, smells, does it use to make these references? Does it make you want to be somewhere else, or right where you are?

If nonhuman animals made gardens, or if we made gardens for other animals, what would those be like? We might think of gardens as collections of plants and other things (animals, rocks, etc.), in spaces that have an inside and an outside, that make imaginative reference to other gardens or landscapes, and that are kept relatively static. If we made gardens like this for other animals, what elements would they contain? How would those be arranged and kept in place? How would the inside and outside be marked or maintained? What other landscapes or gardens would they make the animal think of or remember? Pick an animal you know about, and try answering these questions through a mental image, drawing, model, written description, or however you want.
Maybe an actual garden?

By Meredith Root-Bernstein

Mapping Multispecies Layers

Hold your breath for a moment and listen. What do you hear? What do you see out of the corner of your eye? Is there the buzz of an insect, a flap of bird wings, a rustle in the leaves in the gutter? If you pause and begin to map these sounds or sights, point by point you can chart their movement. Pause a moment longer, and you can chart the movement of the human and non-humans around you, overlapping webs of movement and interaction. See where they intersect, where they depart, where they are entangled and rely upon each other. Two of my own maps from Paris:

PARROTS

Late autumn in the Jardin des Plantes, the sunflowers have grown over two meters tall. A flock of small green parrots swoop through the garden, moving between all the overblown plantings, turning brown and heavy with seeds. The sunflowers are the favorite haunt of the parrots. Their bright green wings are the same shape and color of the leaves. They grip the flower with their feet, extracting seeds in a noisy squawking riot, throwing husks aside. I follow the trail of sunflower seeds from garden bed to bed, tracing the path of the parrots. One layer of movement. Other human visitors trail between the flower beds, parrot-hunting with their iPhones. A second layer, images of the parrots moving from phone to phone.

WASPS

Sitting in the July heat in the courtyard of the Grande Mosquée, shaded by a large tree, sounds echoing off the tiled walls. I hear human voices in conversation, clinking glasses of tea. Tuning those out I hear the low buzz of wasps as they move between tables, between crumbs of marzipan and spilled tea. Watching the ebb and flow of wasps and people, I map their layered networks of lines, a cat's cradle of movement, of give and take.

By Adrian Van Allen

Adrian Van Allen is an artist and cultural anthropologist currently based at the California Academy of Sciences.

To do while walking

In the north of Italy, horse chestnuts fruits are believed to cure sickness such as cold just by keeping one in the pocket.
That's obviously a myth.
The curative effect is given by the aescin, an anti-inflammatory, draining substance capable of increasing venous pressure, produced by the horse chestnut tree.
As a result of the popular believe though, most of the people I know and conserve a horse chestnut given by their grandmother.

If today you'll be alone while going from A to B, pick up an object and put it in your pocket.
You'll generally direct your gaze towards the pavement or towards what is in front of you. You might look at the sidewalk, windowsills, lampposts, trees, patches of soil around the trees along the sidewalk; passing on a bridge. The concrete or stone railings; going up or down a staircase, the steps.
Did you find anything interesting?
Did you find anything you could take with you?
The object must fit your hand. Doesn't matter If It isn't yours. Anything you might find it's probably something that had been abandoned, lost or that doesn't have a place to be.

To give you some Ideas, you might find a piece of brick, a key, an old piece of something, a little rock, a leaf.

Pick what attracts you because of the texture or shape (better without sharp edges).
Then fit it in your pocket.

While going through the city, keep touching the object in your pocket (outside the pocket is fine too}. You can inspect it, try to understand what material is made of. You can think of what had been the history of that object before you picked it. Or, in alternatively, you can keep touching it while you carry on with your agenda.
It is like an amulet.
Thatis the object that will accompany you through a long day away from your shelter.

As for the majority of human history men had been nomads, walking is one of the most ancient practices that survided through the millennials. The convergence of traditional nomadic routes gave birth to many urban cities we inhabit today, i.e. Rome, Vienna, Madrid. Those routes connects places that extend far over the city borders, places that might no longer belong to the same country, society or culture. The Alps are an example of such traversed territory, their paths connect geographies that might otherwise divided.

The object in the picture is called "mongioia" (Italian), an ancient construction that can still be find on the north western Alps. They are drywall structures made of stones, that had been collecting in the surroundings or transported along the way, cut as sort of obelisks. They might have an original secret use, all the locations are of a visual impact such as crest, spurs, and peaks. And we don't find just the remains, but also entire structures that had been maintained integral throughout the centuries by the different peoples that inhabited or passed the mountains' s paths. From the "mongioia" might come the habit that mountain walkers have of picking up stones to signal a position or a direction with a similar, much smaller obelisk.

1.Emilio Sulis e Giovanni Vachino, Il "Progetto Transumanza" : alle Radici dell'Identità Biellese (Asiago: DocB1 - Centro Studi Biellesi, 2005), in La Transumanza Alpina tra Storia Presente, ed. Michele Corti. Image taken the text.

By Sara Cattin. She is an artist based in northern Italy. She is currently doing an MA at the Dutch Art Institute Roaming Academy.

We are the pollen

A blog to gather art and poetry actions for pollinators.
Bees and all pollinators are dying because of the pesticides. Only a wave of collective love will change the law of the land that allows the killing. Pollinators speak the chemical language of life. If we don't listen to their plight, we are next in the beeline of death.
Please join us and send your work for inclusion.
Send your images and works to weearethepollen@gmail.com

Cecilia Vicuña is a Chilean artist and poet based in New York and Santiago. Her work has been shown at major art museums and galleries in New York, London, Santiago, and elsewhere.

Maybe some of the previous activities can inspire you to make contributions to Cecilia's project!

http://wearethepollen.tumblr.com

pamphlet for city dwellers and city visitors

This pamphlet is designed for city dwellers and city visitors, chilldren and adults, mainly humans (but maybe other species!). You can find more material about BIOVEINS and about cities, gardens, biodiversity and sustainability on our website at bioveins.eu, and on our blog at [http://bioveins.eu/blog/article4].

EXPLORING CITIES AND PARKS

connectivity of green and blue infrastructures:

living veins for biodiverse and healthy cities

I have a question!

There are many ways to generate questions about ecology. Maybe you are looking for a new question no one has asked before, or a new way to ask a question about an old debate, or maybe you just want to ask for yourself a question that has been asked many times, to experience finding the answer. In any case, you might do things like observe, form a mental image, make an abstraction, recognise a pattern, create a pattern, form an analogy, use your kinaesthetic senses (body thinking), empathise with something in the world, make a model, or just play. Now you have a question in the form of an observation, a pattern, an analogy, a model, or a feeling, for example. So far, you would be doing the same thing as an artist, an inventor, a philosopher, a physicist, or an anthropologist. Let's say your observation/ pattern is what Thoreau wrote about how squirrels create forests by forgetting about their buried hickory nuts: «This, then, is the way forests are planted. . .If the squirrel is killed, or neglects its deposit, a hickory springs up.» So far this is a nice observation/ image/ speculation, and could be described as natural history. But let's say you want to be an ecologist. Ecologists count things. Your job as an ecologist is to convert this observation/ image/ speculation into something that can be counted.

There are several ways of counting, here with examples from beetles:

Nominal scale: We have categories, and we can say how many things are in each category. In addition to counting the number in each category, we can calculate things like the mode (the most frequently occurring number in a sample), and frequences (e.g. percents).
•Example: in our sample of beetles, there are 9 detritivores (meaning they degrade biomass), 4 herbivores, 3 omnivores, and 4 predators.
•The mode is 4.
•45% of beetles in the sample are detritivores

Ordinal or ranking scale: Our data falls into categories that can be ordered but without equal intervals, meaning that we can arrange things into before and after or bigger and smaller, but we don't know exactly when they happened or exactly what size they are. This means that we cannot use arithmetical operations (e.g. the average).
•Example: in our sample of beetle life-stages, there are 200 eggs, 45 larvae, and 20 adults.
•We can say, for example, that 75% of the sample is made up of eggs.

Interval scale: Our data can be put into categories that can be ordered with equal intervals. This is good for most arithmetical operations.
•Example: Our data on beetle reproduction has a set of dates of egg-laying. We can easily calculate how many days occur between each egg-laying date because dates are a uniform standard measure.
•We can calculate the average or the median date of egg-laying, for example.

Ratio scale: Inverval scale with true zero point. Good for all arithmetic operations.
•Example: Our data on beetle body masses is a set of discrete measures of mg. We can say, by definition, how much bigger each beetle is than 0 mg.
•We can calculate the average or median body mass, for example.
•We can multiply the body mass of each species by its abundance to make an index of its relative importance in the invertebrate community.
•We can compare the distribution of beetle masses to another sample distribution or to a normal distribution, for example, using a parametric statistical test.

How does nature circulate through cities?

Nature is the lifeblood of urban environments. Parks bring urban residents clean air, cooler temperatures, beauty and wellbeing. Parks act as corridors for many animals, plants, and other living things that need nesting spots, food, and ways across the city. In this project, we ask how cities can care for nature while nature cares for cities. BIOVEINS is a European research project running from March 2017-March 2020 that aims to provide, together with local stakeholders, the knowledge to identify the critical features of green and blue infrastructure, to guide its establishment, management and restoration of and to mitigate the effects of major urban global challenges, like habitat fragmentation, air pollution, and urban heat islands.

You are in a city. So, what is a city?

A city is defined as a dense accumulation of human–made constructions — buildings, roads, blue and green infrastructure. Many animals also make dense accumulations of constructions — they build nests or burrows, which may be very complex structures. And many animals build their nests and burrows in dense colonies, which are sometimes very extensive. Many arctic birds — penguins and albatross, for example — live in large colonies but make no or very basic nests. These are perhaps less like cities and more like giant campsites. Other birds, like weaver birds in Africa, fill up trees with their nests. Each tree is like a village. Many rodents also build their individual burrows in colonies connected by tunnels or trails. Insect colonies, such as termite mounds, ant nests, wasp and bee nests, whether made of geometrical patterns in paper or wax, or by moving tiny grains of sand or wood pulp, are certainly amazing collective architectural feats. Finally, in some cases animals form cities out of their own bodies. The algae – cnidarian symbiosis that makes corals forms huge reefs, which provide habitat for many fish and other aquatic species. Trees, for that matter, also each provide spaces inside their trunks, under their bark, and in their branches and leaves, for the nests of many large and small species, from squirrels, owls or oran – utans, to beetle larvae and ants.

Although most human cities look more or less similar today, made with concrete, bricks, asphalt, steel, and glass, we should also remember that vernacular architectures of the world are more varied and might accommodate different kinds of biodiversity in "human colonies" of different sizes, densities, structures, textures, porosities, etc.

The first cities were proto-city-states: Jericho and Çatalhöyük. These were built in the Near East towards the end of the Paleolithic. Jericho was first settled 12000 years ago and is still an inhabited city, in what is now the Palestinian Territories. Çatalhöyük, now an archeological site in Turkey, was settled between 7500 and 5700 BC. During the Palaeolithic, humans mastered fire, made increasingly sophisticated stone tools, were hunter – gatherers, domesticated plant and animal species, made art, spread around the world — and lived in apartment buildings in proto – city – states.
Çatalhöyük seems to have been a residential city without a clear social hierarchy or a central temple or administration. There were no streets, with people apparently climbing across the flat roofs to get around. Waste was dumped outside the city, but the dead were buried inside the mud – brick residential buildings. In general, however, city states arose around powerful religious temples and kings, who created large bureaucratic operations to collect temple offerings, taxes, and tribute from conquered rural lands. Cities thus affected life far out into the countryside. For example, the demands of urban residents for food or tax collectors for an easily collectible resource led many Near Eastern rural groups to transition from mainly hunting and gathering to mainly shepherding, since sheep were easier to trade or send as tax to cities than wildlife. Early city – states were also often points at which merchants stopped along trade routes. But they were not necessarily key locations in the spread of ideas: dramatic and transformative new practices like the domestication of various species seem to have spread through rural networks.
Roman cities affected European landscapes a great deal due to the Roman conquest of many parts of the continent. The Romans considered cities as the central elements in land organization, and as superior to the countryside. Legally, cities included the surrounding countryside, on which many were dependent for the creation of food and wealth. Famously, Roman cities are made of an orthogonal grid of streets, with outdoor public spaces and interior, private courtyards, and with canals to bring fresh water in and sewers to take waste out. Roman cities also had gardens. The king of Macedon (Ancient Greece) Alexander the Great brought back garden styles and plants from his conquests in Persia and India, which influenced Mediterranean gardens in general. The Ancient Greeks, however, did not seem to have many residential or public gardens. The Romans by contrast were very keen on gardens in their cities, including household gardens in villas, palace gardens, temple gardens and public parks. (For maps of Roman cities over time, see: Ancient World Mapping Centre).
There are many reasons why cities have been invented, but some of them have to do with efficiency and control: cities house administrations and bureaucracies to maintain political control over large rural territories. Our European image of cities is also strongly influenced by Roman culture, but very early cities like Çatalhöyük were organised on an entirely different logic. There is nothing natural or inevitable about our ideas of what a city is: what might they be like in the future?

What is Blue, Green and Grey infrastructure?
Grey infrastructure refers to buildings, roads, and other urban constructions. Blue infrastructure refers to water elements, like rivers, canals, ponds, wetlands, floodplains, water treatment facilities, etc. Green infrastructure refers to trees, lawns, hedgerows, parks, fields, forests, etc. These terms come from urban planning and land-use planning.
In the past, roads and settlements seemed like human habitats that helped us to move across the landscape and find safe places to live in the wilderness. Today, there is so much «grey» infrastructure, in cities and in rural areas, that we are in the opposite situation. Land planners now talk about forming stepping stones and networks of blue and green infrastructures to allow animals, plants, water, clean air, and so on, to move safely around the landscape.

No matter how big it seems, this patch of vegetated area you're in is small—a fragment.

Are you in a park? What's a park, anyway?

A park is a kind of garden. The earliest thing called a park was a "deer park", or woodland maintained full of deer for hunting. From this developed two different kinds of things we still call parks—National Parks, and large gardens.
A garden is a collection of plants and other natural elements that have been moved and arranged. A very early garden, the Karnak "Botanical Court" from around 1440 BC, contained King Thutmosis III's collection of plants, mammals and birds in a courtyard; the plants may have been planted, but its hard to tell.

In Lesotho (a mountainous country in southern Africa) there are two words that can be translated as "nature," one that refers to things that can be controlled, and one that refers to things that are outside our control. A garden, if I can be permitted to extrapolate from this interesting concept, might be thought of as a collection, a splitting off of the "nature that can be controlled" from the nature that can't. At the same time, though, the act of moving and arranging the plants, soil, animals or rocks, etc., arguably forms these categories rather than simply recognising their latent existence. Many garden plants are domestic varieties that have gone through processes of selection over generations. On the other hand, a large interesting rock placed in a garden becomes amenable simply through our desire and ability to manipulate it.

The word "garden" apparently comes from a Germanic word meaning an enclosure. Thus a garden is a space apart, a space that some things can't get into and other things can't get out of. The enclosing wall, whether it is a real wall or just a boundary of effort, is what prevents the collection of "nature we can control" from agitating back into its emulsion with things we can't control.

Another thing one immediately notices about gardens is that they often represent other gardens, or idealized landscapes. McCall's Garden Book, a practical guide to gardening from the 1960s, contains many illustrations of "ideal garden layouts" that "you, too, can have." Many of the gardens featured in The Garden Book (Phaidon) also have this characteristic. The Insel Mainau in Switzerland is a "Mediterranean island paradise north of the Alps." On the facing page, the Sanssouci garden in Potsdam, Germany, is a "European fantasy of imperial Peking." Persian gardens, which influenced many other garden styles, are references to earthly oases and heavenly delights. Gardens are thus doubled, pleated spaces in which each gardener strives to create a uniquely ideal garden of immediate sensual enjoyment, which should simultaneously evoke an imaginative reference to other ideal or desired gardens and landscapes. The less the real experience of the garden pales in comparison to the imagined ideal experience suggested by the garden, the more it has succeeded. You are never in just one garden at a time.

Finally, though gardens may incorporate seasonal change and may change over the years, they are largely intended to be static, to fit a design, to match an ideal. It is for this reason that gardens require constant care and maintenance, and why people speak of dilapidated gardens that need to be restored. When a garden undergoes succession, it gradually ceases to be a garden and becomes an abandoned lot, whereupon it enters a whole different realm of human desires.

Are you in an abandoned lot or an urban ruin?

Are you in an abandoned lot or an urban ruin?

Ruins are entropy in action, the natural recycling of materials back into nutrient and mineral cycles. Buildings, and gardens, become ruins and wastelands when they are no longer cared for.
Yet, the discovery of a ruin—like the discovery of the secret garden in the eponymous book—can generate new engagements of care and forms of value.
Perhaps what also fascinates us about ruins, what makes us sometimes prefer the disintegrating monument to the well-preserved or the new one, is the unpredictable mixing of nature and culture that seems to contradict our inherited ideas about these being two, contrasting categories. As Michel Makarius puts it in the introduction to his book "Ruins: Representations in the art of the Renaissance to our time", "When we discover the disorder of monuments sunk where ivy and blackberry mix with broken stones, and the tree, the hill and the sky are framed by the gaps of broken walls, it seems to us that a subtle perfume is floating through the air, spread by the spirit of the place" (my translation). Ruins, as he points out, came to be understood in the Renaissance as sources of learned knowledge, comparable to the ancient books that were being retranslated, recopied, and eventually printed. The relations between nature and civilization were understood in particular ways throughout history (not to mention between cultures). Ruins have classically, in Europe, been sites where the brevity and vanity of human achievements and glories are contrasted with the eternal return of nature. As plants, animals and soil take over cathedrals, gardens and palaces, commentators have often discussed on the struggle between civilization and wild nature, and their different temporalities. However, what we read in ruins has changed over time.
Today, when we see industrial ruins, abandoned lots, brownfield sites, or urban wastelands, we may be more likely to think about urban renewal and the coexistence of nature and cities. Abandoned buildings and brownfields are often taken over by voluntary associations, developing ad hoc communities of social aid, artistic workshops, or urban gardening.
But of course, let's not forget about the plant and animal communities that make ruins and brownfields home before they are re-colonized by humans. In the UK, biodiversity experts have worked to come up with standards appropriate for assessing the biodiversity value of brownfield sites. An interesting view is that many rare and endangered invertebrates are found in brownfields because these act as refugia. Such species have been driven out of "nature" by agriculture, and survive only in abandoned industrial lots in cities! Ironically, biodiversity compensation plans may include recreating brownfields de novo in specified areas, to compensate for urban renewal projects.

Thus, the species most common to vacant lots and other urban wastelands are ruderal plants and invertebrates and vertebrates well adapted to disturbed and early-succession habitats. It is important to remember that disturbances—such as fire, large plants falling over, erosion, rock falls, soil being turned over by digging, trampling, intense herbivory, and so on, are all natural processes that can occur at low, medium, or high densities. An urban wasteland may resemble a highly disturbed or degraded natural habitat, due, for example, to hard concrete or asphalt surfaces, exposed soil, lack of a tree canopy, and so on.

Succession is also the natural ecological process through which new habitats (for example, soil formed after a volcanic eruption, or land exposed after a change in sea level), or recently disturbed areas, develop new species communities over time. These changes occur as ruderal or disturbance-adapted species change the habitat through their growth and other activities, creating new niches for a new set of species. For example, trees create shade, which both plants and animals need, and help form soil through leaf litter. You can observe ruderal and disturbance-adapted communities, and the processes of succession that they facilitate, in your local urban wasteland or ruin. Keep notes on your observations, and one days these may be valuable data. Paradoxically, urban ruins are sites of renewal. The ancient wisdom and moral lessons that we read in them might today be about solidarity, flourishing and regeneration. Natural processes that create value—successional processes creating habitat niches for many species, or curious urban residents creating communities of care and creativity—materialize out of the slow recycling of past practices of construction.

What does it feel like to be an urban animal?

Analogies from a city in chaos

Last week I travelled to Chile for a conference on socio-ecological transformations (https://transformations2019.org/en/), and to carry out fieldwork in the countryside for several research projects. I arrived just in time for the major protests about inequality and quality of life that started on Friday the 19th and continue more than a week later as I write this. I was obliged to stay in Santiago longer than I intended because all the buses in and out of the city were cancelled for several days. There is a lot to say about the protests that is not really relevant to this blog about urban biodiversity. Here, I only want to reflect on an analogy to urban biodiversity that occurred to me while I was in Santiago.

I have experienced protests in Santiago before, but this one was bigger: it took up more space in the city and lasted much longer. There was also relatively more destruction of property and sacking of chain stores than is usual. Santiago is a city built around a single axis, the Alameda which runs east-west and connects the old and poor downtown with the uptown malls and wealthy neighbourhoods. There is a striking gradient inequality up and down the Alameda, but what is also striking is how hard it is to get anywhere without at some point travelling up and down it, either walking, by taxi, by bus, or along the main line of the metro. Although Santiago is nominally laid out on a grid, many of the streets within the grid form disconnected zigzags or come to dead ends. The Alameda is also a critical artery to get on and off the highways that provide direct paths between various commercial and residential parts of the city (while also sometimes cutting off neighbourhoods from one another). Shutting down parts of the Alameda thus inconveniences everyone and is a classic protest tactic in the city.

Several times, I crossed the Alameda in the morning to go to a park, a museum, the zoo, or a café, and then had difficulty getting back across it to get to where I was staying. Nearing the Alameda from a couple of blocks away I would hear people shouting or chanting, or yelling 'f—the police' and screaming, or see smoke from something on fire, or see streams of people with their noses covered walking away from the Alameda, or running, or feel the tear gas myself. I walked away from these signs. I often walked along a pedestrian street many blocks downtown, since the protests usually moved uptown. On the first Friday, I caught a glimpse of the Alameda, empty and quiet on my side of the street, full of trapped buses on the other side. I decided to cross, but as I was crossing the street, a tank spraying tear gas appeared out of nowhere, bearing down on me and 3 other people crossing the street. I ran away. Another time, I found a pedestrian undercrossing that used to be for cars. It was painted in cheerful colours and allowed me to pass under the tear gas and whatever action was going on on the Alameda above. Even on the south side of the Alameda, where I was staying, the protests extended much further south than I expected, all along Parque Baquedano, which runs north-south, and I often had to walk very far south to avoid crowds, police, and uncertainty. The crowds weren't necessarily dangerous, but sometimes they had erected barriers from road signage and infrastructure and started bonfires, so it seemed best to walk around that. Getting home every day became an exercise in sensing the position, movement and mood of crowds, the sounds of police sirens and the feeling of tear gas, judging which way to go to get around barriers and bonfires, where to cross major roads and when. It was challenging (thought by no means really difficult) to move around in a city in chaos. Many small shops as well as almost all chain stores were closed as well by the weekend, meaning that finding food and other supplies also became a guessing game. In some areas, everything was closed, while in pockets both near the protests and farther away, shops and cafés were open and life in general went on almost normally.

It occurred to me that for animals like moths, bats, butterflies, bees, songbirds, crows, raptors, rats, mice, hedgehogs, foxes, and all the other animals that try to cross over and move around in cities, life in the city must feel like this every day.

• Urban buildings, cement surfaces, streets and highways are to other animals what Santiago's public spaces blocked by crowds, blockades and bonfires were to me. That is, they are dynamic and uncertain barriers, spaces of possible risk and discomfort.

• Sometimes the only path somewhere crosses these areas, or sometimes there is an animal underpass or green corridor, just like the pedestrian underpass I found.

• Urban pollution, sound pollution and light pollution are to other animals like the tear gas I felt and tried to avoid.

• Parks and gardens are like the neighbourhoods I found where the neighborhood shops were still open, which were nice even if I had to buy Instant Noodles and canned tuna for dinner instead of a hot meal at a restaurant.

• Maybe abandoned lots are like the little hole-in-the-wall restaurants where I found tres leches cake (a Chilean classic), hotdogs covered in avocado and mayonnaise (another Chilean classic), or Venezuelan arepas.

• There were even treats to be found: street vendors continued to sell freshly pressed orange juice and fried sopaipillas: maybe this is equivalent to an animal finding just the right plant or space it was looking for to forage, lay eggs, or make a nest.

Indeed, ecologists find that urban animals often need to be more behaviourally flexible than their peers in order to survive in cities (Lowry et al. 2013). One might also expect urban animals to experience more stress, as measured for example by cortisol levels, than individuals of the same species outside urban areas. However, chipmunks, blackbirds and tree lizards show lower overall stress levels and stress responses than non-urban ones (Partecke et al. 2006; French et al. 2008; Lyons et al. 2017). The chipmunks moved and explored less, groomed less (which can be a sign of stress), and were plumper. I would interpret this not as the urban environment being stress-free and great for chipmunks, but that it has selected for chipmunks who are placid and stay put in small comfortable pockets rather than risking it in uncertain matrix habitat. Making a similar argument, French et al. (2008) suggest that «urban tree lizards may have suppressed overall corticosterone concentrations possibly from down-regulation as a result of frequent exposure to stressors, or increased access to urban resources». Ultimately, selection for indifference to stressors and lack of exploratory behaviour might have negative outcomes for urban animals as it may make them less, rather than more, behaviourally flexible in the face of novelty (such as changes in urban climates, management regimes, or infrastructure).

I have visited many cities, including chaotic ones, but what I think made me feel a bit like an anxious hedgehog or a stressed owl was the feeling of a city I knew how to navigate that had become non-functional. The city, suddenly, was no longer organised for people's normal life. This jolt of non-recognition, of having to learn to re-navigate urban space, gave me this feeling of how it must be for non-human animals to survive in cities that are not designed to meet their needs, and which they can do little to shape.

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