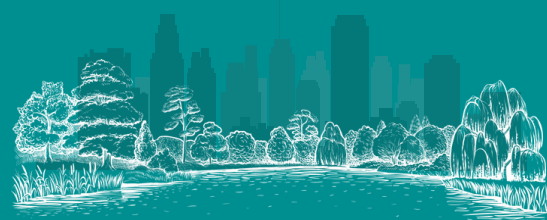


CREATING URBAN WILDLIFE AND GREEN CORRIDORS FOR THE BENEFIT OF NATURE AND PEOPLE

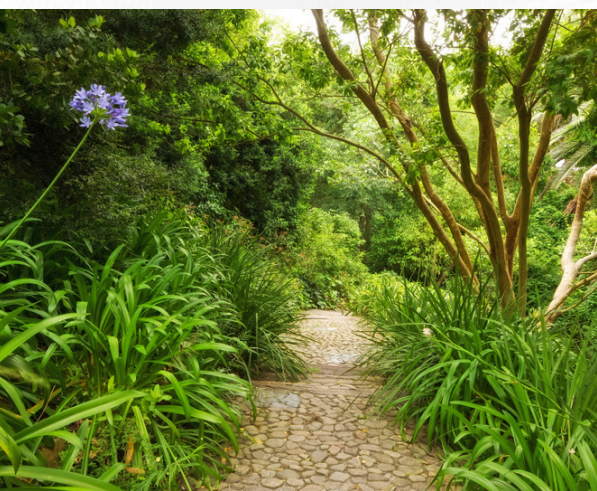


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THE CASE OF THE “OTHER” (THE UNKNOWN, GREEN) SIENA

*Case Study of the BiodiverCity URBACT network:
community-based approaches to foster urban
biodiversity and nature-based solutions, based on its
network meeting in Siena, Italy (17-19 June 2025)*



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Urban areas might harbor high diversity of species. Urban landscapes can be, for instance, especially valuable for pollinators and shelter a relatively high pollinator diversity compared to monoculture-dominated agricultural landscapes due to the high variety, availability, and temporarily even distribution of floral resources. Conservation within urban areas can be essential for many species and, of course, beneficial for residents for multiple reasons through the ecosystem services green areas provide.

In line with the ambitious EU Biodiversity Strategy for 2030 and the Nature Restoration Law, stopping and reversing biodiversity loss by promoting the systematic integration of healthy ecosystems, green infrastructure, and nature-based solutions into all forms of urban planning is the utmost priority.

This is, of course, fully in line with the global developmental goals. Target 12. of the Kunming-Montreal Global Biodiversity Framework refers to urban green areas (Enhance Green Spaces and Urban Planning for Human Well-Being and Biodiversity) as follows: “*significantly increase the area and quality and connectivity of, access to, and benefits from green and blue spaces in urban and densely populated areas sustainably, by mainstreaming the conservation and sustainable use of biodiversity, and ensure biodiversity-inclusive urban planning, enhancing native biodiversity, ecological connectivity and integrity, and improving human health and well-being and connection to nature and contributing to inclusive and sustainable urbanisation and the provision of ecosystem functions and services*”.

Ecological connectivity and integrity are key aspects in these definitions, and creating wildlife and green corridors for the benefit of both nature and people is therefore a crucial component of any urban strategy that tackles urban green and blue infrastructure and intends to increase urban biodiversity.

Green corridors are (linear) green spaces that can provide natural habitats and recreational pathways. Connecting urban green areas (public parks, private areas, tree alleys, etc.) can be effectively strengthened by creating microhabitats for different species (pollinator-friendly flowerbeds, wildflower meadows, ponds, etc.) in those areas where recreation is not the primary function. Wildlife corridors facilitate the movement of wildlife by connecting fragmented habitats, which improves population stability and biodiversity.

However, habitat fragments in urban landscapes are often divided by roads and scattered across multiple parcels owned by different individuals and organisations. In addition, property ownership in cities can change quickly. As a result, conservation recommendations that prioritise wildlife — such as maximising corridor width or completely excluding human activity — are often unrealistic in urban settings. Consequently, traditional wildlife corridors, like bridges linking two protected areas, may be insufficient for maintaining connectivity within cities.



Yet, establishing priority areas for urban wildlife corridors, where efforts are coordinated to preserve multiple pathways of connectivity, can be realistic to facilitate conservation in urban areas. For that, cities must use a combination of approaches, including green infrastructure, habitat restoration of private lands, conservation partnerships, and, if needed, acquisition of lands. Of course, land acquisition makes the process significantly more difficult, while improving the quality of existing green spaces to better support conservation goals by biodiversity-inclusive approaches (e.g. micro-habitats, climate resilient grassland management) is often more realistic.



The very dense historic centre of Siena
© Ferenc Albert Szigeti

Development of a green corridor around the world-famous built environment of the magnificent city of Siena provides a great case, since five green valleys, radially approaching the very dense historic centre, built on a plateau, bring the countryside just next to the main square. These green valleys are like mementoes of history: the medieval town is still connected to the countryside through them, which was an essential part of the local identity over the centuries in the Siena city-state, where self-sustainability was very important. These valleys are partly abandoned today as farmers stopped their activities in the 1960s, and at the same time, many people moved out of the historical centre. In the last years, enthusiastic NGOs and ecologists rediscovered some of these valleys, fragmented each other by roads and neighbourhoods, and they are jointly rethinking their future with the municipality along biodiversity goals.



Siena, Piazza del Campo
© Ferenc Albert Szigeti

SIENA – CAN THE GREEN VALLEYS BE PART OF THE SO IMPORTANT SIENESE IDENTITY AGAIN?

Siena's (approx. 52.000 inhabitants) UNESCO-protected city centre is a globally known embodiment of a medieval city. „The whole city of Siena, built around the Piazza del Campo, was devised as a work of art that blends into the surrounding landscape”, – says the UNESCO website and indeed, thousands of tourists roll along the medieval streets most of the year. Yet, few of them recognise the five green valleys, radially approaching, almost touching the very dense and compact historic centre, bringing the countryside just next to the main square.

The world-famous Palio is the clear symbol of the Sienese identity: during this unbelievable horse race at the Piazza del Campo, the various Sienese "Contrade", areas in which the historic city is divided, challenge each other. Originally, there were about fifty-nine "Contrade"; now only seventeen remain, ten of which take part in the historical pageant and the race at each Palio. The Palio is much more than a simple event for the locals, and Contrade are much more than simple cultural associations - they organise neighbourhood meetings, community actions to strengthen neighbourliness and provide social services. Each person belongs to a Contrada and participates actively in its life but also pays a yearly fee (in line with the person's economic status). Not independently from this community (soft) power, many families still live in the historic city centre, which – let's be honest - suffers from over-tourism and does not seem very livable for modern young families.



At Contrada Leocorno (left) and a street symbol of another Contrade (right) © Ferenc Albert Szigeti

The different Contrade have played a key role in the conservation and care of the green valleys over the years. They have managed these areas for their own activities, but also for agricultural purposes.

The exclusive management of these green spaces has also historically served as a guarantee for their preservation. However, time and habits are changing, and the number of contrade “members” is decreasing; thus, contrade must reinvent themselves. Taking care of the green valleys and enhancing urban biodiversity projects seems a new and rather innovative way to strengthen the so famous Sienese identity (which once belonged so much to these green areas too) as well as the membership of the Contrade.

There is a world-famous fresco in the iconic building of Piazza del Campo, in the Palazzo Pubblico: the Allegory of Good Government was painted by Lorenzetti in 1338, and it draws attention to the interactions between climate, biodiversity, land use, social sciences and economic models, describing for example how urban and rural areas should live together in harmony. Nowadays, there is a huge literature about the so-called Renaissance Ecology. A French expert, Julien Dossier, even prepared a contemporary version of the fresco and designed 24 projects exploring this knowledge hidden in the fresco. Whether it is possible to reactivate this Sienese identity in the form of pro-environmental behavior?

FROM VALLEY TO VALLEY: EXTRAORDINARY NATURAL AND SOCIETAL ASSETS WITHIN THE CITY WALLS

Due to the city’s special heritage status, the urban plan of the city forbids any new construction within the historic walls, thus preservation of the existing green areas (including the five valleys) is safeguarded. When Siena was a city-state in medieval times, self-reliance was essential for its inhabitants; therefore, food production was also provided (partly) within the walls. Centuries later, typically small gardens operated in the valleys until the 1970s-1980s, and miraculously, the city has never been built in these 5 valleys throughout history.

As for Pecci’s Garden, which starts right behind Palazzo Pubblico, a hospital dedicated to mental illness used it for decades, and when it moved out in 1983, a social co-operative started to operate here, providing nature therapy. Today, this organisation cultivates the garden (incl. a medieval one), partly because it also operates a local restaurant, providing job opportunities for disadvantaged people.

The beautiful Orto Botanico (Botanical Garden) is in another valley. It is operated by the University of Siena, which, along with the Museo di Storia Naturale (Accademia dei Fisiocritici), is a core player in Siena when talking about biodiversity. The museum hosts an important collection regarding nature and natural history and also monitors the urban biodiversity of Siena through citizen science projects, bioblitz and other events: so far, it has collected more than 5000 observations

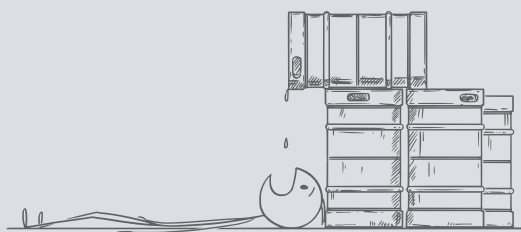
and documented the presence of more than 1300 different species, including rare and protected ones.



Siena, in the Pecci garden
© Ferenc Albert Szigeti



Siena, Follonica Valley - 'beer of the walls'
© Ferenc Albert Szigeti



In other valleys, there is some small-scale agriculture, mainly operated by contrade; some of them are abandoned, but one thing is sure: based on this great asset, more and more activities have been born in the last years. For example, Association Le Mura organises visits to the green valleys around the city walls, regularly organises cleaning actions, and has launched several interesting projects (i.e. “the beer of the walls”).

“Along with the ecological crisis, there is a lot of attention to these urban green spaces in Siena now. The city has a policy to regenerate these green areas, and the municipality facilitates this process with the private owners and stakeholders. There are new tools in our hands to make our connection to nature more attractive,” says Pietro Romano, a municipal officer from Siena.

Having a strong and positive narrative of green transition, including urban biodiversity, green and blue infrastructure and nature-based solutions, one crucial question has arisen: how to capitalise more or better on Siena’s great green assets and how to move forward?

THE RAVACCIANO VALLEY, THE TESTBED OF A FUTURE GREEN CORRIDOR IN SIENA

Siena’s answer is the creation of a green corridor, and the first steps have already been made in the Ravacciano Valley, where a lot of different initiatives have been running. The first step was made in 2014 within the participation process provided by the Common Goods Regulation (2014), which is an innovative legal instrument regulating forms of collaboration between citizens and the administration to better care, regenerate and manage common goods. The valley, first and foremost, gives home to the Busseto Woods: a secondary vegetation that grew when locals stopped agriculture here. A few years ago, local volunteers, coordinated by WWF Siena and Legambiente Siena, cleaned the forest up, and the plan is to make Busseto Woods into an open-air classroom, with local greenways, a nursery of endemic species, etc.



Siena, Ravacciano Valley
A small wooden house providing apitherapy
 © Ferenc Albert Szigeti



In connection with the Ravacciano Valley, we must also talk about another unbelievable, partly invisible natural asset of Siena: the “Bottini” water . Bottini is a net of tunnels under the historic city, channelling water from the mountains under the ground to provide water for the city (contributing to self-reliance in medieval times). In modern times, the drinking water supply is based on other sources, and the Bottini water feeds historical fountains, and then leaves the city silently, for example, in the green valleys. Although there is a relatively new museum dedicated to the Bottini, the Association La Diana organises visits, there are school programs and some community gardens, as well as the botanical garden, use this resource, the general use of the Bottini is under debate, because it is underused or even wasted, and there are much more potentials to use it, especially in times of climate emergency (e.g. cleaning streets).

The Ravacciano neighbourhood and the valley were the target area of the H2020 project URBiNAT. The whole neighbourhood was involved in co-designing nature-based solutions in the area; therefore, the valley is the home of several projects focusing on nature. Some pioneer initiatives have already taken place such as the small wooden house with a separate beehive, providing apitherapy, the creation of an urban community garden (one of the 5 within the city and 80 (!) in Tuscany - many of them established in the frame of the regional initiative "One hundred thousand vegetable gardens in Tuscany"), creation of public paths and connections, and wildflower meadows and fruit forest for pollinators. The biodiversity of the area was highlighted by the organisation of a bioblitz event within the City Nature Challenge in 2022.



Siena, Follonica Valley
One of the Bottini fountains
 © Ferenc Albert Szigeti

The next step was the elaboration of the ConVerSi green corridor strategy Siena (2021-2023), scaling up the participatory regeneration model tested in the Ravacciano Valley to the urban level. First, Municipality of Siena submitted an urban regeneration strategy related to the Park of the City Walls within the framework of ERDF funds. The idea was to systematise all the projects developed within the municipality or local institutions concerning the enhancement of green spaces adjacent to the historic walls, also promoting nature-based solutions and the role of the Contrade and local associations. Between 2022–2023, a participatory process was carried out (co-funded by ESF Funds), leading to the new name of the strategy — ConVerSI (Conessioni Verdi Siena) — and the collection of bottom-up proposals. These were combined with existing ones, ultimately leading to the creation of a Masterplan.



This Masterplan now underpins a long-term vision to be implemented over the coming years through projects to be developed through ERDF funds. Currently, detailed designs are being developed for some of these green areas.

The plan builds on this magnificent socio-cultural heritage and the active communities committed to caring for common goods (i.e. the centuries-old history of the Contrade), which is still recognisable as the Regulation of Common Goods resulted in the launch of collaboration agreements with various groups (Le Mura Association, RigenarSI project, Boschetto San Miniato, Rete degli Orti di Siena).

Besides increasing biodiversity, the Masterplan prepared within the ConVerSi project in 2024 aims at connecting neighbourhoods through the creation of pedestrian and cycling routes, forming a basis for a wider green corridor in the future, and recommends various project solutions (street furniture, paving, lighting, vegetation, building works, accessibility, signage, etc.). The ultimate goal is a green transition, and nudging residents to be greener. Siena's green assets provide an excellent learning facility to do that. Green valleys around the historic city centre, combined with novel nature-based solutions and awareness-raising activities highlighting ecosystem services, can activate pro-environmental behavior of residents, prompt green consumption, for example and change in shopping habits towards more environmentally-aware purchasing, as some international research pointed out (Barr, 2005).

The clear added-value of ConVerSi is its complex character, enhancing urban redevelopment and socio-cultural regeneration of various green areas in the city connected to the city walls. It targets the wall system (approximately 7 km in total with seven gates and several passageways, tow-



Siena, lesson at the community garden in San Miniato
© Ferenc Albert Szigeti

O



ers, fortifications, etc.), the system of green valleys inside and outside the city walls, as well as cultural heritage (Medici Fortress, S. Marco Complex, Villa Rubini, the Lizza Gardens), and includes various local stakeholders (owners of the walls and green valleys; institutions, districts, associations, citizens, schools, etc.).

Siena, educational wildflower meadow in San Miniato

© Ferenc Albert Szigeti

WHAT FUNDAMENTAL QUESTIONS SHOULD EVERY CITY ADDRESS TO ENSURE EFFECTIVE WILDLIFE AND GREEN CORRIDOR RESTORATION?



What potential exists in your area?

Begin by working with researchers and ecologists to assess the potential for wildlife or green corridors in your city. Which areas could be connected, and which species could benefit? Are you linking only parks, tree alleys, and wildflower beds, or can you also incorporate more natural or protected areas with greater potential for supporting mammals and other wildlife? This assessment will also guide stakeholder engagement, ranging from residents and park maintenance teams to national park administrations.



A long-term “conservation area” plan defining priority areas for an urban wildlife corridor

Once possibilities are clarified and there is political will, you need a good plan to establish priority areas for city or region-wide connectivity. Do you need a new plan, or does your green infrastructure plan include a long-term vision for creating a green corridor, including aspects and tools to increase biodiversity?



How will you assess urban wildlife corridors?

Establish a database to research and monitor connectivity. Use diverse scientific tools — such as remote-triggered camera traps, community science contributions (e.g. bioblitz events), and field monitoring by researchers — to track wildlife presence within priority areas.



What is the status of the land parcels involved?

Gather detailed information on parcel boundaries, ownership, and publicly held lands. After identifying priority areas on maps, complement wildlife data with on-the-ground assessments: walk potential routes, evaluate habitat quality (availability of resources like food and water, levels of pollution), and identify both conduits (e.g., underpasses, channels) and barriers (e.g., fences, roads, buildings) to movement. Rank parcels according to their suitability for conservation goals.



Is land acquisition necessary for connectivity?

Compare all vacant and privately owned parcels in the target area to prioritise conservation needs. Use these findings to make evidence-based decisions about purchasing land to preserve and restore connections.



How will you restore and manage the corridor?

Support restoration by initiating diverse actions, from distributing native plants to residents to organising volunteer-driven habitat restoration projects.



How will you foster collaboration and community engagement?

Develop outreach and education programs to share research results and inspire residents to participate in protecting urban wildlife.

For the case study I used a study from Los Angeles (Urban wildlife corridors: Building bridges for wildlife and people / Amanda J. Zellmer and Barbara S.)