

COLridor:

Co-Design and Co-Living for Sustainable Futures

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Abstract



Figure 1: Distinguished (Collaborative Collective 2011)

The mission of the present trans-disciplinary community project COLridor is to generate a situation of eco-systemic co-living across local species and abiotic agents in an urban environment through their co-design. Located in the city centre of Prague, the case study bio-tope is a part of larger bio-corridor that has evolved namely thanks to the adjacent railway and water stream. Though the prevailing opinion of European urbanists is that cities should remain dense and separate from the rest of nature (see illustration Figure 1), landscape ecologists and biologists tend to disagree. There is

no nature on Earth without human beings and these together evolved reflecting each other's impact and interaction. A great variety of species have adapted and evolved for the urban environment that, at the moment for many, offers a safer living environment than agricultural land. Through systematically co-designed and co-created so called '*prototypical urban interventions*' (Doherty, 2005), the project aims to motivate edible landscape, culture and dwellings for all.

Introduction



Figure 2: The first author is giving a speech on Bio-Corridor's importance at the local community meeting at Nusle Stairs (photo: Michálková 2016)

The old garden of log-house Zvonařka with adjacent Nusle Stairs is Prague's nature-like bio-topo¹ with remarkable diversity (see Figure 2) and together with the adjacent railway, parks and gardens generates a rare bio-corridor² within the city centre. As it is located in one of the most expensive residential areas, the pressure on its building development is high. In 2011 a large apartment-complex design was submitted for permit, arguing for keeping the greenery character due to its

¹ 'Biotope: A region that has a characteristic set of environmental conditions and consequently a particular type of fauna and flora (biota).' (Oxford University Press, 2004)

'Biotope: An environmental region characterized by certain conditions and populated by a characteristic *biota.' (Allaby, 1998)

² 'A point of particular significance is that local extinctions are common events (see Section 7.5), and so recolonization of habitat fragments is critical for the survival of fragmented populations. Thus, we need to pay particular attention to the spatial relationships amongst fragments, including the provision of dispersal corridors. There are potential disadvantages – for example, corridors could increase the correlation among fragments of catastrophic effects such as the spread of fire or disease – but the arguments in favour are persuasive.' (Begon, Harper, & Townsend, 2006)

green roofs (RH-Arch, 2011). Neither previous nor a recently proposed metropolitan plan lists the area for protection (Institute of Planning and Development Prague, 2016). From a personal conversation with its creators, the Institute of Planning and Development Prague has its interest in increasing the city's density, not extending its bio-corridors and bio-diversity. The plan is neither co-designed with ecologists nor with local communities or NGOs. Purely urbanists, marking the areas in the plan from their table, have created it. As also confirmed by the Concept of Metropolitan Plan Justification, the plan does not consider "details" (Kubeš et al., 2014). It also states that for the reason of being behind the range of land planning, the design is not done in respect of the European Commission's strategy of Green Infrastructure (European Commission, 2010), but instead, the term Landscape Infrastructure is used (Kubeš et al., 2014). This term doesn't respect the complexity of the strategy. The first author's architectural NGO Collaborative Collective (Collaborative Collective, 2012, 2016) fixed through cooperation with the second author's ecology support and evaluation focused NGO CoolAND (CoolAND, 2016a, 2016b) the first ecological pre-study (Zimová, 2016) for reasoning its relevance, building on and submitting a detailed investigation for funding.

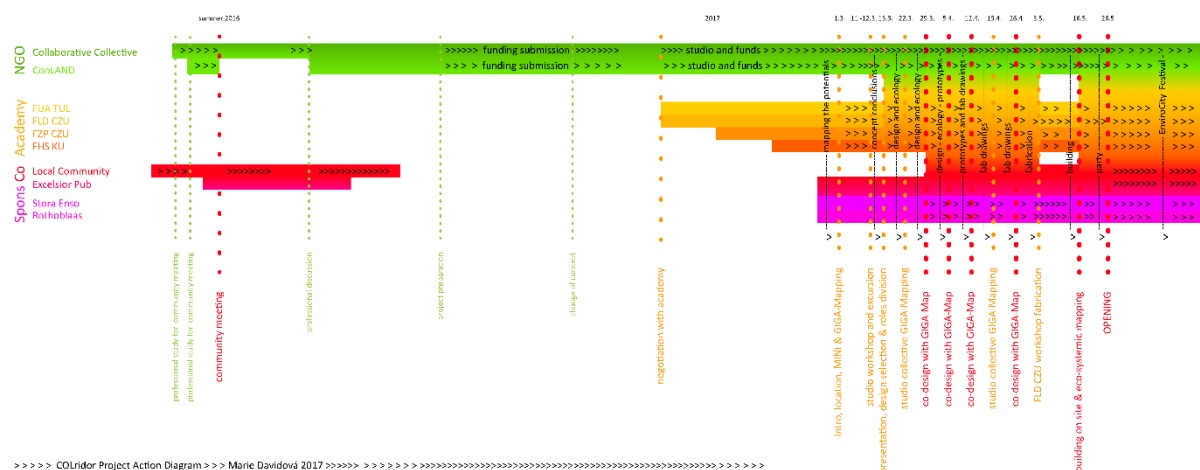


Figure 3: An action diagram showing the integration of the Local Community, NGOs, Academy and Sponsors for Future Co-Design and Co-Living (Davidová 2017)

Within the spring semester of 2017, a fully transdisciplinary systems oriented co-design project led by Collaborative Collective and CoolAND among the Faculty of Art and Architecture at TU of Liberec Faculty of Forestry and Wood Sciences, the local community and the local environment (see Figure 3). This 'GIGA-mapping' (Sevaldson, 2011, 2015) and 'full scale realisation prototyping studio' (Davidová & Sevaldson, 2016) focuses on supporting the local bio-tope by building shelters for the habitat of, for example, bats, insects or homeless people. The design process, prototyping and further local development fully engages the local specific environment³ together with the local community. In this sense, it is not only participation but also co-design⁴. Here the co-design method involves both biotic and abiotic agents within a so-called 'Time Based Design,' investigated by

³ Environment is physical and biological surroundings of an organism. The environment covers non-living (abiotic) factors such as temperature, soil, atmosphere and radiation, and also living (biotic) organisms such as plants, microorganisms and animals.' (Oxford University Press, 2004)

⁴ The division between 'participatory design' and 'co-design' is used here in the meaning as discussed by Sanders and Stappers (Sanders & Stappers, 2008) and as it is commonly used in Central Europe. In this, participation means that the related stakeholders are invited to the discussion board, while co-design means 'co-creation' (Sanders & Stappers, 2008) where the stakeholders play a creative active role within the design process as co-authors.

Sevaldson (Sevaldson, 2004, 2005, 2017) in which the project does not end by the building finalisation. This paper represents the first steps in this research-design process.

The project is to motivate humans to co-live with other species and among each other across social differences. The common events such as prototypes installations or seed bombs, topic related lectures and workshops, cultural performances, bat mapping at the EnviroCity festival (Davidová & Kernová, 2016) aim to support the eco-system⁵ through '*urban prototypical interventions*' (Davidová, 2004; Doherty, 2005). This '*non-anthropocentric architecture*' (Hensel, 2013, 2015) was concluded by the first author's previous study on performance also to be most beneficial for humans in the end (Davidová, 2016b).

Systemic Approach to Architectural Performance Methodology Driven Design Field in COLridor Project

While performing Research by Design during full-scale prototyping, the first author developed her own design field. Systemic Approach to Architectural Performance is a fusion of process-based fields formally initiated by integration of '*Systems Oriented Design*' methodology (Sevaldson, 2012, 2013, 2017) and '*Performance Oriented Architecture*' (Hensel, 2011, 2012, 2013). It develops methodology and generates theory through experimental practice. SAAP involves Time Based Eco-Systemic Co-Design that is performed by both biotic and abiotic agents, including humans. It belongs to a broader field of Systemic Design, considering the overall eco-system. Through engagement '*prototypical urban interventions*' (Doherty, 2005) in public space, thus interacting with the (eco)system, the (eco)system is co-designed and re-designed with all involved interacting agents.

Trans-Disciplinary and Public Based Co-Design

As mentioned, the project developed from an ecological pre-study of the location. Furthermore, it continued with GIGA-Mapping workshops in a local restaurant. These workshops developed the design of prototypical interventions in the forms of an insect hotel and various public events of EnviroCity 2017 Festival concept.

GIGA-Mapping Workshops

After a series of lectures from each of the specialist team members and embarking on a study field trip, the team arranged an initial GIGA-mapping workshop. Though on site, it was arranged in an exclusive setting. Each of the team members, being from different disciplines, GIGA-Mapped their individual field's interests and speculations within the project in a search for intersections (see Figure 4). This mapping helped to co-organize individual interests for teamwork. Therefore, this event was crucial despite the fact that some of the original members decided to abandon the project as it was not meeting their expectations or required a significantly larger workload than originally expected.

While setting our aims, every participant was asked to print out reference pictures of the items they wanted to discuss for the next GIGA-Mapping workshop that was already public. Use of images in GIGA-Mapping brings also tacit, even sub-conscious layers into play (Davidová, 2016b, 2016c, 2017; Davidová & Uygan, 2017). Therefore, the GIGA-Map has more dimensions and also relations in these

⁵ Ecosystem was described by Allen and Roberts as an ecological system inside the system that includes the geophysical part (Allen & Roberts, 1993).

dimensions. The workshop focused on searching for such utilizing drawing techniques (see Figure 5). The other follow-up workshops were already utilizing gathered image and drawing information and implementing them into multi-layering on preprints (see Figure 6 and Figure 7).

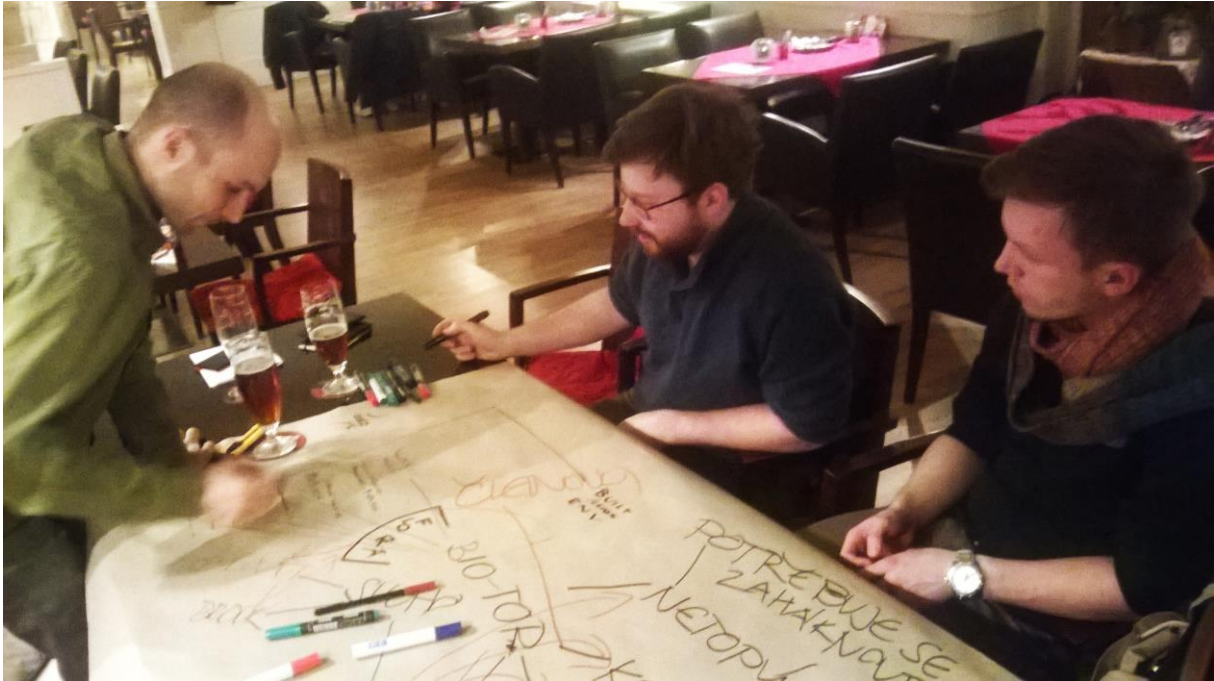


Figure 4: 1st GIGA-Mapping Workshop for COLridor Project. In this case, it relates to the Trans-Disciplinary Experts' Collective Mind Mapping (Photo: Davidová 2017)



Figure 5: 2nd GIGA-Mapping Workshop for COLridor Project - combination of drawing and printed images correlating (Photo: Davidová 2017)



Figure 6: Photograph taken shortly after the start of the third workshop (Photo: Davidová 2017)

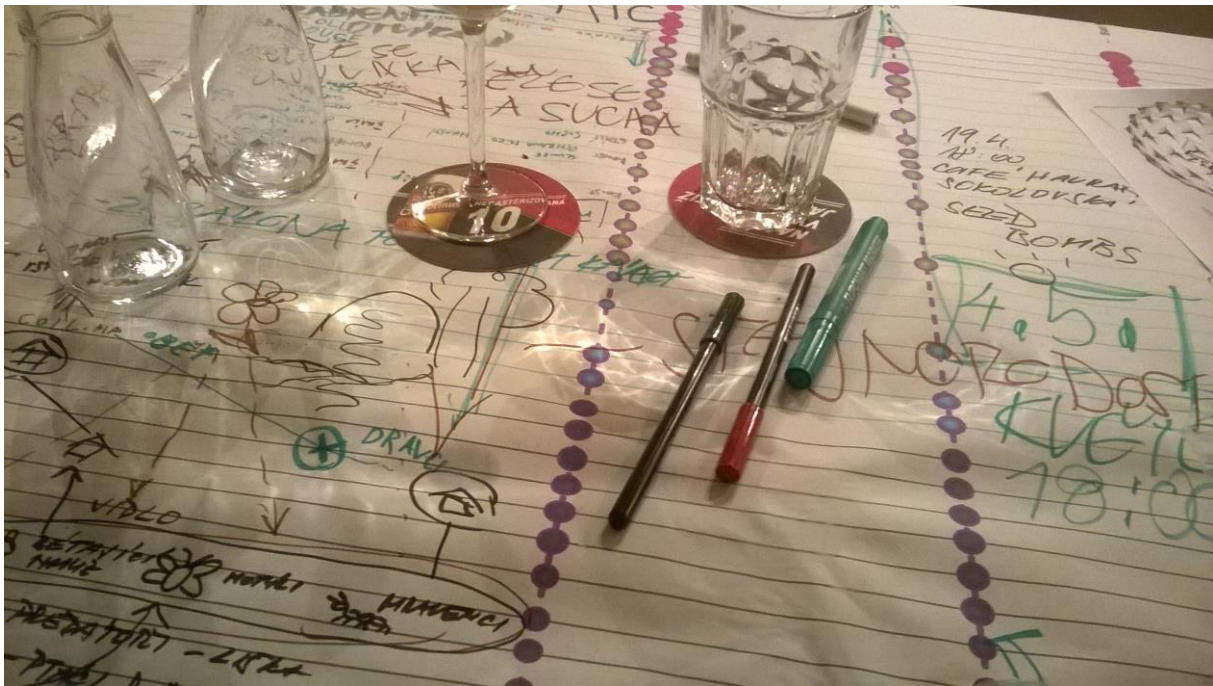


Figure 7: Detail of the pre-printed map after the workshop, showing the time planning of EnviroCity's events as well as the Eco-Systemic Performances (Photo: Davidová 2017)

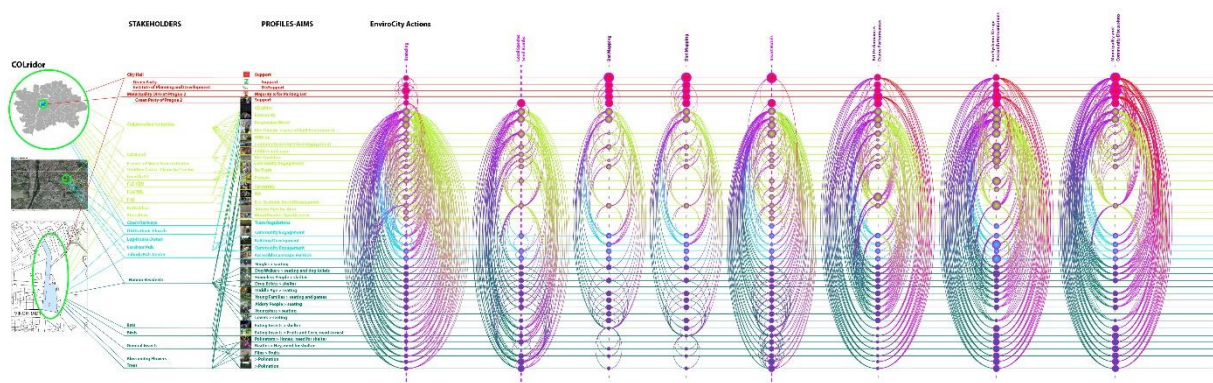


Figure 8: Speculative GIGA-Map relating the stakeholders' feedback looping the interactions within EnviroCity's actions and the scale of the locality they relate to (Davidová 2017)

The mapping for the interventions resulted in the concept design for EnviroCity festival events and the insect hotel design for prototyping, both of which will be discussed later in this article.

All the gathered speculations on eco-systemic relations among stakeholders (including our team as well as local species), their aims and our designed interventions were GIGA-Mapped by the first author and served well for understanding and leading the project (see Figure 8). The GIGA-Map is still publicly exhibited in the garden of the restaurant. It performed as a discussion board during the EnviroCity festival, also discussed in the following section. All attending stakeholders were interested to find themselves on the map and follow and discuss their relations to the others. The analysis of relations also served as a tool for interaction, expectations and branding of the events and actions.

EnviroCity Festival

The concept of the multi-genre EnviroCity Festival (Davidová & Kernová, 2016) is very open while also having a strict rule: every performer must somehow relate to the topic of the project. Therefore, they co-design the project through their performance, the project's interpretation, (Davidová, 2017) and influence towards the audience. The fields consisted of local community ecological NGO's (see Figure 10), politicians (see Figure 9), social-geographers, architects (see Figure 14), national heritage architects (see Figure 9) and systemic designers (see Figure 12), ecologists (see Figure 13) and biologists as well as dancers and performing artists (see Figure 11) or audio-visual shows (see Figure 15). Some performances were more interactive, some less. Therefore, a large spectre of age and social groups became engaged as well as joined the festival events.

While the discussions among politicians and experts helped to reach some solutions at the public agencies level, the artistic performances and ecological workshops, such as seed bombs, birds and bats mapping managed to include the audience in a personal public engagement. Though, most often, these prototypes had no physical character, they all served as prototypical urban interventions, generating eco-systemic performance through further co-design whether through public or other means (seed bombs, etc.).



Figure 9: Debate on Bio-Corridors within the city and its relation to Bio-Top Zvoňarka – the disputers consisted of a National Heritage Architect, City Hall Representative for Urban Development, Prague 2 District Counsel, the first author as an Architect and the second author as an Ecologist. The discussion had a stated goal to discover common strategies for action (Photo: Robert Carrithers 2017)



Figure 10: Community brunch discussing *Initiatives for Eco-Systemic Co-Living* (Photo: Robert Carrithers 2017)



Figure 11: *Darina Alster: Sea Siren* (Photo: Robert Carrithers 2017)



Figure 12: Who We Are / Who Are We' Community GIGA-Mapping Workshop by Linda Blaasvær (Photo: Robert Carrithers 2017)



Figure 13: Morning picnic with birds – Local Bird Mapping performed by Kateřina Zimová (Photo: Robert Carrithers 2017)



Figure 14: VR game *Bumblerun* by Kateřina Horák Goryczka and Jan Horák in the public space of Nusle Stairs (photo: Carrithers 2017)

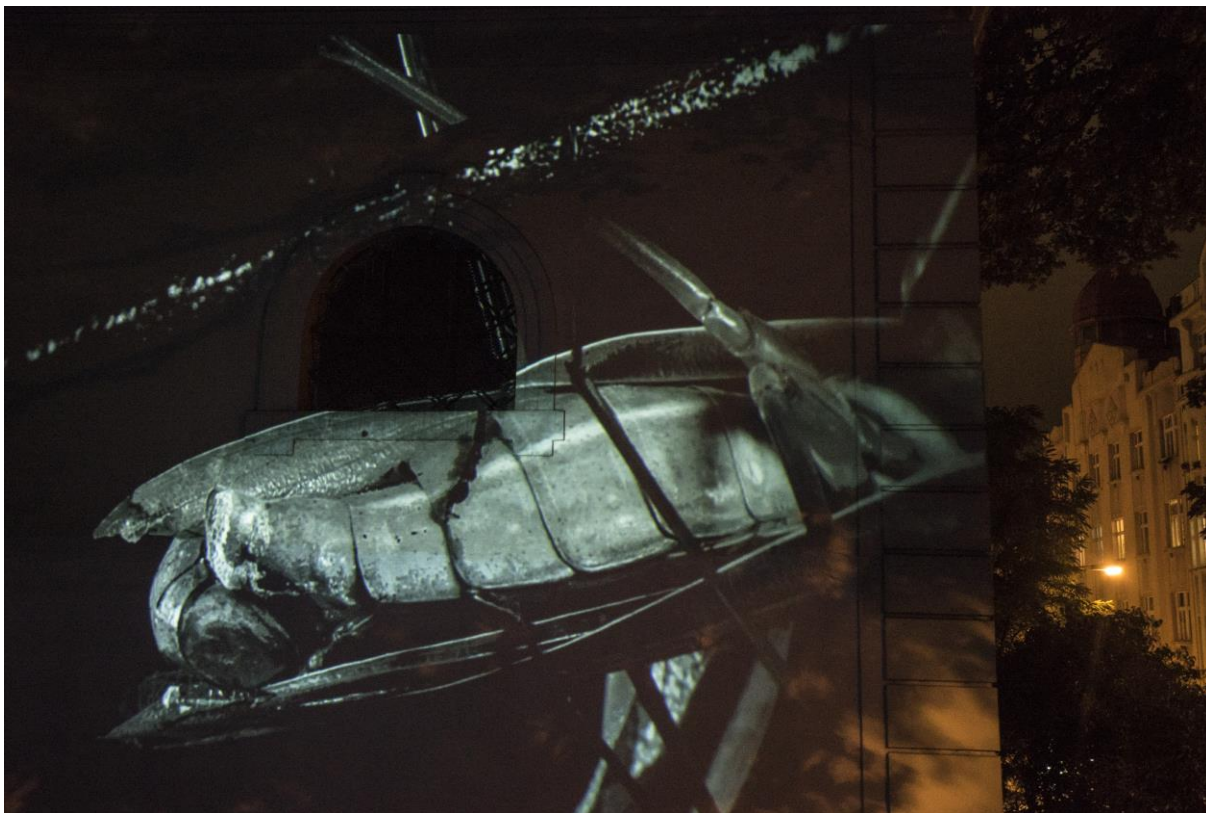


Figure 15: Lunchmeat Eco-Systemic Closing Audio-Visual Performance (Photo: Go 2017)

Eco-Systemic Urban Prototypical Interventions

The eco-systemic urban prototypical interventions, inspired by CHORA's 'urban prototypical interventions' (Doherty, 2005), can serve as an input stimuli for an eco-system to start flourishing. For the COLridor project, we categorised three of them:

Edible Landscape

The project promotes the concept of 'edible landscape' (Creasy, 2004). For an eco-top to flourish, above all, there has to be enough food. As birds and bats are the precious species for the location, we built an insect hotel for hosting their food. However, this impending food also has to eat in addition to the fact that there has been a nearly 80% decrease in flying insects since the end of nineteen eighties in western Europe and there is no other relevant data (Vogel, 2017). Therefore, EnviroCity implemented a Seed Bombing workshop with blossoming flowers to offer honey (see Figure 16).



Figure 16: SeedBombs Workshop by Kateřina Zimová (photo: Robert Carrithers 2017)

Habitation



Figure 17: TreeHugger: Responsive Wood Insect Hotel that offers a variety of climatic and spatial conditions to be met with diverse insects' preferences. This is achieved by global axis orientation, the shape of the hotel and cutting the panels from different positions of the tree trunk. Please also take note of the social communication and engagement of people and the insect habitation architecture (Photo: Carrithers 2017)



Figure 18: Ray 2 Responsive Wood Envelope Prototype a) in semi-dry April weather when the screen is partly open for boundary exchange between the exterior and semi interior; b) After April light rain when the System is closed, not allowing the humid and cold air to pass through the boundary; both after four years of exposure to weather and biotic conditions. The prototype became inhabited by Blue Stein Fungi, Algae and Lichen. These, especially the algae, regulate the moisture content of the wood, thus contributing to its warping. Notice also the organisation of Algae habitation caused by the material's fibre direction and position within the design that is affected by material performance and form. Thus, it is organised through its moisture and the organism's abundance and distribution interaction (Photo: Davidová 2017) (Davidová, 2017)

The first prototype for habitation is the insect hotel TreeHugger (see Figure 17). The hotel employs the concept of responsive solid wood from Norwegian traditional architecture. This concept uses the tangential section through the tree trunk, thus the fibre density on the left and right side of the plank is different. Therefore, the plank warps in low relative humidity and high temperature, while in

humid cold weather it is narrow. When organized into a screen, the system airs in dry and closes in humid weather (Larsen & Marstein, 2000).

This prototype further developed the first author's responsive wood screen Ray (Davidová, 2013, 2014, 2016a, 2017a) (see Figure 18) in which the warping is moderated based on the moisture content when the wood is cut and the position from the tree trunk. Here, the difference in warping not only enables the organisation of the panels' overlapping but also generates diverse climatic habitation chambers within the hotel. Therefore, the hotel will cater to a larger diversity of insects that is also supported by the terrain and world axis orientation. This wooden platform offers dwellings for algae that also moderates its performance through moisture content (Davidová, 2017, 2017).

Social Interaction

Social interaction potentially provides the most crucial impact for our ecosystem. Without public engagement our mission will stagnate and cannot develop into the concept of sustainability defined by Ehrenfeld as the possibility that humans and other life will flourish on the Earth 'forever' (Ehrenfeld & Hoffman, 2013). This impact through interaction was specifically increased by the EnviroCity festival discussed above.

Eco-Systemic Performance Registrations and Observations

The complex of the greenery consists of a mosaic of urban greenery, permanent grasslands, private gardens and ruderal stands along the railway line. The greenery is a varied species composition representing all floors from tree to herbaceous. Some trees have significant ecological importance because of their age and habitat, especially trees in the private gardens in the streets Pod Zvonarkou and Na Klenovce. The complex of greenery is situated on a sloping terrain; the entire site slopes down to the Botič stream and railway lines. The Zvonařka greenery complex, based on observations, is an ecological enclave in the middle of an urbanized environment. The site is ecologically valuable from several different points of view:

- The area is an important breeding and food biotope for birds and bats.
- The area is valuable due to its species diversity and the occurrence of nectar plants for pollinators, which are currently included among highly vulnerable groups with a priority for protection within the European commission (European Commission, 2015).
- The location of the greenery on a distinctive slope has a unique anti-erosion function, thus protecting lower-lying sites that are heavily urbanized.
- Greenery plays a positive role in the microclimate of the site, thus avoiding the temperature extremes typical within an urban environment.
- The site is the only corridor for species migration between adjacent systems of urban greenery - Havlickovy and Folimanka Parks. These greenery systems have no other migration potential because of the heavily urbanized environment surrounding them.

- The area is crossed by the NRBK 40 bio-corridor.
- The concept of flood protection of MoE No. 11 - PPO Complex in the Lower Vltava River Basin in the section Štěchovice - Mělník, meaning the action Botič Revitalization is covered. Due to its rich patricity, biomass concentration and slope location, the site has significant hydrological importance for water retention in the countryside and protection from local flooding.

Biological observations:

A field survey was conducted from April 2017 until October 2017. During this survey, the entire site was explored in terms of functional ecological links outside the site and its interaction with the surrounding greenery. The collected field data was then compared with information from professional sources (AOPK, 2017) and subjected to an overall evaluation. Among the species identified, a total of 27 bird species and two bat species were observed (see Figure 19) and it was registered that they have no safe opportunities for nesting. Burnt nested bats were noted in the baskets inside heating exits of human dwellings.

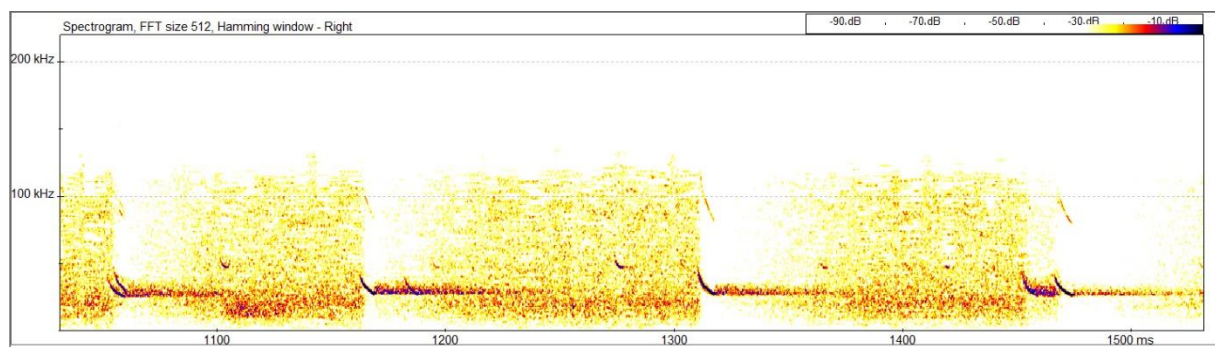


Figure 19: A Sample from Ultra Sound Bat Detector Recording Registering Two Species of Bats from the Location (Bat Protection Association 2017)

Birds species:

Phylloscopus collybita	Fringilla coelebs
Phylloscopus trochilus	Falco tinnunculus
Turdus philomelos	Phoenicurus ochruros
Turdus pilaris	Garrulus glandarius
Columba palumbus	Carduelis carduelis
Delichon urbica	Pica pica
Motacilla alba	Dendrocopos major
Turdus merula	Dendrocopos minor
Sylvia atricapilla	Emberiza citrinella
Sylvia curruca	Troglodytes troglodytes
Sylvia communis	Parus major

Parus caeruleus

Carduelis chloris

Sturnus vulgaris

Picus caz

Corvus corone

Bat species:

Pipistrellus pipistrellus and Pipistrellus nathusii

Conclusions

To ensure the ecological and various other site functions mentioned are preserved, it is necessary to keep the current green areas in the current state (November 2017). The site has the potential to provide a biotope for observed rare or protected species such as bats, birds and insects. It is crucial that the site provides food and dwellings for them to survive, especially important as many are only adapted to live in an urban environment and agricultural land is often even more dangerous to their chances to survive. To reach such a situation, it is necessary to involve both bio-technological research as well as local human community in the vision to co-design the urban environment and cohesively inhabit it with other species. It is alarming that though the UN agenda for 2030 sustainable development is calling for collaborative partnership of all stakeholders and fight of poverty while being determined to ensure that economic, social and technological progress occurs in harmony with nature to reach prosperity (United Nations, 2015), its goals are so anthropocentric, that *'Cities and Communities'* are discussed in separate goal (United Nations, 2015, 2016a) from biodiversity, discussed in *'Life on Land'* goal (United Nations, 2015, 2016b). These goals are not in any sense cross-referenced. As opposed to this human-centred approach, this project is to demonstrate the relevance of consideration of human settlements as being part of the overall eco-system. Through the generation of public awareness and pride for the local specificity and community, we believe the bio-corridor will be marked into the Metropolitan Plan and no future building development in the precious garden will be enabled. Through this *'Ecological Urbanism'* that involves *'anticipation, sensing, curation, collaboration, production, interaction, mobilisation, measures, adaptation and incubation'* (Mostafavi & Doherty, 2016a, 2016b), our policies are targeted to be implemented from the bottom up!

Credits

The project was co-organized by Collaborative Collective, z.s. and CoolAND, z.s. with support of the Technical University of Liberec, Faculty of Art and Architecture and the Faculty of Forestry and Wood Sciences at the Czech University of Life Sciences in Prague. It was co-funded by VIA Foundation and through EEA Grant program for Biodiversity and Climate Change Adaptation lead in cooperation of the Technical University of Liberec, Faculty of Art and Architecture and the Oslo School of Architecture and Design. The sponsorship involved the Forests of The Czech Republic, Stora Enso, Rothoblaas, Skuta Design and the Faculty of Forestry and Wood Sciences at the Czech University of Life Sciences in Prague.

The festival events were listed as a part of European Sustainable Development Week and European Cultural Heritage Days.

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