BEEyou

- how architecture can reconnect us with the honeybee

Karianne Rydstrøm
Master’s thesis at Chalmers Architecture
Master programme Design for Sustainable Development
Thank you Lena - for your inspiration and engagement.

Thank you Emilio – the project wouldn’t be the same without our conversations.

Thank you Alexander - for all your knowledge on urban beekeeping and your enthusiasm.

Thank you Hanna & Mia - for your support, sofas and smiles.

Thank you Edvard - for your never-ending interest in honeybees and me.
The bee & me

I started my architectural education in Trondheim, at the Norwegian University of Science and Technology (NTNU), in 2009. When starting on my fourth year I decided to make a new choice regarding my education. I wanted to engage myself in sustainable architecture, with focus on how architecture can inspire people to live more sustainable. I found Chalmers to be the best university for me, and I am now proud to deliver my master’s thesis within the master program Design for Sustainable Development.

During my two years in this program I have followed different kind of studios and gained new knowledge. I have worked with system thinking, how an old brewery can reintroduce itself in an urban environment, why allotment gardens at a tram stop should steer the development of an area and how a specially designed henhouse can encourage the inhabitants of a small Swedish town to keep hens in their garden and create a new understanding of where our food comes from.

The first time I really saw bees for what they truly are, was in an old movie theatre in Gothenburg, in the fall of 2013. Seated in a warm, purple velour seat, in a theatre for 10 persons only, I saw the inner secrets of the bee’s life. I followed their dance, their flying patterns and their community.

Seeing the movie “More than Honey” (2012) changed my view on these wonderful creatures and I discovered a whole new movement, working worldwide, to secure their survival.

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BEEyou - abstract

Today millions of honeybees are disappearing from the face of the Earth. The reason why is still being debated, but there is a consensus view that modern food production, with monoculture and pesticides, has a big influence on the honeybee population. The phenomenon is called Colony Collapse Disorder and is a consequence of the disconnection between people and the natural world.

This master’s thesis explores how architecture can reconnect people and the honeybee, and hence foster more environmentally friendly behavior.

Based on literature regarding bees, psychology and architecture, the design discusses a new approach to how we can inspire change. The design also discusses how nature can inspire and improve modern city planning. On a rooftop in Oslo, an urban beekeeper takes care of two beehives. This is the starting point for my master’s thesis. I look into how architecture can create a healthy and green environment for the urban honeybees and at the same time explore how humans can interact with the honeybee in an urban environment.

The end result for my master’s thesis is a design, consisting of two parts. The design for the rooftop ensures the possibility to grow vegetables and, at the same time, provide the honeybees with an important food source. Across the river, overlooking the rooftop, a green beehive will create a meeting place in the urban environment, where people share with the honeybees, and bring local food production out in the city.

The project is meant to be an inspiration for expanding urban beekeeping in Oslo, and a reminder of the natural connection we as human beings share with the honeybees.

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Aim and questions
The aim of this master’s thesis is to explore how architecture can create a space where people and honeybees can meet, strengthen the human/nature connection and inspire people to take better care of the planet we live on.

I will explore how an architectural project can connect humans and urban honeybees by creating a common ground within the urban environment we share, and at the same time make people more aware of the importance of the honeybee’s existence.

If people in an urban environment reconnected with the honeybee, could this lead to a stronger connection between people and the natural world? And how can architecture create the urban space for this reconnection?

The honeybees are small and hard to get a good look at. But what we see clearly everyday, maybe without noticing it, is the traces they leave behind. Their pollination enriches our surroundings with colourful and tasty fruits, vegetables and plants. One part of my design is boxes for planting vegetables on a rooftop where honeybees already live. The other part is a green beehive across the river from the roof - implementing urban farming as well as a viewpoint to/of the roof.

Methods
In this process I have used different kind of methods to be able to explore my subject. I have studied literature on human psychology and change, honeybees and the human/nature connection. I have conducted several interviews in Oslo. I have talked to urban beekeepers, people working with sale of locally produced food and people in the Municipality of Oslo, responsible for the greenery in the city. I have followed Alexander Du Rietz, an urban beekeeper in Oslo, on different events and also been able to take a closer look at his beeboxes. This has provided me with hands on experience on urban beekeeping.

Sketching has been important through out the process, together with model studies and site analysis. The site analysis consists of photography, sketching on site, learning more about the neighbourhood and the natural conditions of the place.

Delimitations
I have limited my thesis to focus on human behaviour and change, human/nature connection, the honeybee and urban beekeeping. This master’s thesis will still not hold all the information in these fields, but rather focus on the connection between them.

If the time had been there I would have liked to study...
ecosystem services and urban landscape design. I believe that there is a lot to gain for this project from these two fields.

Reading instructions

Chapter 2 “Research background,” starts with the human mind and behavior psychology, followed by my own reflections. From here you can read about human/nature connection, before reflections on these two fields ends this section. This chapter ends with my design guidelines, extracted from the research part. In the chapter called “Conclusions,” I reflect on how the design managed to follow these design guidelines.

The third chapter, “The honeybee,” contains facts on the honeybee, the honeybee community and urban beekeeping.

In the chapter “The site,” you can read about Oslo, Norwegians and the area for my design.

In the “Design” chapter, you will first read about my design concept, before I present the design at the rooftop, before presenting the design in the nearby park. This chapter ends with pictures from my landscape model and my thoughts around the design and the seasons.

The following chapter, “Conclusions,” starts with a reflection on the guidelines, as mentioned above, before I reflect on the project as a whole and take a look into the future.
This chapter is based on my literature studies on the human mind's ability to change, environment psychology and human/nature connection. There is a lot of information to be found on these subjects, and I have made a selection based on my personal interests in these fields, and studied the links between these fields.

I will use the term environmental psychology and ecopsychology in my text. These are wide fields, and I focus on only some of the aspects. Environmental psychology focuses on the relation between people and their surroundings. The environment includes the build-, the social- and the natural environment. Ecopsychology studies the relation between humans and the natural world by looking at ecological and psychological principles. Ecopsychology wants to expand our emotional connection with the natural world.
The human mind

How understanding the human brain can help us inspire people to change

Technological solutions might be important and impressive, but without a behavior technology that changes what people actually do, they cannot be achieved. (Koger & Winter, 2010, p.132)

I started the whole process with my master’s thesis, exploring how the human mind affects our ability to act in environmentally friendly ways. My goal was to gain background information I could transfer into guidelines for the design.

In 2009, World Wide Fund for Nature, WWF, published the report “Meeting Environmental Challenges: The Role of the Human Mind” This report gives a critical view on the history of the human race, we have seen dramatic and rapid changes happen before, such as the agricultural, industrial, and technological revolutions. Despite the psychological mechanisms of personal goals, industrial and technological revolutions have affected the human mind, leading to stereotyping, discrimination, and even extinction of other species. By placing someone or something in an out-group, we automatically treat this group in a manner that enhances our own group’s identity. (Whitley & Kite, 2006, p.132)

The second aspect is the in-group/out-group phenomenon. The in-group/out-group phenomenon explains how people, by placing themselves inside particular groups, such as gender, nationality and profession, define who they are. This is a highly effective mechanism of the human mind leading to stereotyping, discrimination and even extinction of other species. By placing someone or something in an out-group, we automatically treat this group in a manner that enhances our own group’s identity. (Koger & Winter, 2010, p.132)

The first aspect, our values and life goals, tells the story of how the focus among human beings has shifted over time. Today we focus more on ourselves and our own well-being. We want to make the most of our own life and hence we focus on self-enhancing values. Shalom Schwartz and colleagues (1992) describe this as a desire to dominate people and resources, and demonstrate success relative to others, such as the natural world. Studies show that in countries where the inhabitants place a greater priority on pursuing life goals such as wealth, power, status, and the CO2 emissions are higher per capita, then in countries with other priorities. These materialistic goals also lead to negative attitudes towards non-human nature and less engagement in positive environmental behaviors. (Schwartz and colleagues, 1992, p.66).

The human mind

As mentioned on the previous page the aspects of values and life goals, in-group/out-group and how we manage fear, are important to be able to understand how humans try to deal with environmental challenges.

The three aspects

How our brain limit our ability to change

The aim of that project was to design a henhouse that would inspire people to keep hens in their backyard, and by doing so reconnect with animals and rethink how their lifestyle affects the natural world. Indeed, everyday we see how people ignore animal welfare, because access to the desired food products is more important. Today, the beekeeping industry is industrialised and has lost it’s natural connection, transporting hives full of bees across continents to ensure pollination at big, monoculture acres. (Hewstone et al., 2002, p.132)

The third aspect of the human mind explains how people attempt to manage fear and threats to their identity and their existence. This is a very important feature to address. If we feel overwhelmed and scared over the situation the planet is facing and least stressful solution will be to just ignore the fact. Climate change is a visible threat to the human society. Feeling threatened leads to emotions such as anxiety and guilt, feelings I can recognise from my own coping of environmental questions. When we meet these feelings we react with anxiety and deal. Freud said that humans protect themselves against unwanted feelings in order to reduce pain by using defence mechanisms to contain their anxiety. Freud’s defence mechanisms explain our mental operations used (often unconsciously) to manage such threats. “Such mechanisms are commonly-used by humans in response to feelings of anxiety and guilt, threats to one’s self-esteem and identity” (Ehrlich & Ehrlich, 1992, p.132).

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The human/nature connection

How reconnecting with the natural world can shift our mind-set

Since the industrial revolution, the human exploitation of the planet’s resources has only started to increase. We build cities without habitats for animals or birds, we forget where our food comes from and more and more species appear on the red list. The losses of different species are bad for humans in many ways. Biodiversity can generate enormous economic benefits in the form of food, medicines and industrial products. The working parts of natural ecosystems that provide the essential services necessary to sustain life. As the Earth’s dominant species, we have an ethical and moral responsibility to protect diversity (Liu, 2008).

I started to look into the historic perspective of the human/nature connection, to see how this connection has developed over time. As early as the 1400s, theories exploring the human race in relation to the universe started to appear. Copernicus (1473-1543) revealed that the planets revolve around the sun and not the Earth. This started to appear. Copernicus (1473-1543) revealed that the planets revolve around the sun and not the Earth. This revealed that the environment the human species evolved in, is radical different from the environment we live in today. Because our biological evolution has used centuries to develop, and the cultural evolution happened over night in comparison, the human mind is having a hard time making sense of, and coping with, the current environment, despite the fact we are ourselves the creators (Sarafino, 2008). This means that today people are starting to recycle, but as more and more recycling is being done, the same people also consume more and more. Today, environmental campaigns still focus on the specific behaviour. In the long run however, these actions lead to signs of depression and anxiety. In this way we miss the link between our actions and the consequences that produce these kinds of psychological reactions in humans. To be able to react in a new environmentally friendly way, we need to lower the level of stress and anxiety, and focus on direct action. Considering the threat of climate change, experts mean we still are able to stop the changes. However, the overwhelmingness of this complex situation is enough to overwhelm our stress response – reaction. By doing so, our stress levels goes down and we can focus on minor, everyday problems. In the long run however, these actions lead to signs of depression and anxiety.

When we encounter stress, our stress response is activated and we use one of three different stress response – reactions, to escape or control a situation, people and other animals are inclined to give up (Seligman, 1995).

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Then you are more likely to take this information to use for his proper ends (White, 1967, p.405). Our perceptual system evolved over a period of time where sudden dangers were present, and problems that would reveal themselves later were of lesser importance (Schultz, 2001). If we think about problems that feel like happening, but not very big for us and we are able to handle, our lack of response may lead to unprepared levels of stress that is damaging to the human health, the Earth. The serious problem of Colapoge Columnar Disorder displays the features that produce these kinds of psychological reactions in humans. To be able to react in a new environmentally friendly way, we need to lower the level of stress and anxiety, and focus on direct action. Considering the threat of climate change, experts mean we still are able to stop the changes. However, the overwhelmingness of this complex situation is enough to overwhelm our stress response – reaction. By doing so, our stress levels goes down and we can focus on minor, everyday problems. In the long run however, these actions lead to signs of depression and anxiety. We build cities without habitats for animals or birds, we forget where our food comes from and more and more species appear on the red list. The losses of different species are bad for humans in many ways. Biodiversity can generate enormous economic benefits in the form of food, medicines and industrial products. The working parts of natural ecosystems that provide the essential services necessary to sustain life. As the Earth’s dominant species, we have an ethical and moral responsibility to protect diversity (Liu, 2008).

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More and more research point out the link between human/nature connection and pro-environmental behaviour. In a large cross-cultural study of citizens in 14 countries, connectedness with nature emerged as one of the strongest and most consistent motivational predictors of pro-environmental behaviour (Loomis, 2001). If we see ourselves connected to the natural world and if we integrate nature in our in-group, we are more likely to make choices not only based on our selves, but other living things as well (Loomis, 2001).

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A panel of physicians concluded that climate change represents the biggest global health threat of the twenty-first century (Sarafino, 2008). As a result, the prevalence and severity of stress disorders will increase, such as grief, depression, anxiety, suicide attempts and substance abuse (Abler et al., 1989).

Our perceptual system evolved over a period of time when sudden dangers were present, and problems that would reveal themselves later were of lesser importance (Schultz, 2001). This helps us explain why we don’t respond to future danger but also why our response can happen too late in the case of global warming. We don’t want to think about problems that feel like happening, but not very big for us and we are able to handle, our lack of response may lead to unprepared levels of stress that is damaging to the human health, the Earth. The serious problem of Colapoge Columnar Disorder displays the features that produce these kinds of psychological reactions in humans. To be able to react in a new environmentally friendly way, we need to lower the level of stress and anxiety, and focus on direct action. Considering the threat of climate change, experts mean we still are able to stop the changes. However, the overwhelmingness of this complex situation is enough to overwhelm our stress response – reaction. By doing so, our stress levels goes down and we can focus on minor, everyday problems. In the long run however, these actions lead to signs of depression and anxiety.
From theory to design guidelines

Here I will translate elements from the research background into strategies for my design. By doing so I combine the fields of human psychology, human/nature connection and urban beekeeping, and connect them to the field of architecture.

A new type of city, where the natural world can develop side by side with humans.

**Design for empowerment.**

**Design for new views.**

**Design for reminding us of our connection with the natural world.**

**Design for an optimal connection between humans and nature.**

Humans need to consider the natural world as a part of our in-group, instead of increasing the distance by seeing plants and animals as an out-group. This can be done by developing means of increasing optimal contact between humans and non-human nature, including indirect contact. I will explore how architecture can create this optimal contact between humans and bees.

Design for a new, positive attitude.

In a setting where you see positive actions for the environment being taken, it’s easier for humans to direct energy towards changing behaviour, and use less energy to fight negative feelings such as anxiety. I will try to utilize this effect with my design by connecting it with existing urban bee keeping, and hopefully foster further actions in benefit of the environment.

Today people are surprised when they hear that the bee pollination is responsible for 75% of our diet. By creating a space where people can reconnect with the bee and be aware of our connection to them, this fact will not surprise people, but remind them to take better care of the honeybee population and the rest of the natural world.

**Design for reminding us of our connection with the natural world.**

**Design for new views.**

The vast majority of humans are visual-dependent. Sights use a greater part of the human brain cortex than the other senses, and people generally rely on what they can see. We cannot really see the bees and their fascinating movements, but architecture can open up our eyes to the traces they leave behind when pollinating our plants.

**Design for new views.**

**Design for reminding us of our connection with the natural world.**

**Design for a new, positive attitude.**

Small steps towards a greater meaning will lead to empowerment and control. With the feeling of control, follow reduced stress levels and you become more open towards behaviour change. I will not focusing on all the different aspects of climate change, but rather inspire people with a place to start.

Today people are surprised when they hear that the bee’s pollination is responsible for 75% of our diet. By creating a space where people can reconnect with the bee and be aware of our connection to them, this fact will not surprise people, but remind them to take better care of the honeybee population and the rest of the natural world.

**Design for reminding us of our connection with the natural world.**

**Design for new views.**

**Design for reminding us of our connection with the natural world.**

**Design for a new, positive attitude.**

Small steps towards a greater meaning will lead to empowerment and control. With the feeling of control, follow reduced stress levels and you become more open towards behaviour change. I will not focusing on all the different aspects of climate change, but rather inspire people with a place to start.
Honeybees are part of nature’s pollination crew, together with other species of bees, bumblebees and insects. Pollinators are key parts of ecosystems, both in the wild community and in the agricultural community. 75% of our world’s crop species require pollination to set seed (Utah Farming Bureau, 2014). Honeybees are contracted out as pollinators by beekeepers, and are by far the most important commercial pollination agents. Honeybees are well adapted to pollinate; they are fuzzy and carry an electrostatic charge so pollen easily attaches to their bodies. On their hind legs they have a structure called the pollen basket, where they collect pollen. Bees gather nectar, a concentrated energy source, and pollen. Pollen is high protein food that they use to nurture their babies. By “accident” they spill some of this among the flowers they are working on, and pollen grains transfer from the male anthers of a flower to the female stigma of a flower.

Honeybees need an abundant and steady pollen source to multiply and they will fly up to 5 km to gather food (Society for Apiculture, 2010). The nectar is regurgitated into a honey cell, and by flapping their wings and extracting fluid from the nectar, the honey is made. Then they seal the cell to keep the honey safe. It takes 150 trips to a flower or a tree to make one teaspoon of honey.

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The honeybee today

There was a time when the bee was considered a sacred animal. The honeybee symbolised the fertility of life and their community-inspired human beings. The bee community is a fascinating structure. Each bee works for the hive and strives only for the common good. The bee is biological dependent on the hive, and can only survive 24 hours outside the community (Siegel, 2010). Today the honeybee is threatened by a phenomenon called Colony Collapse Disorder.

Colony Collapse Disorder

Colony Collapse Disorder (CCD) is a phenomenon where whole honeybee communities disappear from their hive. The queen, the food and the bees are left in the hive, but the bees never return home. This is what makes the CCD so challenging to comprehend; bees would normally never leave their hive with the queen and brood still in it.

CCD was first noticed in North America in 2006 (Henein & Langworthy, 2009), and has since then spread throughout the world. CCD is not yet well know, but it is one of the more important issues in the honeybee industry. CCD is a threat to the beekeeper, and it is important to understand CCD and prevent it from occurring in our beehives. Agricultural crops all over the world depend on the pollination from honeybees; without this help, we would lose 75% of our daily diet (Utah Farming Bureau, 2014). Fruits, vegetables, almonds, and berries are some of the food that will disappear from our plate. The cause for CCD is, as mentioned above, still under debate. However, more and more research is pointing to pesticides, loss of habitat, a new beekeeping culture, the Varroa mite or a mixture of all of these, as the main problem.

The monoculture farming we see around the world today, makes it hard for the bees to survive in an area for the whole season. The bees depend on a variety in plants and flowers, so that they can access pollen and nectar from April to August. The Varroa mite is a great threat to the bee, mainly because of the viruses it carries into the hive. Consequently, the Varroa mite is responsible for millions of dead bees each season. As for the pesticides, they are often based on nerve gas, which destroys the bee’s natural “GPS system” so they don’t find their way back to the hive (Benjamin & Legrand, 2009). These are the most possible causes of CCD, but this review is far from exhaustive.

While reading about the honeybee, I found a lot of interesting information about this intricate creature, such as their ability to recognise human faces and that they communicate through dancing. Understanding that the bee holds all of these qualities can help us seeing the bee as something more than an insect, but recognise ourselves in their existence and bring them into our in-group.

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Bees navigate after the sun or polarized light if it is cloudy. Bees can recognise human faces. Bees have their own language, they communicate by dancing. The honeycomb structure, the hexagon, is proven by mathematics to be the most practical structure for maximum use of unit area. Their honey is a pure nature product and is filled with healthy nutrients. The bee brain stops aging when they perform jobs most for younger bees. A toxin in bee venom called malitoxin may prevent HIV. The bees pollination is responsible for 75% of all the food we consume.
The honeybee & the hive

Honeybees are called social animals because they live in colonies and rely on each other. Honeybee colonies are super organisms. A super organism is an organised society or group consisting of many individuals, that together function as a whole unit. In the summertime one honeybee community can consist of 80,000 individuals, and in the wintertime the number drop to around 10,000. Bees inside one colony recognize each other through a common smell, which originates from the queen. Guards at the entrance will make sure that bees with a different smell can’t enter (Heier Du Rietz, 2014). A hive consists of bottomless boxes stacked on top of each other. On the inside you can find the honeycombs. These are wooden frames featuring a wax plate, where the bees build their cells. The cells consist of wax and have the shape of a hexagon. The cells will contain pollen, nectar, honey or brood. 90% of a bee’s life takes place in the darkness of the honeycomb (Heier Du Rietz, 2014).

Honeycomb contains frames used for honey storing. A beehive consists of bottomless boxes stacked on top of each other. On the inside you can find the honeycombs. These are wooden frames featuring a wax plate, where the bees build their cells. The cells consist of wax and have the shape of a hexagon. The cells will contain pollen, nectar, honey or brood. 90% of a bee’s life takes place in the darkness of the honeycomb (Heier Du Rietz, 2014).

The queen is the only member of the hive that is sexually developed. In natural surroundings, the worker bees select the queen egg. In modern beekeeping however, the beekeeper places a queen in the hive. Once she is born, the queen goes on a marriage flight. On the flight 10-15 drones will mate with her and this fertilisation will last for her entire lifespan. She will lay 1000 eggs each day. The queen’s temper will affect the rest of the hive. Urban beekeepers strive to keep friendly bees, to avoid conflict with an urban environment (MAAREC, 2014).

The working bee survives for 30 days during summertime. The workers are all female and they are the mightiest bees in the colony. They take care of the babies, build the honeycombs, guard the entrance and collect nectar and pollen. The worker bee makes about 10 flights a day of 15-30 minutes (MAAREC, 2014).

The drone bee survives for 30 days during summertime. The drones are all males and are the spawning bees in the colony. Their main job is to mate with the queen, but you also see them guarding the entrance of the hive. In the wintertime drones are kicked out of the hive, to ensure enough food to the queen and the worker bees (MAAREC, 2014).

The queen excluder is an egg that is sexually developed. In natural surroundings, the worker bees select the queen egg. In modern beekeeping however, the beekeeper places a queen in the hive. Once she is born, the queen goes on a marriage flight. On the flight 10-15 drones will mate with her and this fertilisation will last for her entire lifespan. She will lay 1000 eggs each day. The queen’s temper will affect the rest of the hive. Urban beekeepers strive to keep friendly bees, to avoid conflict with an urban environment (MAAREC, 2014).

A frame with wax contains frames used for honey storing. A frame with wax contains frames used for honey storing.
Urban beekeeping is a growing trend all over the world, from London to Hong Kong. New York is perhaps the most famous city in regards of beekeeping, where beekeepers fought for their rights to keep bees in the urban environment. In Oslo you can find beehives in the Royal Castle’s garden, by the highway, at the roof of shopping malls and in backyards. In Norway honey is mostly imported, since Norwegian beekeepers can’t meet the demand (Honningsentralen, 2014). The goal for The Norwegian Bee Society is to keep Norway self-sufficient with honey. To reach this goal they depend on more people taking up urban beekeeping. Urban beekeeping is an important aspect of increasing the honeybee population all over the world, and hence ensure pollination.

I want my project to inspire Heier Du Rietz to expand and develop their urban beekeeping company, and connect beekeeping with urban farming, to put more focus on the honeybee’s vital role in our food systems. Alexander has been a great asset for my project and I hope the finished result can work as a vision and inspiration for his urban bee garden.

The honeybee & architecture

Architects shape the environment. Today we shape environments without focus on nature and animals right to the space. Today we create urban landscapes without focus on biodiversity and ecosystem services and hence we build unsuitable surroundings for the honeybee. A city without flowers, trees and water, is not only a sad sight for the honeybees, but for us as well.

The honeybees are architects themselves, constructing their own house, using hexagons. Here are some pictures that have inspired me through this process.

Urban beekeeping

Liv Ragnhild Heier and Alexander Du Rietz established Heier Du Rietz – urban beekeeping, in the spring of 2013. Heier Du Rietz produces honey and works to inform people on the importance of the bee and their existence. They have two beehives on a rooftop in the centre of Oslo, and in the summertime 160,000 honeybees live here.
Oslo

Oslo is the capital of Norway with more than 600,000 inhabitants. I have chosen to work with Oslo because this is a city I know well, and since it now is my home, I feel it very interesting to explore Oslo’s potential regarding sustainable development. There is already a growing focus on honeybees and urban beekeeping in Oslo, much because of Heier Du Rietz and their designer bee hives.

The honey production in Norway has been declining the last couple of years and the main delivery company of honey in Norway, “Honingcentralen,” wants to increase the production from 350 tonnes to 1000 tonnes_ann, 2014, in order to avoid importing honey like we do today. The unique Nordic fauna makes the honey here ecologically rich in nutrition, and honey from the centre of Oslo passed laboratory quality tests by a wide margin_ann, 2014. The test results reports that production in Oslo is safe and the honey is full of healthy nectar from the rich fauna we see in cities like Oslo.

Urban setting

During the industrialisation, people left their natural surroundings and moved into cities and thereby cutting themselves from their place of origin and their previous connection with natural (non-build) places (Bodnar, 2008). Architecture has a great potential to change people’s perception of an urban space and set it in relation to the natural world.

Oslo from a bee’s perspective

Source: bjorvikautvikling.no
In 2011, Nielsen Global Survey conducted a survey in 51 countries. It revealed that only the people of Estonia care less about the climate than Norwegians.

TNS, The Norwegian Climate Barometer, shows sinking engagement among Norwegians on the climate issue. In 2009, 29% said that climate change was the most important task Norway was facing. In 2013 this number was reduced to 19%. Worth noting is that people under 30 years old are more engaged.

Kari Marie Norgaard travelled in 2006 from the United States to a small town in western Norway to find out why so many people who are fully aware of the climate change crisis, are staying silent and inactive. Norgaard found that Norwegians have a tendency to focus on how globally insignificant Norway as a small country is, both in relation to national greenhouse gas emissions and political influence internationally.

Denial about environmental problems includes minimizing their severity, seeing them as irrelevant, and seeing oneself as not responsible (Opotow & Weiss, 2000), much as we see happening in Norway.

Norwegians in winter time
Norwegians in winter time

The area - Vulkan

My project will be situated in the Vulkan area. Here we find the urban honeybees of Heier Du Rietz, and hence this became a natural site for my project. Vulkan area is located in the centre of Oslo, as you can see from the maps.

Vulkan used to be a heavy industrial area by Akerselva, a river running through Oslo. A sustainable city development has been the leading idea for the development of this area. Today Vulkan is filled with schools, apartments, offices, hotels and restaurants.

On the 2nd of October 2012, a new food adventure in Oslo started. "Mathallen" food court is a centre for Norwegian food culture with focus on high quality food and drinks, located in the middle of the Vulkan area. Mathallen consists of 30 special shops, cafes and eating places. Mathallen also hosts seminars, festivals and cultural happenings. This building makes a good starting point for urban beekeeping, with focus on locally produced, high quality food. Naturally, this is also where the honey produced by Heier Du Rietz is sold.

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Vulkan is a great area for urban beekeeping. There is already a focus on locally produced, high-quality food and sustainable city planning. The surrounding area consists of several exciting qualities for bees, such as a wide variety of plants. There is also a great possibility to expand food production and green roofs in the area, as this map shows.

Access to water.

Sun orientation

Restaurant/ brewery

Different species of trees.

Food production

Green roofs with beehives

Dwellings/restaurants/shops

Dwellings

Dwellings/restaurants/shops/offices

Food production

Access to water.

Heier Du Rietz
Two buildings surround the roof where you find the beehives of Heier Du Rietz. One of them is Mathallen (the food court,) an old industrial iron-production building from 1908. The other building is Dansens Hus (the house of dance) from 1948, which was part of Vulkan engineering workshop. Dansens Hus is a national scene for dance and was established in 2004.

The two buildings surrounding the roof and the roof itself are regulated as “Special area. Cultural heritage. Can be used for: sports, businesses, offices, industry, education.” (S-4268, 2006)

In the regulation it is also stated: “Changes should be made in consultation with the Cultural Heritage Management.” The roof was originally planned as an outdoor restaurant, and the architect brought this idea to The Cultural Heritage Management. They wanted to keep the building’s originally appearance by keeping the exterior, and especially the end walls, visible (Kyrkjebø, 2013), and did not recommend the idea. Consequently, the roof was left empty until Alexander Du Rietz suggested starting up urban beekeeping on this spot. The bees demand minimum from the roof, regarding space and facilities, and two beehives with 160,000 honeybees moved up on the roof.

Across from the Vulkan area you find today an empty, grey area used for parking. In 2017 this area will be turned into a new park, called “Nedre Fossen Park.” This park will be part of the important recreation area around the river Akerselva. The new park will be developed by the municipality of Oslo and will contain a playground, a big lawn, a restaurant and historical traces from old buildings. After a meeting with Heier Du Rietz they will also try to incorporate bee friendly plants in the park.
the project
The design

The roof where Heier Du Rietz keeps their urban honeybees will be the starting point for my design. Heier Du Rietz wants to expand with additional beehives and make it possible to grow vegetables on the roof. I want to develop this opportunity, and at the same time explore how people can get to know more about urban beekeeping and maybe even be inspired to start something on their own on another empty rooftop.

Since getting to know the bees by touching them or taking a close look, like you would with other domesticated animals, is not an option, the design will play an important role in the search for human/honeybee connection. The design will show the traces honeybees leave behind after one of their flights, namely pollinated plants and a rich selection of healthy food for humans to eat.

My design has a strong focus on visual contact, and from here the idea of a tower overlooking the roof started to grow. In our everyday life we will not see honeybees close up. So I wanted the meeting with the honeybee to reflect the way you meet a bee in your garden or in a near by park. Therefore, by looking over to the roof you see the bees live their natural life, and maybe they will come over to the green beehive were you stand to get some pollen from one of the plants there.

The green beehive will be filled with vegetables and plants, providing the bees with additional food and creating a beautiful, green city-space.

go from... Colony Collapse Disorder Monoculture No urban food production... towards: A strong bee society Urban food production Contact between people and nature Building an understanding of where our food comes from.

The bee city focuses on the traces the honeybees leave behind when they fly from flower to flower. The green beehive creates good growing conditions for plants.

The beehive focuses on the flowers the honeybees leave behind when they fly from flower to flower. The green beehive brings the plants and vegetables, pollinated by the honeybees, over the river, into the park and the city.

Fits into the lift.
Easy to move around on the roof.
Easy to fill the box with soil.
Vegetables for bees and people.

A specially designed box will make it possible and fun to grow vegetables at the rooftop.

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The design: inspired by the beehive the design will have a vertical production system (frames) and a horizontal subdivision.

The green beehive

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Plan 1: 100 one possible layout

The roof will no longer be a flat, black, asphalt area, but rather filled with happy honeybees, vegetables, flowers and herbs. The new green roof will reflect the honeybee’s life and connect the roof with the green beehive across the river.

The urban honeybees will have access to pollen and nectar throughout the seasons, and Heier Du Rietz can sell vegetables and honey. This emphasizes the important role the honeybees play in our food production. Because of the bee’s constant pollination, the plants here will be connected with vegetables and honey. The layout of the roof is flexible, thanks to the movable boxes and allows Heier Du Rietz to change the layout of the roof, depending on the on-going activity. They can still take groups of people up to the roof, give them a close-up look at the bee city and educate them on the honeybee and food production. Schools, kindergartens and people working with these questions are some examples of people that could visit the roof. Companies in Oslo will have the possibility to own one beehive and the honey produced here. People working at these companies could also visit the roof, or maybe put up a webcam to follow their honeybees. A professional gardener will have the main responsibility for the plants, flowers and vegetables.
The wheels include a locking structure so the box won’t move around on the slightly tilting rooftop.

A bag of soil, some seeds and a pipe for water collection is what is needed to start the production in the boxes.

When practicing urban bee keeping, it is important to know which plants that will ensure the best living conditions for your bees. Honeybees rely on a steady source of nectar and pollen to be able to live and reproduce at a certain place. The plants around their hive should vary, and provide nectar and pollen throughout the season (April-September). A good variety in plants also provides the beekeeper with honey that varies in taste and colour.

I have made a selection of some of the plants that will be perfect for my project. They will provide the bees with pollen and nectar throughout the season and they will produce high quality food for people, thanks to the steady pollination (BuzzAboutBees, 2014).

**Honeybee friendly plants**

- Crocus
- Oregano
- Tomatoes
- Rasberries
- Rosemary
- Thyme
- Heather
- Coneflowers
- Salvia
- Hyacinths
- Strawberries
- Spring Heathers

Source pictures: wildernessarea.com
The green beehive

Plan & section C-C’ 1:100

This green beehive will create a space for farming in vertical direction, inspired by the honeybee’s vertical production pattern on the frames inside the beehive. The ground will be where you orient yourselves, like the bees do on their entrance platform. When you reach the top of the green hive you can overlook the bee city on the roof and the green beehive, just like a beekeeper that keeps track of the bee community by lifting off the rooftop of the hive and glancing down.

The green hive will be a place where Heier Du Rietz can sell honey, vegetables produced on the roof and arrange events. They can show a movie on one of the walls. They can invite school classes or kindergartens to play in the green hive, and at the same time tell them about the honeybees. The new restaurant that will open in this park can grow their herbs in the structure, ensuring locally produced food with high quality, thanks to the honeybees. This pavilion will bring food production from the rooftop over to the park. I suggest that this new park should focus on urban food production, in cooperation with the honeybees.
Construction concept

The structure consists of steel frames, with a corten staircase and resting platforms. The structure can look different depending on where you chose to place your plants, what kind of events that take place here or the seasons.

The wider yellow frame supports the staircase, as well as the platform overlooking the roof. The wooden boxes can be used to different things, such as sale of vegetables and plants.

Three steel frames support the staircase, together with the steel wires. In between the vertical steel wires there will be horizontal wires. In these you can hang baskets for vegetables and plants.

Materials

Corten steel, originally named weathering steel, is a combination material of different steel types. This combination allows the corten steel to exhibit increased resistance to atmospheric corrosion compared to other steels. This is because the steel forms a protective layer on its surface under the influence of the Nordic weather (Fremring, 2014).

Corten at Vulkan
Corten is a material used at the Vulkan area. It is used in facades, signs, flowerpots and sculptures. Vulkan is an area with a strong image and viewpoint regarding local food production, and I want the green hive to have a physical connection to the Vulcan area through the use of corten steel.

Heartwood from pine is an environmental friendly material. The colour of this wood type does not darken over time, but get a silver-grey appearance in rain. This is an important aspect since the honeybees get aggressive around dark colours, and in the middle of a city we want friendly bees! The material does not deteriorate and hence binds greenhouse gases. The wood is also free from maintenance (Aavatsmark, 2014).

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Model study 1:50

I have used this model to study the spatial structures of the green beehive. I have explored how people should enter the structure and what they will see as they climb the stairs. I have focused on visual contact with the park and the river, as well as the rooftops.

Landscape model 1:200

This is a model I have used to explore the space around my design.

The model shows the green beehive in the park and the beehives at the roof.

This is a model meant to give an overlook over the situation, hence the simplified design.
The bees are busy building cells. The queen starts laying eggs. The bees collect nectar from the flowers, and the workers convert it into honey.

In the summertime, the bees are at their peak. The design is lush with greenery, flowers, and bees, creating a vibrant community space.

In the wintertime, the design goes to sleep with the honeybees. The rooftop becomes a quiet place, and the green beehive fills up with white snow.

In the springtime, the design wakes up. The honeybees start to work, and the vegetables start to grow in the spring sun.

In the summertime, the design is at its greenest, filled with fresh vegetables, flowers, honeybees, and people.

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In the summertime, the design is at its greenest, filled with fresh vegetables, flowers, honeybees, and people.

In the wintertime, the design goes to sleep together with the honeybees. The rooftop becomes a quiet place, and the green beehive fills up with white snow.

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From theory to design guidelines

Early in the process I stated some design tools that would help me frame the research towards the design. The five design tools will be the frameworks of this conclusion.

Small steps towards a greater meaning will lead to empowerment and control. The stairs in the green beehive are a maximum 19 centimetres high - easy and not scary at all to climb!

Building on the already existing beekeeping in Oslo, introducing people to something that is already a success, removes negative feelings like stress and anxiety. By creating a structure that allows you to look over to the bee city, without walking around on the roof, I remove stress from the honeybees and the spectator.

The beehives at the rooftop are made visible through plants and vegetables. The green beehive in the park enables people to get up and look over to the bee city, something they are not able to do today. The green beehive expresses itself through vertical green elements and enhances the bee's important role in food production. The structure is a starting point for urban food production in the park.

The green beehive is inspired by the honeybee's vertical production system on the wooden frames. This will provide a new view on urban farming and open up our eyes to the importance of locally produced food for people and the honeybee.

I have reflected on the term “optimal contact” between people and honeybees. You can’t get to know the honeybee by petting it, and there will always be a natural distance between honeybees and people without the beekeeping outfit. I have decided to work with this distance, and focus on how we can see the result of the honeybee’s pollination in green elements and in the honey we buy.

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Personal reflections

I never knew that after handing in my master’s thesis in architecture, I would be left with this much information and affection towards the honeybee. For me that is the real beauty of my thesis - the combination of architecture and the honeybee and how these two together can help us to reconnect with the natural world and make us more aware of where our food comes from. The simplicity of the honeybee community has inspired me in the complex jungle of literature and thoughts around human/nature connection, human psychology and behavioural change. The honeybee has also opened up my process to people from outside the field of architecture.

I have had a lot of giving and interesting conversations with my friends, starting with the question: How can you do a master’s thesis in architecture about honeybees? My starting point for this master’s thesis was the rooftop where we find the two designer beehives of Heier Du Rietz. The two beehives, designed by Snøhetta, do not improve the living conditions for the honeybees, since they are only a shell surrounding a normal beehive. The two designer beehives got a lot of attention in 2014, and started an important discussion, but we need to ensure that the discussion continues for years to come. With my project I hope to show that architecture can be more than just a pretty shell. Architecture can, with a simple design, change how we relate to the natural world in urban environments and ensure nature’s right to develop in our cities.

The aim for this master’s thesis then became to explore how architecture can create a space where people and honeybees can meet, strengthen the human/nature connection and inspire people to take better care of the planet we live on. I decided to work in an urban environment. So in addition I explored the question “how can architecture create a common ground for people and honeybees in the urban environment they share?”

This project is part of a bigger discussion regarding sustainable city development. We need to create cities livable for nature, animals and humans. Cities with biodiversity and ecosystem services will not only increase the living conditions for the nature, but also bring us humans closer to the natural world we once belonged to. By looking to the natural world, and for instance including urban beekeeping in modern city planning, we will bring new and existing starting points into urban planning, and develop livable cities.

The aspects on human psychology and our ability to change are vital to understand when working with these questions. There are aspects of our brain that work against us making more environmentally friendly choices or grasping the climate changes we currently are going through. These aspects are complex and have shaped our brain for a long time. But even so, we do have the ability to change rapidly. Just look at the cultural and industrial revolution – how rapid the human brain shifted into a new direction.

This thesis has explored how architecture can be a part of changing our mind-set, with focus on how human/nature reconnection will foster environmentally friendly behaviour. By creating better habitats for urban honeybees we will also create healthy urban habitats with food production for humans. This will remind us that we are in the same ecosystem as the honeybee and by taking care of them; we also take care of ourselves.

Exploring the term “optimal contact” regarding people and the honeybee has been an important aspect in my master’s thesis. When we want to achieve contact with an animal we normally strive to make the distance between us as little as possible. We put animals behind fences and glass, so we can move closer to them. In my project I want the honeybees to be able to fly freely, and if someone should be restricted by a space it should be us. For many people the honeybee and other insect feels scary to be around. So by placing a natural distance between the honeybee, we will not stand in the way for a new respect for the honeybee.

In your garden or in the park, you don’t see the honeybee close up. My project challenges this natural distance between us. We must be able to appreciate the honeybee’s existence at a distance.

By reconnecting with the honeybee, we will also reconnect with ourselves. We will get a greater understanding of where our food comes from and what it takes to get it on our dinner table. If we can open up our minds to the honeybee and let go of our fear and separation, we can use this mind-set to face the questions and life style choices the global situation need us to face.

By opening up our minds we can rediscover the beauty of the honeybee, the natural processes we share and gain a greater respect for the common place we all call home.
The project & the future

It’s already decided that the roof will be populated with several new beehives during the spring. Hopefully, inspired by my project, Heier Du Rietz will also start vegetable production. Urban beekeeping in Oslo has a great growing potential, and Heier Du Rietz has already created a platform for learning and inspiration. Hopefully we will see rooftops all over Oslo and Norway filled with happy urban honeybees within the next couple of years. There are also a lot of other people that could benefit from this project. See the sketch over stakeholders. Not all projects needs to be built to make a difference. I believe that my master’s thesis belongs to this category.

The conceptualisation and the illustrations can open up a discussion about the human/honeybee connection and lead to other smaller projects, like minor bee cities across Oslo or other urban farming projects close to urban beehives.

This project has without doubt defined the direction I wish to continue when I start to work as an architect. The relationship between the build environment and the natural world holds great opportunities for the reconnection between humans and nature.
References


Aavatsmark, Andreas (2014). Mail contact with Andreas at Inspirasjon Tre.


Hopp, M. (2013). E-mail to architect and real estate office from Byantikvaren regarding the rooftop restaurant.


5-4018(2006), zoning plan for the municipality of Oslo.

Movies:


Pictures/illustrations:

The sources for the different pictures are mentioned at each picture in the report.

Where nothing else is mentioned, the author is the photographer and the creator of the illustrations.
Vocabulary

Bee dance: Language used by bees to convey information about the location of food.

Bee friendly plant: A plant's size, the depth and with, colour, pattern called nectar guides that are only visible in ultraviolet light, scent, amount of nectar and composition of nectar are all different factors that make a plant attractive for the bees.

Brood: Eggs, larva.

Cell: Hexagonal structures build by the bees.

Colony Collapse Disorder: A phenomenon in where whole honeybee communities disappear from their hive.

Compound eye: Eyes on each side of the bee’s head made up by 4000 facets, which gives a bee 360° field of vision.

Honeycomb: Wooden frames with a wax plate where the bees build their cells.

Nectar: Sugar rich liquid produced by plants in glands called nectaries, which attracts pollinating animals.

Pollen: A powdery substance containing the microgametophytes of seed plants, which produce the male gametes (sperm cells.)

Pollinator: A pollinator moves pollen from the male anthers of a flower to the female stigma of a flower.

Round dance: Circular dance performed by the worker to communicate the discovery of a source of food less than 100 meters from the hive.

Smoke: When bees smells smoke they strive to take with them their precious belongings. In their case that is their honey. So they eat as move as they can until they are numb from all the honey and then they stay calm.

Urban beekeeping: Cities all over the world experience increasing interest in keeping bees in urban landscapes.

Waggle dance: Dance performed by the worker to communicate the discovery of a source of food more than 100 meters away from the hive.
The roof could be a case study in sustainable living! Compact living, eating locally produced food, local food production, a strong community are some of the aspects of the bee live style with a high standard of sustainable living.

Opening up the roof to the general public will create a stressful environment for the bees and the beekeeper. The bees will feel pressured if people get too close and the beekeeper would have to be responsible for where people walk on the roof.

...and where would the access point be? A river and main entrances surround the roof. So it will be difficult to add a stair in this space without conflicting with current flow of people.

So maybe the bees could be moved to a park in the area? This would remove the access problem, but bring on a new set of challenges. The bees would be in danger of vandalism and the beekeeper will not be able to control his hives as he can on the roof.

Maybe if I make a protection skin for the beehive? And the skin could contain plants and vegetables. And people could observe the bees through glass. But by putting a piece of glass between the bee and the viewer I would only highlight the distance between us. And that is the exact opposite of my intentions.

But the concept of mixing beehives with vegetables and plants is exciting. I could emphasize the importance of pollination by connecting bees and plants. And make a self-water system, so the plants can be self-sufficient. A beehive! But this construction would make it unnecessary difficult for the beekeeper to access the inside of the hive.
Could the bridge be enough itself? Could the beehives be placed on a construction that takes them down toward the ground? But making a construction to get the bees closer to us is not the strongest statement. It seems better to let people come nearer the bees and their environment.

So now the distance between people and the bee is a physical condition - a river. But building a bridge can eliminate this distance. And by adding a vertical volume, people can view the bee city close up. Here humans will be the ones protected inside the glass, and the bee will fly free.

So then I take a new look at where the best possible access point to the roof would be. The roof tilts towards the river. And this area on the roof is also the biggest area. So this would be a good place for more beehives and vegetables. The other side of the river then? The distance is not too big, and there is also a visible connection between this side and the entry hall (Dansens Hus.)

So back to the idea of the distance. It seems like a complicated challenge to increase the physical distance between the bee and us. So maybe it is better to make the most of the distance. Since the bees will always be at a certain distance due to their size and natural conditions, the design can focus on what this distance can give back to us.

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Design inspiration

Student project, Hens of Tidaholm by myself, Johanna Saleryd & Johan Marklund.
Process

10. th of September - Oslo
First meeting with beekeeper Alexander Du Rietz

12. th of September - Oslo
Helping Matahallen and HeierDuRietz to create their stand for “Matstreif” - a food festival in Oslo.

5. th of September - Oslo
The Snøhetta bee hives gets attention from the Norwegian architecture review magazine.

17. th of September - Oslo
Meeting with Alexander and Carsten (Snøhetta).

25. th of September - Oslo
Laboratory tests show that honey made from city bees has the same quality as honey from the countryside. The city honey is even better because of its high level of minerals (potassium, calcium.)

26. th of September - Oslo
Aftenposten writes about the new plans for the park across from Mathallen and the roof!

3. th of October - Oslo
Checking if the bees are preparing for winter, with Alexander.

8. th of October - Gothenburg
BEE hearing if the bees could decide how Gothenburg should look like.
Be a part of the solution

Buy honey from a local beekeeper that care about their bees.

Eat organic, eat local. Grow our own food. Then you help save the bees and the world’s food security.

Understand that honeybee’s aren’t out to get you. They are vegetarians.

Don’t use insecticides in your garden and don’t buy seeds from garden centres that use pesticides. Use bird boxes instead!

Make your garden bee friendly, and enjoy lots of herbs, berries and fruits from their pollination. You don’t need to overthink it old fashioned wild flowers is perfect for the bees! The bees also appreciate some fresh water.

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