Green Vertical Housing

Combining Vertical Housing with Greenery to Improve Living Conditions

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Introduction

In a lot of low-income areas there is a lack of accessibility to green spaces. When I went to Manila, Philippines with the class of Urban Shelter, I noticed that the green urban spaces where often charges with an entry fee. The greenery left for the less fortunate population of Manila was substandard and lacking a planned use of space. In the big cities of the world the population is increasing constantly, and the land area is getting more and more used up. UN-habitat has projected that the urban population of developing countries will double by 2030, while the area covered by cites would triple. This level of urban expansion leads to alteration of ecological systems in cities and is wasteful in terms of land and energy consumptions as well as increases greenhouse gas emissions (p.7, UN-habitat, 2016). To solve the problems related to housing, one part-solution is to build highrise housing. But often highrise living for the poor can be rather unpleasant. Greenery is proved to have a good impact on our wellbeing, although the access to green space often becomes a matter of income. The aim of this paper is to discuss the combining of highrise building with access to green spaces in order to improve the living conditions in vertical, urban living.

The Positive Advantages of Green Urban Spaces

Vegetation has a major positive effect on improving and retaining a good climate. Urban vegetation can mitigate the urban heat island, reducing air con costs, improving air quality and providing a psychologically superior setting for human activity.
With the water and the evaporation of plants, greenery can lower the surface temperature. The effect of the greenery depends on the plant's meteorological conditions and time of day (p.165, Erell, et al, 2011). The actual reduction of air temperature beneath trees is probably overstated in many cases, contribution to human thermal comfort is real but probably because of the reduction of radiant load more than the actual cooling affect (p.172, Erell, et al, 2011).
Higher set plants or trees reduces penetration of short-wave solar radiation. They can also can intercept infare-red radiation from the ground surface to the atmosphere and reduce wind speed (p.165, Erell, et al, 2011).

Plants may shade the built surfaces to reduce the radiant load. For example, a dense growth of ivy can almost entirely block the radiant exchange at the wall surface. In hot dry climates it has been shown that vegetation near buildings can give up to 80 % savings in energy (p.172, Erell, et al, 2011).

Providing green areas in urban environments is also known to provide several health and wellbeing advantages for the population. Green areas allow for positive effect such as psychological relaxation, stress relief, providing enhanced opportunities for physical activity, reducing exposure to noise, reducing air pollution and protecting against excessive heat. Low-income areas often lack green urban spaces and studies show that residents in these kind of urban areas are the ones who benefits the most of improved access to greenery. Reducing the different accessibility to green areas can also reduce the inequality in health between different socioeconomic groups (p.188, Braubach, et al, 2017).

Positive consequences such as improved air quality, improve physical activity, stress compensation and bigger social cohesion can make a big difference for those in less beneficial situations. Proposed physical activity, engagement with nature, relaxation, and social interactions as major pathways to health. Health is one of the factors of inequality that is the most important to reduce since it is

fundamental to those who are affected. Urban green areas do not only improve the mental health of the inhabitants, since it also mitigates the urban heat island and gives protection against heat related health-conditions. Exposure to natural microbes leads to enhanced immune system and functioning as a major pathway linking nature and health (p.189, Braubach, et al, 2017).

A study done in the UK show that living near a green area has a positive impact on people's mental health. This effect is shown to be long-lasting, in contrary to a promotion or pay rise (Kinver, 2014).

The Need of Vertical Living in Urban Areas

In 2008 we went from having a majority of rural dwellings to urban dwellings in the world. This means that we have got a big number of growing cities and we must plan our use of space and housing more closely than before. The development of urban sprawl in former green areas destroy not only natural fields and forests, it also ruins animal habitats and extinguishes species all of which are vital to the health of the planet. In lower density areas the cost of public and private services and infrastructure increase. "Higher density cities will help us conserve land for wilderness habitats, environmental protection and agriculture" (Lee et al). High density does not mean good or bad it just means higher density, it can be environmentally friendly, culturally rich, lead to increased economic competitiveness or crime, pollution and income disparities. For high density cities to work we must plan how we live and how we use the space in our cities (Lee et al).

Greenery in Social Housing

Health benefits are a class related issue. Giving the less fortunate access to greenery and the health benefits it provides, is class equalizing. In Metro Manila, access to greenery is an economic benefit. The fee to the parks makes it not available to the poor. Thru the interviews that me and my class conducted during our time in Metro Manila we learned that it is very common to think it is unsafe to leave your home in a social housing area. Implanting greenery in social housing is a way to guarantee the access to greenery. It won't be a matter of being safe or a question of affordance to be able to enjoy the greenery when it is integrated in

your home. In Metro Manila, like in many big cities in developing countries, greenery is a question of priorities of the land. The land is too valuable to not build on, which makes greenery not prioritized. Making vertical greenery is a way to ensure that financial issues are not reason for neglecting to build green areas. Creating social housing with urban farming facilities is also class equalizing. Providing opportunity to farm in urban environment gives the people extra food and perhaps even a small income when crops can be sold. Designing social housing with integrated access to greenery for recreation, urban farming and micro climate benefits is both beneficial for urban poor as well as for our planet.

Urban Shelter Design

By 2050 66% of the world's population is expected to live in cities (Foreword, UN-habitat, 2016). To cope with the rapid growth of urbanization we need integrated, innovative and sustainable solutions. The concept of the vertical city could be an answer to the challenge of high-density urbanization. In this future city, we then need vertical forests.

Greenhouse, Malmö

Greenhouse is a residential project in Ekostaden Augustenborg, Malmö Sweden. The project was built in 2014 and is run by MKB, the public housing of Malmö. Greenhouse consists of one fourteen stories building connected to one lower building. It consists in total of 32 apartments, 12 maisonette apartments and 12 student dwellings. Apart from the fact that the project is a passive house and runs only on renewable energy, the construction of the apartments gives the residents great opportunities for urban farming. The apartments have a 20-sqm balcony each for growing flowers and foods and half of the balcony is glassed in, due to the Swedish climate. The balconies have five meters of permanent cultivation beds. All the residents have also access to a private communal cultivation garden with two green houses and over 200 sqm for urban farming.
All residents must sign a farming agreement, complementing their lease agreement, in which they promise to use the balconies and communal plots for urban farming.

The residents in Greenhouse are offered knowledge support in cultivation thru arranged meetings and workshops where they can share their tips and exchange experiences (MKB).

Picture 1, Visualisation of Greenhouse (MKB).

Picture 2, Visualisation of balcony (MKB).

St Hannibal, Metro Manila

When we were visiting the housing project St Hannibal in Metro Manila it was a big contrast to some of the other social housing project we had seen. It was full of plants. Apparently, they have an agreement that obligates every resident to plant ten plants before they move in. The neighbourhood was flourishing in greenery

and you could feel that there was it was a different atmosphere compared to other neighbourhood.

Picture 6, St Hannibal (Photograph by the author)

Picture 7, St Hannibal (Photograph by the author)

Trudo Vertical Forest, Eidenhoven

Trudo Vertical Forest is a social housing project in Eindhoven, Netherlands designed by Stefano Boeri. It is planned to be a 75-meter-high building, holding 125 units and being home to 125 trees and 5 200 shrubs and plants. All the apartments will be under 50 sqm and have a 4 sqm terrace with 1 tree and 20 shrubs. The project will be aiming towards low-income social groups, especially young people with an urban lifestyle. The idea is to create a metropolitan residence that contributes to the development of biodiversity. Trees have the capacity to absorb over 50 tons of carbon dioxide per year. With an authentic eco-system with over 70 different plant species the project will be able to counteract atmospheric pollution (Stefano Boeri Architetti, 2017).

"The high-rise building of Eindhoven confirms that it is possible to combine the great challenges of climate change with those of housing shortages. Urban forestry is not only necessary to improve the environment of the world’s cities but also an opportunity to improve the living conditions of less fortunate city dwellers,” declares Stefano Boeri (Stefano Boeri Architetti, 2017).

Picture 3, Visualisation of Trudo Vertical Forest (Stefano Boeri Architetti, 2017).
Picture 4, Visualisation of balconies (Stefano Boeri Architetti, 2017).
Picture 5, Visualisation of apartment (Stefano Boeri Architetti, 2017).

Design Considerations

When discussing incorporating greenery in the cities one often thinks of parks or other selected areas in the cities. I think greenery needs to become a more natural part of the urban environment and I think one good way to do that is to integrate the greenery with the buildings of the city. The greenhouse in Malmö is one great example of how farming can be achieved within the urban environment. The architecture provides great conditions for farming and the landlord induces the habitants to farm by providing lectures and demanding farming from the habitants by contract. This gives the habitants incentive, knowledge and facilities to farm. I also think that Trodo vertical forest is a good example of a social housing project

that incorporates greenery and recreational spaces in order to create good living environments.
Farming on balconies, recreational greenery on balconies and terraces and roof terraces with trees and shrubs are all great examples of how one can create sky parks and gardens in order to incorporate greenery in the urban environments.

5 The Role of Architects

As architects we have a responsibility. As the head of Lund school of architecture said to my class during his welcoming speech: “architects change the world one building at the time”. Housing is a keystone in people’s life and can have major impacts on their lives. What kind of housing you live in is a matter of class and the housing kind of sets the foundations for most other aspects of your life. Living conditions and the quality of the neighbourhood effects people physical health, mental health and prospects of life. It is all connected.
Poor people and people representing a minority might have a harder time getting their voice heard. As architects we need to value and consider the residents’ needs and come up with innovative design for improving the living conditions and possibilities. Solving the issues of inequality and segregation is a job for politicians, constructions companies and whole communities. As architect we can take the first steps by suggesting more health improving housing in urban environments, such as green vertical housing.

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