EXPLORING THE POSSIBILITIES OF URBAN ROOFTOP FARMING IN VIENNA

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INTRODUCTION

The global trend of urbanization entails major social, economic and ecological challenges at the present and even more in the future. Urban farming is one way to cope with the difficulties ahead. There are numerous studies which show the benefits of urban agriculture, including positive effects on a city's microclimate, urban water management and contribution to food security. [1]

Due to the limitation of available space within the city boundaries, people around the world are beginning to use the existing empty spaces of flat roofs to grow food. A study conducted in Bologna found that the yield of urban rooftop farms would be able to cover 77 % of the vegetable requirements of the city's inhabitants. [2] Thus, such concepts could provide a major contribution to vegetable supply for city dwellers.

The present research is concerned with the possibilities of rooftop farming in the city of Vienna, with a focus on the implementation of different food production systems on existing surfaces.

RESEARCH SUMMARY

The aim of this interdisciplinary work is on the one hand the identification of all roof areas suitable for growing food. On the other hand it seeks to investigate the significant parameters for the installation of farming systems on the scale of an individual building.

According to a study of the MA 22 (viennese municipality department for environmental protection) about the green roof potential in Vienna, there are 1.068 *ha* of roof surfaces which are less than 5° inclined and therefore suited for intensive greening. [3] This represents a high potential for green roofs, but the study does not entail any other factors than surface inclination.

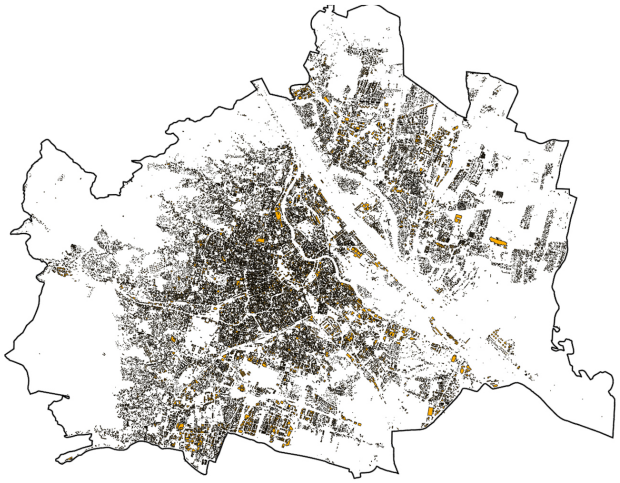

Figure 1: Possible rooftop farming areas in Vienna (data provided by MA 22)

To get a better idea which areas are in fact suitable for the purpose of agriculture, there were following important factors identified: size, supporting structure and roof structure of the building, sunlight exposure, accessibility, infrastructure, legal matters and possible management of the farm. A first analysis with GIS-data was conducted to include some of these parameters. Figure 1 shows for example a visualization of all the roof areas in Vienna, which are less than 5° inclined, bigger than 10 m^2 and receive a minimum of 900 KWh/m^2 solar radiation per year. These surfaces add up to an area of 1.057 *ha*.

All of the above mentioned factors include a number of issues which have to be taken into consideration. In the course of this work the significant parameters in all of these fields were investigated on the basis of a literature review, leading to a guideline for the fundamental requirements regarding the planning and installation of a rooftop farm.

Furthermore there are various ways to produce food on roof areas. For the present research the following systems were considered: conventional farming with soil spread on wide areas of the roof, raised-bed gardening, hydroponics, aeroponics, aquaponics and the combination of any of the mentioned with a greenhouse.

To get further into detail different types of buildings were regarded in connection with the described food production systems. It seems obvious, that an industrial building cannot be treated the same way as a residential building referred to the kind of cultivation. For example a large industrial building with a flat roof offers the possibility to install a lightweight food growing system, which could be managed as a commercial farm. If the building is a supermarket or a shopping mall, the products could even be sold on location. In contrast a conventional apartment building would be probably more suitable for a community garden where residents can rent individual vegetable patches. These could be constructed as raised-beds, placed alongside the beams of the supporting structure.

The examples above show that the existing structure and purpose of the building have a major influence on the feasible food production system. The next step is to find out which systems are suited best for which kind of building and roof type. To this end the strengths and weaknesses of the different growing systems will be investigated and linked with exemplary building typologies.

EXPECTED RESULTS AND CONCLUSION

The main result of the work will be a practical handbook for city planners, real estate owners, companies, associations or otherwise interested individuals. It will entail an overview of what to consider and which steps to take in order to construct a rooftop farm on an existing building in Vienna. In addition the analysis will show the size and location of areas suitable for rooftop agriculture, based on specific parameters.

Furthermore, the work should lead to a better understanding of the opportunities of urban agriculture on top of existing buildings and could serve as a basis for future research in that field.

REFERENCES

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[2] Orsini et al. (2014), Exploring the production capacity of rooftop gardens (RTGs) in urban agriculture: the potential impact on food and nutrition security, biodiversity and other ecosystem services in the city of Bologna.

[3] Nima Vali (2011), Analyse des Dachbegruenungspotentials Wien. Published by MA 22