Urban agriculture:
the potential and challenges

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There is a worldwide trend for people to move from the countryside to cities and even South Africa is urbanising rapidly. According to the United Nations 71% of the population will live in urban areas by 2030. Urban growth may have both positive and negative impacts. A major negative impact is however the decrease in the amount of forest area, wetland and woodland area as well as farmland. Ecosystems are disrupted and habitats fragmented as roads, power lines and pipelines cross these areas. In the United States Urban growth is predicted to consume 2.8 million hectares of farmland during the period 2000–2025. A good example of this happening locally, is the Philippi horticultural area, just outside the Cape Town city centre, where the City recently wanted to rezone a sector of the district for development. One solution to this complex problem is the greening of our cities employing various methods, including food production through urban agriculture.

Urban agriculture can take many forms including organic community farms on available land, rooftop farms, edible landscaping and vertical farms on top of or inside city buildings. The size can also vary from a self-sustainable unit to large commercial enterprises. All of these types of urban farming have a role to play if we want to ensure a sustainable food supply for future generations. High-tech soilless systems being used for food production in vertical urban farms are becoming very popular but for low-income

Hydroponic vertical urban farms like these are a viable option where soil is not available or usable for crop production.

Other non-food crops ideally suited for urban hydroponic production systems includes gerberas either as cut-flowers or pot plants.

families, urban farming is often a means of subsistence that can on occasion also generates an income. Community-based projects are already well established in South Africa. They are playing a significant role in ensuring food security as well as having the additional benefit of promoting social interaction. Examples in Cape Town include the Oranjezicht City Farm and Abalimi Bezekhaya.

A major concern when urban food production intensifies is the significant increase in water required in urban areas. In a water scarce country such as South Africa this is definitely an important factor to consider. Solutions to this include drip irrigation, mulching, water harvesting, either capturing rainwater or run-off, and the use of greywater, (water from sinks, showers, and washing machines). The most water efficient method to produce food however remains a closed hydroponic system where all the water and nutrients not taken up by the crops can be collected and re-used for irrigation. The water use can be decreased by up to 60% in a closed hydroponic system compared to open field production. Not only is water and nutrient use decreased in a closed hydroponic system but eutrophication[1] of freshwater systems as a result of fertilizer run-off can be reduced.

Producing crops in vegetable beds in the city also assumes that the soil is suitable or can be remediated through the use of compost, cover crops and organic mulches.

[1]excessive richness of nutrients in a lake or other body of water, frequently due to run-off from the land, which causes a dense growth of plant life.

Although in many cases this is absolutely possible there are cases where the soil might be not ideal or even too polluted to be used for crop production. The land might previously been used for industrial purposes or chemicals released into domestic

waste streams can result in contamination with hazardous waste or pollution. Crops grown in these areas cannot be assumed to be safe to eat. Additionally, air pollution - partly due to car exhausts - result in city air having high levels of nitrogen oxides, sulphur oxides and hydrocarbons. This can not only reduce urban crop yields, but might have negative impacts on human health and is an aspect that requires monitoring and further research. In England, a survey of fruit and vegetables produced in a historic mining region revealed high levels of toxic metals in the produce from this area. In areas where the soil is not suitable for crop production, hydroponics is a viable alternative. Such a hydroponic system can take on many different forms depending on the purpose and crops being cultivated. It can range from bags filled with sawdust being drip irrigated, a simple gutter system filled with gravel or even a aeroponic system where the roots hang in the air and is intermittently sprayed with a nutrient solution.

Urban agriculture can reduce the carbon footprint of food transport and reduce our dependence on food from large-scale rural food under current unstable climatic conditions. Additionally rooftop and indoor farming would result in more land area available for in rural areas for conservation or agriculture. Producing alternative or non-food crops in urban areas is furthermore becoming more common and has numerous benefits. Algae is considered a nutrient dense superfood but can also be used as a biofuel. Innovative technology employing stacked glass tubes can be used for the production of algae in urban algae farms. Eco-roofs, or green roofs consisting slow growing plants in light-weight containers, sequesters carbon, it can reduce

In indoor hydroponic system for growing lettuce and herbs.

Students and staff from the department of Agronomy, Stellenbosch University, helping a local community establish a vegetable garden.

An eco-roof helps reduce storm-water run-off, clean water and buffer temperature.

Using containers to grow vegetables in urban areas where the soil is not suitable is a common sight in large cities all over the world.

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In existing cities innovative thinking is required to accommodate urban farming but hopefully in planning our future cities the current constraints can be overcome. A future goal should also be to recycle urban waste into energy, building materials to use in urban agriculture resulting in healthier cities.

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Image courtesy of SCHOTT International: A photobioreactor with green algae developed.