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Strategic planning for cultivation of fruit trees and shrubs in urban landscapes using the SWOT method: A case study for the city of Mashhad, Iran

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ABSTRACT

In urban landscape planning, using or not-using fruitful trees and shrubs as part of urban agriculture is a significant challenge. This study evaluated the important factors affecting cultivation of fruitful shrubs and trees in urban landscapes. It also utilized these factors in developing effective strategies for cultivation of these groups of plants in landscaping of the metropolitan city of Mashhad, Iran. It would be crucial for urban landscape managers and decision-makers to understand the relative importance of the affecting factors and to develop effective planning strategies for using these groups of plants in urban landscaping. To support their decision making process, a SWOT analysis approach was applied. Twelve factors and their relative weighting were examined through focus group interviews. This was followed by a semi-structured questionnaire survey with landscape decision makers in the city of Mashhad. The results suggested a range of SWOT strategies among which Strength-Threat (ST) strategies were the most important strategies. These ST strategies should be applied in productive cultivation of trees and shrubs in landscape development in the city of Mashhad. One of the main strategies which might be applicable for urban agriculture development in developing countries is using germplasms of native fruit trees with low water requirements. Using native species leads to sustainable use of local water and soil resources that are critical in these countries, such as the countries in the Middle East, on the benefit of employing more labors that are relatively cheap. This can also improve satisfaction of the society with reduction in unemployment rates.

1. Introduction

Today, the majority of people in the world live in urban environments, and it is estimated that future population growth will be concentrated in urban areas of less developed countries, while the global rural population is expected to decline after 2020 (UN, 2010). By 2020, developing countries of Africa, Asia, and Latin America will be home for 75% of urban dwellers in the world. Most cities in developing countries will have difficulties coping with this development and are unable to create sufficient formal employment opportunities or to provide food for the poor (Baudoin and Drescher, 2008; Drescher, 2000; De Zeeuw et al., 2011). In recent decades, urban agriculture has been powerfully advocated as a solution to particular types of urban challenges by contributing to the social, economic and environmental sustainability of cities (Deelstra and Nijwening, 1997).

Urban agriculture throughout the world is transforming itself in response to political, economic, environmental, and technological changes. Its emerging role in today's urbanizing world is just beginning to be understood (Zezza and Tasciotti, 2010). Urban agriculture can include community and private gardens, edible landscaping, fruit trees, food-producing green roofs, aquaculture, farmers markets, small-scale farming, hobby bee keeping, and food composting (Mendes et al., 2008). The definition of urban agriculture varies among scholars. However, it is difficult to find an appropriate definition for urban agriculture because some definitions are based on usage and the background or origin of the users. Based on the scope of this study, we discuss the concept as cultivation of fruit shrubs and trees in urban public landscapes.

Urban agriculture has various benefits. Its environmental benefits include the creation of active green spaces, revitalizing brownfield sites, improving air quality, providing food that travels a shorter distance from field to plate, preservation of cultivable lands, cooler buildings,

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and improving urban biodiversity (Irvine et al., 1999; Mougeot, 1994). At the same time, scholars suggest that urban agriculture provide a host of social benefits including active public spaces, community capacity building, participatory decision making, an enhanced sense of place, food security, community safety, physical activity, social inclusion and improved health and nutrition (Dubbeling, 2006; Holland, 2004; Mendes, 2007; Wakefield et al., 2007; Welsh and MacRae, 1998). This notion has its roots in Jane Jacobs's classic argument of "eyes on the street" as a mean to improve urban safety (Jacobs, 1961). A number of studies argue that urban agriculture contributes to foster 'community development' through the use of shared experiences, spaces, tools and skills (Armstrong, 2000; Smit et al., 2001; Jamison, 1985). Furthermore, some studies presented that urban agriculture can help to create a sense of place and stability for immigrant populations (Saldivar-Tanaka and Krasny, 2004). Other literature provides insight into the 'psychological benefits' of green spaces in urban areas, for stress levels, health and general well-being (Kaplan, 1973).

Gardening projects have been said to increase neighborhood pride and change the way people feel about their environment (Schmelzkopf, 1995). They can add a new and "uplifting aesthetic" and "sense of nature" to blighted areas. According to Schmelzkopf (1995), fruit gardens can help establish 'community engagement' and transform people's attitudes about their neighborhoods, often increasing commitment and involvement in neighborhood programs (Jamison, 1985). It has also been argued that gardening has the potential to decrease crime in an area (Armstrong, 2000). This is because gardens create 'defensible spaces' blocking criminals escape routes and increasing the public range of vision (Schukoske, 1999).

The reaction to urban agriculture has been varied. In some cases urban agriculture has faced strong opposition from city authorities, because of a range of negative health, environmental, economic and cultural aspects, comprising contamination of crops with pathogens, chemical residues and heavy metals (Lock and van Veenhuizen, 2001), soil degradation (Quansah et al., 1997), surface and groundwater pollution with agro-chemicals (Lock and van Veenhuizen, 2001; Van Veenhuizen, 2006), conflicting land and water issues (Lynch et al., 2001) and the perception that agriculture is not an appropriate activity for urban areas (Kalebbo, 1998). The problem is that because of such numerous health and environmental risks which have been perceived to be associated with the urban agriculture concept the authorities of developing countries prefer not to get involved in it.

Urban planners, especially in less-developed countries, need to find ways to capture the benefits and counter or prevent the potential problems of urban agricultural activities (Quon, 1999). Indeed, many city planners argue that urban agriculture is not compatible with modern urban forms (Girardet, 2004) because the sites used for urban agriculture as new green space developments may not provide monetary benefits (De Sousa, 2003).

The attitude of policy-makers towards urban agriculture in many countries ranges from repression, to tolerance and support. Generally, urban agriculture suffers from a combination of political restraints (Berg and Zeeuw, 1998) which includes restrictive urban policy, laws and regulations due to the legal status of urban agriculture, uncertainty about property rights of land, lack of supportive services, unfeasible implementation of environmental technologies, and lack of organizations and representation of urban farmers.

The key issue is how opportunities for urban agriculture can be translated into sustainable initiatives. In order to set the right conditions for city farming and urban agriculture to develop, a fundamental step is to recognize the interrelated nature of food, agriculture, health and ecology by forming a municipal working group that can deal with food issues from a total system perspective. This could involve the health department, planning department, engineering, local economic development, water management and waste management organizations. Municipalities are now more involved in urban agriculture because the concept has emerged as a strategy to achieve urban sustainability and green space designs (De Sousa, 2003).

Some planners and municipal policymakers have proposed tools and strategies to achieve greener cities that are both ecologically and socially sustainable. In Iran, urban agriculture has had a great history (Hobhouse, 2003). However, in recent years, there are controversial ideas about the concept and there are challenges about the best strategies to apply the concept in urban planning, design and management. Therefore, this study used a SWOT analysis to assess the feasibility of cultivation of fruit bearing shrubs and trees in the city of Mashhad, Iran. The SWOT analysis approach has been previously used as a successful strategic planning method for open and green space development (The University of Manchester, 2010; Laghaei and Gilani, 2014). This research applied the SWOT approach for developing strategic plans regarding urban agriculture using fruit shrubs and trees in the city of Mashhad in Iran as a case study.

2. Methodology

This study used the SWOT analysis approach as a strategic planning approach to indicate strategies for developing urban agriculture in the city of Mashhad, Iran. This method is adapted to identify critical factors affecting the cultivation of fruit shrubs and to undertake preliminary decision making and planning (Arslan and Er, 2008) for developing urban agriculture in large cities. The main advantage of the SWOT approach is to indicate the current constraints and future possibilities of implementing the proposed policies (Johnson et al., 1989). The SWOT analysis approach is an effective technique in formulating strategies (Hill and Westbrook, 1997) since it categorizes factors as being internal (strengths, weaknesses) or external (opportunities, threats) in relation to a given decision (Shrestha et al., 2004). Hence, the approach can provide an insight into the means for converting threats into opportunities, and offsetting weaknesses towards strengths (Cheng-yong, 2010; Liu, 2013; Valipoor et al., 2013).

This method has been previously used in open space development scenarios (The University of Manchester, 2010; Laghaei and Gilani, 2014). The study findings can be helpful to achieve strategic objectives in order to develop fruit trees and shrubs in landscape of a city and its associated benefits including the use of multi-functional landscapes.

2.1. The study area

Mashhad as the capital of Razavi Khorasan province and is the second most populated cities in Iran. It is located in northeast of the country (Fig. 1).

It has a high population growth of 1.7 million people (Statistical Centre of Iran, 2011). It is a tourism city which hosts about 30 million people every year. The average area of green space per capita was 11.3 m^2 in 2016 (Mashhad parks and green spaces organization, 2016). This city is located in an arid climate region based on the Koppen Geiger climate classification (Rubel and Kottek, 2010) with relatively low quality water and soil resources. The high population and limited green space per capita in city of Mashhad with low green space per capita requires further development of its green spaces. In such a city with a high population and low natural resources, there is a need for sustainable multifunctional green spaces such as urban agriculture which can improve sustainable use of resources (Ebrahimpour et al., 2013) as well as opportunities for employment and food safety. Considering that there are native plant species of fruit trees and shrubs with low water consumption in the local region, urban agriculture has potential to improve urban landscapes while optimize the use of water resources (Kazemi and Abbassi, 2016).

The city administration is comprised of various organizations with a hierarchy as described in Fig. 2. Management of urban green spaces has been active since 1972, and the parks and green space organization, which works under supervision of the municipality of Mashhad, is the most responsible organization on green space development and