Rooftop Gardening as a Strategy of Urban Agriculture for Food Security: The Case of Dhaka City, Bangladesh

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Abstract
Urban population in the cities of developing countries are growing rapidly which also means the number of low-income consumers is increasing. Because of this, food insecurity in these cities is increasing. Urban agriculture (UA) contributes to food security by increasing the supply of food and by enhancing the quality of perishable foods reaching urban consumers. The exploration of local socio-economic and institutional conditions that might promote and hinder urban agriculture is needed to implement policies that effectively integrate agriculture into the urban environment. This study aims to identify the potential for and barriers to UA with reference to rooftop gardening (RTG) and to explore strategies to promote food security in Dhaka.

INTRODUCTION
Dhaka is the largest and fastest growing city of Bangladesh. Rapid population growth in Dhaka has created severe pressure on the land of the already overcrowded country. Agricultural lands have given way to housing developments and roads in an agriculturally based economy like Bangladesh. With rapid and unplanned urbanization, incidence of urban poverty and food insecurity has been also increasing alarmingly in Dhaka (Choguill 1995).

Rooftop gardening can be an effective method in ensuring food supply and satisfying nutritional needs of the inhabitants (Helen Keller International and Institute of Public Health Nutrition 1985). Rooftop gardening, although is being practiced in the city in many form for years in the past, there have been hardly any concerted effort on part of the Government, community organizations and as well the general citizens to integrate it to urban agriculture. Proper understanding of the problems and prospects associated with the adoption of policies will contribute, to a great extent, to increased food supply in the city. The proposed study is an effort in this direction. It identifies the long-term policy measures for rooftop gardening that can become the basis for a sustainable approach for urban agriculture.

The key objective of the paper is to identify and explore the necessary strategies to stimulate urban agricultural growth in the city of Dhaka through examining the areas for development and re-development of rooftop gardening (RTG). Therefore the specific priority objectives are to investigate the existing urban agricultural policies and practice in the city with a particular reference to rooftop gardening; to identify the potential areas where policy interventions are required for promoting rooftop gardening to meet the needs of Dhaka and to suggest measures which leads to the formulation and successful implementation of the policies with regard to rooftop gardening.

METHODS AND MATERIALS
The pertinent information on the subject was collected from various primary as well as secondary sources. The feasibility of rooftop gardening (RTG) was explored through a questionnaire survey of the owner’s of households and a survey of occupants and responsible authorities of selected public and commercial buildings. Moreover, a focus group discussion was also organized where stakeholders were invited to discuss the prospects and problems of rooftop gardening in the city. For example, NGO people (on providing micro credit), City Corporation Departments (on changing zoning regulation), land and house owners (on leasing and allowing tenant to gardening) and general public
(on their overall reaction) were asked to express their opinion.

RESULTS

Urban Food Security Situation in the Context of Dhaka

As in other cities in the developing countries poverty is also widespread and rapidly growing in Dhaka. A large migration of poor population to Dhaka has contributed to rapid growth of poverty in the city. Several floods and cyclonic storms caused damage to crops and low per acre yield is further aggravated by these natural calamities resulting in shortage of domestic food supply, causing recurrent food storage and thereby causing higher incidence of poverty (Alamgir 1978).

With a GNP of $220 per capita many Bangladeshis live below the absolute poverty line and recent estimates place 86% of the urban population in this category. According to Balbo et al. (2000), in Dhaka 54% of the households live below the poverty level. If the situation does not improve, Dhaka will be home to almost 2 million ‘very poor’ residents by 2005. Between 1975 and 2000, the demand of cereals increased in Dhaka from 294 thousand tonnes to 2407 thousand tones (Balbo et al. 2000). As the population is growing so is the physical expansion of the city. Rich agricultural land in the Savar and Tongi corridors is likely to be converted to urban uses in the near future. On the other hand, it was estimated that the food requirement gap in Bangladesh will reach at 8 million tones in the year 2000. “The urbanization trends in the future will exacerbate the gravity of the problem” (Asaduzzaman 1994). The challenging task that the Government faces is to achieve a higher growth rate in food production (Ali 1989).

Urban Agriculture in Dhaka

Dhaka’s land use pattern shows that agricultural use is still the highest as compared to other land uses in the city. 61% of the land in Greater Dhaka is nonurban land, used as rural or semi rural agriculture while the rest is devoted to urban use. This is due to the fact that the city is spreading at a growing rate in the agricultural lands.

There is already some food produced in the city areas in Bangladesh. In 1983/84, the urban poor may have produced about 25,000 tones of rice, 180 tonnes of beef and mutton, nearly 100,000 chicken and 19,000 tonnes of milk (Asaduzzaman 1989).

In exploring the UA activities in Dhaka Remenyi (2000) found that, inner city Urban Agriculture favors production activities that require a minimum of land and a maximum of the most readily available resources, labor. In the heart of residential and business district Dhaka, where land has its highest cost, Urban Agriculture tends to be synonymous with opportunistic planting of trees or annuals, plants that use little or no land such as vines and hanging cucurbits grown from roof gardens or hanging pots, various branches of high valued horticulture, including vegetables, flowers, herbs, and potted shrubs, economically useful tree varieties that provide fruit, nuts, flowers, borders and shade, and small scale livestock production built on exploitation of ‘free’ organic waste and/or forage gathered using cut and carry methods common amongst the landless in rural village situations. In the peri-urban ‘lower rent zones’, broad-acre cropping is more common (Remenyi 2000).

Although UA has been in the city for many years and it has contributed to additional income of the households, it is still no more than a “sideline subsistence activity”. However, this is not unique to Dhaka and similar findings are reported in other studies of food security. For the poor of the city, “the potential in Urban Agriculture yet to be exploited as a strategy of poverty alleviation (Remenyi 2000).

Government and City Policy

The Government of Bangladesh does not have any specific policy provision or legislation that promotes urban agriculture in general or rooftop garden in particular. There is no specific city policy that promotes urban agriculture in Dhaka. Until recently the official master plan of Dhaka has included a provision that “Three areas of high
NGO Supports and Initiatives

NGOs have had a significant impact in the development activities in many sectors in the past. NGOs have appreciable impact in development particularly in rural areas. The role of the NGOs, particularly, Grameen Bank, Bangladesh Rural Advancement Committee (BRAC) and PROSHIKA are well known.

It is until very recently that the microfinance provider NGOs have started targeting the urban poor. BRAC has initiated an urban credit program for slum dwellers in 1997 which is targeted at women, especially recent arrivals (Remenyi 2000). Provisions of microfinance for urban agriculture from other prominent NGOs such as ASA, SafeSave, Credit and Development Forum (CDF) are found extremely limited (Remenyi 2000).

As part of the vitamin A deficiency prevention program USAID/Bangladesh currently supports an extensive home gardening program undertaken by the Helen Keller International (HKI) that covers 25% of the country together with other programs such as nutrition education and health worker training. This program has increased the production and consumption of fruits and vegetables in the working areas (Talukder et al. 2000). This initiative in the rural areas of Bangladesh could easily be replicated to the urban areas.

Survey Results on the Current Practice of Rooftop Gardening

To find out the current state of UA and RTG, questionnaire survey on the RTG of residential buildings was carried out.

1. Current Use of Residential Rooftops in Dhaka

Presently the rooftops of the residential buildings are being used for various purposes: for drying (88%) and washing (45%) clothes, as playground for children (97%), for entertaining guests (20%), for cool air during the summer (64%), to sunbathe in the winter (33%). On most of the roofs, some form of pleasure garden exists (78%), sometimes there are fruit gardens (12%), and less often, vegetable garden as well (8%).

2. Fruits and Vegetables Produced

About 60 varieties of fruits and vegetables are produced in Bangladesh. Not all types can be produced on the rooftop. The types and mix are chosen in the city depending upon individual household food preferences, availability of seeds types that can be grown on the rooftop, climate and availability of soils. In the food garden the following fruits and vegetables are commonly grown; Guava, Lemon, Papaya, Grapes, Green Chili, Pumpkin, Squash, Onion, Garlic, Coriander leaves, Tomato, Mushroom, Leafy vegetables (e.g., Callaloo, Jute Leaf and Red Amaranthus), and other (e.g., Cucumber, Flat bean, Bitter ground, Ribbed ground, Ladies finger, Amaranthus, Dhudi, Cowpea and Brinjal). Some families also cultivate spices and plants used for medicinal purposes.

3. Owners’ Determination to RTG

All the owners interviewed enjoy gardening. About 68% of the residents spend 50-80 Canadian $ per annum. Many of them have plans to initiate food gardening (65%) in the future. Only less than 5% of house owners are willing to allow tenants to RTG. They also do not want to increase rent to allow their tenants to RTG as they might lose the tenant if rent is increased.

4. Leasing

Although many roofs are currently being underutilized the owners seem to be reluctant to allow outsiders in the roofs. They worry that this may hamper their privacy.

5. Manpower Availability

Manpower does not seem to be a problem, since one or two persons are available in every house. In most of the cases (90%) someone in the family is available to look after the garden. Moreover, more than 50% of the family interviewed has members who have claimed to have knowledge about and experience in agriculture and gardening.

6. Materials for Gardening

According to 95% of interviewed, obtaining gardening
materials (such as soil, seeds etc.) is not a problem. They are easily available in the local market and in the nurseries.

7. Water Supply Water access is becoming a serious problem in Dhaka. However, most of the respondents stated that water is not a problem for those who can pay for it. Those who own buildings can also afford water. In 98% cases they have access to water on the roofs, and there are already water pipes installed on the roofs for other purposes (such as cloth washing etc.).

8. Suitability of the Rooftops Every house owner thinks that their roofs are suitable for gardening and do not require improvement work. In 75% cases shedding from the next building were not perceived as a problem. More than 75% also did not identify any physical barriers.

9. Assistance Required Most owners (75%) are reluctant to take any outside help sources (75%). Less than 15% respondents sought partial help (from nurseries and friends). However, about 40% owners are willing to join Rooftop Gardeners Association if formed in the future.

10. Problems Identified The possibility of burglary seems to be a main problem. Other anticipated problems include attack of the gardens by insects, birds and monkeys.

DISCUSSION

In a workshop the questionnaire findings and the survey results were shared with government and city officials, NGO representatives and individuals who have experience in urban Agriculture. The issues such as the city’s attitude toward future initiatives of RTG and financial and managerial matters were discussed in a focus group discussion. The findings are summarized as follows:

• It seemed that only a few of the participants were aware of the benefits of UA and RTG.
• In the initial discussion, most of the participants were not really interested. However, after a briefing about the advantages that UA (and RTG) can offer, they all felt that it would bring benefits for Dhaka’s residents as well.
• If there is a “revolution”, the Government and the City officials mentioned that they would have no reservation in integrating UA in the urban development policy agenda. They are also willing to revise relevant laws if necessary.
• However, the city officials pointed out that such new program would create an extra burden on their regular administrative tasks.
• The participants mentioned financing as a major concern. Unless some sort of arrangement for financing is made the poor cannot be involved. Also, some middle class families require financial assistance for the initial few years.
• The Government and city officials think that at this moment they do not have funding available to support UA projects. However, they mentioned that some form of financial assistance might be available from the international donors.
• The NGO representatives expressed their interest supporting RTG projects in the near future. They think that there are many NGOs who will be willing to provide informational, financial and managerial help to the gardeners.
• The NGO representatives also promised other participants that they would explore the possibilities of how the poor can be involved in RTG.
• A representative from the association attended the discussion that feels that the Government and NGO support is crucial for the sustainability of RTG projects.
• All the participants think that putting fences and employing guards can tackle the problems of burglary.
• The participants concluded that hands-on training would help promote RTG. It is mentioned that the formulation of a manual from where the farmers can obtain the necessary information will be helpful.
• All the participants expressed the need for integrating UA in the national educational curriculum.
• They stated that some demonstration projects would also encourage citizens in UA.
Potential Areas for RTG in Dhaka

• Lack of strict land use and physical planning laws and the reluctance to enforce the existing laws can be seen as an opportunity for RTG initiatives for the poor. The laws can be easily tuned in line with the practice.
• Most of the rooftops of Dhaka are flat which are suitable for gardening.
• Most of the buildings are suitable for RTG as rooftops are easily accessible.
• Large number of government and commercial office building roofs that are not currently under any use can be used for gardening.
• The immigrants in Dhaka are remarkable for their innovation and adaptation. Many of them have first hand experience in agriculture.
• Dhaka’s climate is suitable for RTG.
• In Dhaka not too much irrigation is required for growing plants.
• There already exists network of pipelines for water supply to the rooftop for almost every buildings surveyed. Currently Dhaka’s water supply authority (WASA) does not have regulation restricting supply of water in the roof or garden. Even WASA has an advertisement on the national television that shows how to use water properly for gardening purposes.
• There is an extensive NGO net working within the country from where a range of assistance is available for initiating new projects for RTG.
• The gardeners can easily buy their materials from the nearby adjacent markets of the city. The existence of huge number of nurseries in the city will ensure the supply of plants in time.
• Most of the owners of the residential buildings are willing to initiate RTG. This indicates that a possibility of economic return will make them interested in renting out or leasing out rooftops for gardening purposes.

Constraints of RTG in Dhaka

Some major constraints that have been found from the interview, survey and relevant literature search include:

• The lack of finance is one of the critical factors that constraint the innovative projects in RTG in Dhaka. Lack of the provision for credit specially prevents the poor from leasing RTG and initiate food gardening.
• As has been expressed by the majority of the respondents burglary is the main concern. The possibility of theft is apprehended due to the ongoing food shortage in the city.
• Good quality of seeds is not available during the harvesting season because of huge demand.
• Many of the city residents do not have training in agriculture. Starting gardening without proper training may lead to frustrating outcomes, which might result in reluctance of the people in initiating new projects.
• There is no authority to take care of gardens in the commercial and public office buildings especially at night. The guards and caretaker (often known as Mali) are some times part-time staff.
• There are several constraints due to the present conditions of buildings. For example, some buildings are old, especially in the old part of the city.
• Dhaka is situated in an active seismic zone. Many experts express their concerns about possibility of building collapse as a large number of 3-5 storied brick buildings are built with very little seismic resistance. Moreover, many of these are founded on recent loose fills, with a possibility of ground failures during earthquake.
• Even some new buildings are not suitable for RTG. There have been several cases of buildings collapsing the city in recent years. These happened due to the noncompliance with the building construction regulation. In the city some buildings exceeded the limit of number of stories allowed to build on specified building foundation and structures.
• Shadow of taller buildings on smaller ones is one of the barriers for RTG although this is not unique to Dhaka.
• Although supply of water is not an issue for those who can afford it, there is a shortage
of water particularly during the dry season from November to March.

- The limited access of urban poor to high valued land (in this case RT) in Dhaka is the most important constraint preventing the poor to involve and exploit their skills as urban farmers.

The main insight resulting from the survey and discussion is that the people are not fully aware of the benefits that can be tapped from RTG. This is mainly due to the fact that there are no organized efforts on it from government, community and NGO side.

There is a pool of agricultural skills among the recent migrants, which has not been utilized for UA. Through the use of RTG their potential can be tapped.

**Strategies to Improve Rooftop Gardening in Dhaka**

- Strong political commitment and solid policy guidelines are the preconditions for creating supportive environment for RTG.
- A committee consisting of both the government representatives and the related organizations should be formed in order to identify the possible strategies.
- Financial and economic and social analysis of the project should be undertaken to justify the projects.
- Building regulations and laws have to be amended that take into consideration the weight of RTG in the construction. New buildings and structures should have sound foundations to stand against the muddy loose earth. Pillars of the proposed buildings should be strong enough to bear the load of the building.
- The building roofs should be sloped down in such a way that the rainwater passes down quickly and easily.
- Fencing around the RT and electronic signal system to prevent burglary.
- Survey results and group discussion indicate that community activities have to begin, particularly with groups of women farmers.
- Land use regulations for both public and private land are needed for urban food production to flourish.
- More information about crops and fertilizers, water and pesticides, could greatly increase crop production while immunization and advice on feeding would improve livestock and reduce the number of premature deaths.
- Donor agencies and NGOs effort in promoting RTG will create an environment that will help the Govt and the public in this regard. Bangladesh is fortunate to have a number of NGOs with their innovative credit models. Those models of financing can be replicated in providing support for RTG projects.
- Availability of foreign funding for this project may be explored.
- The project should be handled from a multi-dimensional approach and therefore a single department should be created to coordinate implementation of the project among housing, services, and environment, planning authority.
- The question of scarcity of land can be addressed with proper policy strategy.
- The leasing of private rooftops is also not a barrier since it is not a new concept in Dhaka. It has been seen in the case of nurseries that places are made available through formal and informal agreements with the landowners (Mayeed and Choudhury 1996).

**CONCLUSIONS**

Although there has not been found any restriction on RTG, government response to it has generally been one of neglect. The financial barrier fuelled by lack of awareness is limiting the promotion of RTG in the city. In order to realize the potential that RTG can offer, major shifts in thinking of the policy makers is required. The most radical one would be on part of the city officials to integrate UA in general and RTG in particular with urban planning.

The scarcity of land is a key constraint on the use of land by the poor in Dhaka. They have not been fully able to utilize their village-honed skills in agriculture. Roofs of the public buildings can be leased out carefully so that they can be given only to the interested poor. NGOs could offer help the poor in this regard.
Literature Cited
Talukder, A., Pee, de Saskia, Taher, A, Hal, A. 2000. Improving food and nutrition security through homestead gardening in rural, urban and peri-urban areas in Bangladesh.