

Impacts of urban agriculture in Dar es Salaam, Tanzania

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Summary

Urban agriculturalists keeping mainly cross-bred dairy cattle in four different density areas in the city of Dar es Salaam, Tanzania were investigated as to whether they had information about the damaging effects of their animals on the environment. They responded to questions related to five issues of animal activity that damaged the urban environment. The findings revealed that, on average, all four socioeconomic groups possessed information about the damaging effects which their animals caused. Moreover, the people of the highest and quasi-medium socioeconomic status, who in turn kept the most cattle, were the most aware. Most agriculturalists keeping cattle, therefore, lived with the contradiction that they recognized the damaging effects of the animals. Using a conceptual model, several reasons are given as to why people persist in keeping the cattle. These reasons reside at four levels: government, ministry, city council and the individuals who keep cattle. After examining the reasons for keeping dairy cattle in the city, the author proposes changes at all four levels to reduce the serious urban environmental damage.

Introduction

Since the mid-1970s, the economies of most developing countries have deteriorated because of external and internal causes such as the oil crisis, wars, droughts, and increased population, distorted industrialization, political strife, economic mismanagement and a lack of job creation. In rural and urban areas, these causes have led to an attrition in civil servants' productivity, a decline in income, increased balance of payment problems and low productivity (African Development Bank, 1992; Bukuku, 1993; World Bank, 1994). In trying to address the continuing decline of their economies, the governments of developing countries have pursued different policies and practices. These have been designed to encourage citizens, particularly the labour force, in informal sector economic activities specifically designed to subsidize individuals' income and food production. (The informal sector means small-scale, self-employed activities, with or without hired labour. Typically, these activities are not organized and operate with a low level of capital, low technology and often on temporary premises or land. Official

government statistics do not measure this sector's activities nor do formal financial institutions support them.) One such activity has been urban agriculture which emerged as an important phenomenon during the 1980s (Sanyal, 1985; Deelstra, 1987; Sachs and Silk, 1987; Tricaud, 1987; Rakodi, 1988; Yeung, 1988).

Urban agriculture

Traditionally, people of lower socioeconomic status have undertaken urban agriculture. Today, however, studies suggest that a wide range of people are engaged in urban agriculture for different social, economic and cultural reasons (Wade, 1987; Freeman, 1991; Mlozi *et al.*, 1992; Smit and Nasr, 1992; Diallo, 1993; Egziabher, 1993). A decade ago, O'Connor (1983) perceived urban agriculture to be an important part of small-scale enterprises. Surveys from the late 1980s in Bolivia, Egypt, Kenya, India, Mali, Thailand, Tanzania and Uganda showed that poor urban households spent 60% and sometimes as much as 89% of their income on food. In 1990, households in nearly half of the least developing countries' (LDC) largest cities were spending 50–80% of their average income on food (Ethelston, 1992). In Africa, urban agriculture for food and economic survival is a widespread practice (Khoury-Dagher, 1986; Ngwa Nebasina, 1987; Rakodi, 1988; Freeman, 1991; Gbadegesin, 1991;

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Drakakis-Smith, 1992; Mlozi *et al.*, 1992; Maxwell and Zziwa, 1993; Rogerson, 1993; Mbiba, 1994).

The rise of urban agriculture, however, has its negative side. For instance, domestic animals transmit zoonoses or animal diseases, which can afflict humans and circulate among other animals (Acha and Szyfres, 1987; Madkour and Gargain, 1989; Harrison and Sewell, 1991; Phillips and Piggins, 1992). Vegetables and field crops are also a problem. They can harbour malaria-carrying mosquitoes (*Anopheles gambiae*) and *Culex quinquefasciatus* mosquitoes which carry malaria, yellow fever, dengue, *Bancroftian filariasis* (*elephantiasis*) and lymphatic *filariasis*, along with lesser known diseases (World Health Organization, 1992; Bradley, 1993; McGranahan, 1993; Satterthwaite, 1993). In addition, urban agriculture activities can lead to direct and indirect urban desertification, that is a 'reduced productivity of desirable plants, alterations in the biomass and diversity of the micro and macro flora and fauna ... [and] accelerated soil deterioration and increased hazards for human occupancy' (Farshad and Zinck, 1993, p. 4).

To address these alarming and increasing side-effects of urban agriculture, the present study had two objectives. First, through interview and survey techniques, 29 urban agriculturalists in Dar es Salaam of varying socioeconomic status were surveyed. These people mainly raised livestock that included cross-bred dairy cattle, exotic crosses of chickens, for eggs and broiler meat and a few goats. The aim was to determine whether they knew anything about the environmentally detrimental side-effects of their practices. Secondly, a model derived from a literature review and field observations was used to explain why most people with information about the damaging effects that livestock cause on the urban environment continued to keep them.

Context

Tanzania is a low income country in East Africa heavily dependent on agriculture. In Tanzania, people of all socioeconomic statuses are now undertaking urban agriculture throughout towns and cities (Moshia, 1991; United Republic of Tanzania, 1991; Sawio, 1993; Mlozi, 1994). As stipulated by the United Republic of Tanzania under Town and Country Planning Ordinance CAP. 378, urban agriculture refers to the raising of dairy cattle, poultry, goats and pigs and the growing of field crops and vegetables in urban areas. In the City of Dar es Salaam, the problem of environmental degradation caused by urban agriculture is great. For instance, at the end of 1993, the region of Dar es Salaam had 18 286 cross-bred dairy cattle, 1.2 million exotic laying and 0.6 million broiler chickens, 131 891 local fowl, 37 327 ducks, 37 327 pigs and 40 930 goats. People in the urban wards of the city kept over

half these animals and crops covered approximately 1500 ha of land.

The animal hazards include the problems of disposing of animal dung, which decomposes, produces odour and acts as a breeding area for harmful bacteria and flies. Animal dung can be a source of tetanus (Ellner and Neu, 1992) and the slurry containing dung, urine and water pollutes the surroundings and attracts mosquitoes. Other hazards are the improperly buried corpses of cattle and chickens, chemical contamination from the overuse of antibiotics and from acaricides, which are pesticides used to control cattle ticks which transmit East Coast fever, gaseous pollutants such as ammonia (NH₄), which are repulsive to neighbours and contribute to the impairment of the ozone layer (Crutzen *et al.* 1986; Mukherjee, 1992; Tamminga, 1992) and physical damage. Livestock destroy ornamental plants, roads, lawns, water lines, telephone lines, parks, fences and traffic signs. They obstruct pedestrians and motorists and sometimes cause accidents. Cows, chicken and goats, if housed in sections or servants' quarters in government, public institution and private company houses, can cause extensive damage.

Field crops are also a problem because people claim that plants over 1 m high (banana, maize, and cassava) act as hiding places for bandits. Plants also spoil the beauty of the city or pose traffic hazards when grown haphazardly. Spraying pesticides on plants pollutes the environment and damages farmers' health through contact and inhalation. Crops less than 1 m high (mostly vegetables such as African spinach (*mchicha*), tomatoes, pulses and onions) require moist environments that offer potential breeding grounds for malaria-carrying mosquitoes.

The problems of urban agriculture are increasing across the capital city. Dar es Salaam is the biggest urban agglomeration in Tanzania and the most dynamic socioeconomically, culturally and geopolitically. Its population is booming; during 1988–1992, it grew by nearly 1 million people to 2.2 million (Syngé, 1992) and by 1995 it was estimated at 2.5 million people. The city lies 10 m above sea level and is around latitude 7°0' north and 39°0' east. Administratively, modern Dar es Salaam (Fig. 1) is a region composed of the Ilala, Temeke and Kinondoni districts. These districts together have 50 wards and out of these 35 are classified as urban. There are 15 urban wards in Ilala, nine in Temeke and 11 in Kinondoni. The Dar es Salaam City Council (DCC) is responsible for the administration of the city, which has had four developmental plans since its inception in 1891.

A grouping of the chief residential areas by plot size densities in the urban wards shows four distinct groups.

(i) The low density areas such as Oysterbay and Msasani have big plot sizes typically measuring

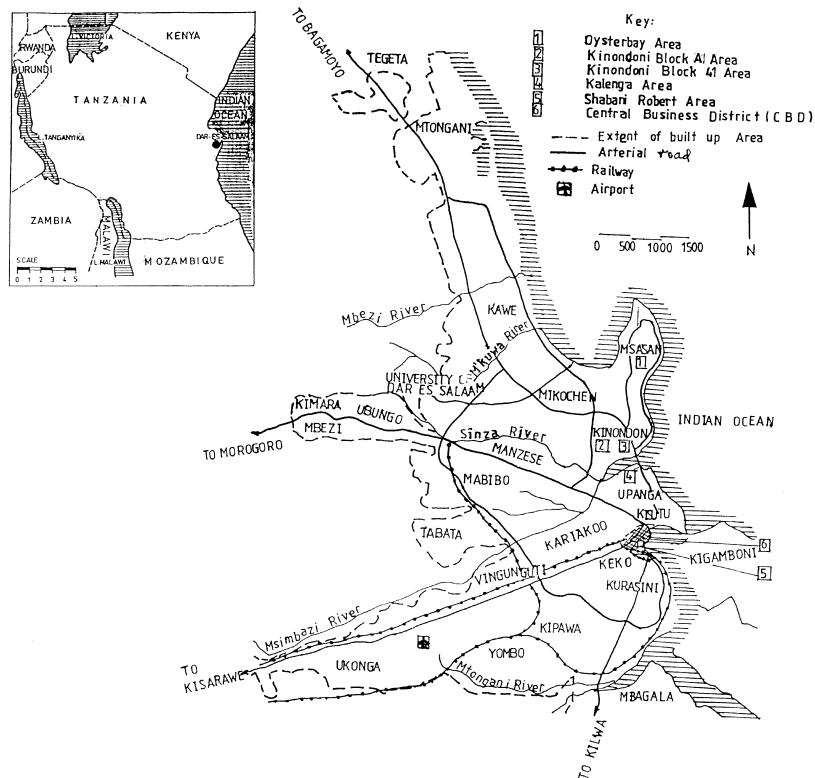


Fig. 1. Location of study areas in the City of Dar es Salaam, Tanzania.

4640 m². They are inhabited by people of the highest socioeconomic status who mostly keep livestock that include cross-bred dairy cattle, exotic crosses of chickens for eggs and broiler meat and a few goats. These people also grow vegetables and field crops.

(ii) The medium density areas such as Upanga west and Shabani Robert measure approximately 1750–2400 m². Here, people of quasi-medium socioeconomic status or mid-level status live, they keep fewer livestock and cultivate crops in smaller plots than the first group.

(iii) Those in the medium density areas such as Kinondoni Block 41 and Chang'ombe where plot sizes measure approximately 900 m². Here, people of medium socioeconomic status live and raise fewer livestock and crops compared to groups (i) and (ii).

(iv) There are many high density areas such as Kinondoni Block A and Mabibo in which the plot sizes measure approximately 300 m². These are inhabited by people of lower socioeconomic status who usually do not keep livestock such as cattle, but rely on a few laying and broiler chickens and stands of crops.

However, a plot of houses in the unplanned squatter areas of the city can fall into any of the four area densities discussed above and their urban agriculture activity varies similarly.

Methodology and results

The 29 interviewees lived in urban areas of each of the four densities and were distributed as follows: six came from Oysterbay (a low-density area), six from Kalenga (a quasi-medium-density area), six from Shabani Robert (a quasi-medium-density area), five from Kinondoni Block 41 (a medium-density area) and six from Kinondoni Block A (a high-density area). From each interviewee the researcher elicited qualitative information using an interview schedule containing 38 questions about livestock effects on the urban environment. The responses were tape-recorded and later transcribed. An analysis of the transcript data employed the methods advocated by Huberman and Miles (1994) which include data reduction, data display, conclusion drawing and verification. The urban agriculturalists were asked their opinions about the five animal-related issues covering the psychosocial, sociopolitical-legal, disease-health, accident and city-landscape aspects. Table 1 illustrates ten of the 19 questions requesting information that were asked.

The respondents gave 515 responses and, of these, 73.7% suggested that the interviewees were conscious that the animals damaged the urban environment. The interviewees were more conscious of the city-landscape and sociopolitical-legal aspects of the animal related issues (Table 2).

Table 1. Some examples of the questions to which urban agriculturalists responded in Dar es Salaam, Tanzania.

| Animal-related issues | Question asked |
|-----------------------|---|
| Psychosocial | Some people say that animals scare children. Some say this is not a problem. What do you think? Some people complain about the noises and odour caused by animals. Others think that is not so. What do you think? |
| Sociopolitical–legal | Some citizens say that urban agriculture persists because by-laws are not enforced. Others disagree with this claim. What do you think? Some politicians have condemned urban agriculture. Others think it poses no problems. What do you think? |
| Disease–health | Some people think that animal dung in the city is unhealthy. Others disagree. What do you think? Some people claim that animals can transmit diseases to humans. Others disagree. What do you think? |
| Accident | Some people claim that animals in the city cause traffic jams that lead to accidents. Some say this is not so. What do you think? Some people claim that animals can hurt pedestrians, children and old and sick people. Others disagree. What do you think? |
| City-landscape | Some people say that animals cause damage to government houses, water pipes, telephone installations and roads. Others disagree. What do you think? Some people say that the presence of animals in the city has destroyed its beauty. Others say that is not true. What do you think? |

The interviewees were least conscious of the potential damage to the environment from the disease–health animal-related issues as shown by the mean of 51.7% of the responses. Table 2 also shows that the respondents in the Oysterbay area (people of highest socioeconomic status) were more conscious of the fact that the animal-related issues damaged the urban environment than the rest. They were also very conscious of the socio-

political–legal (100.0%), city-landscape (95.8%), and psychosocial (83.3%) issues associated with urban agriculture.

In contrast, the interviewees in the Kinondoni Block A area (people of lower socioeconomic status) were generally less conscious of the animal-related damage to the environment compared with the other groups. While they were conscious of the issues concerning the city-landscape (79.2%),

Table 2. Total ‘yes’ responses given by the respondents regarding information about animals damaging the environment ($n = 404$)

| Animal issue | Survey area | | | | | Mean % |
|--------------------------|----------------------------------|-------------------|--------------|----------------|-------------------------|--------|
| | Kinondoni Block A (high density) | Kinondoni Block B | Kalenga | Shaaban Robert | Oysterbay (low density) | |
| Number and frequency (%) | | | | | | |
| Psychosocial | 17 (70.8) | 15 (75.0) | 22 (91.7) | 15 (62.5) | 20 (83.3) | 76.7 |
| Sociopolitical–legal | 12 (66.7) | 12 (80.0) | 16 (88.9) | 15 (83.3) | 18 (100.0) | 83.9 |
| Disease–health | 12 (50.0) | 10 (50.0) | 13 (54.2) | 10 (41.7) | 15 (62.5) | 51.7 |
| Accident | 18 (75.0) | 13 (65.0) | 15 (62.5) | 17 (70.8) | 16 (66.7) | 68.0 |
| City-landscape | 19 (79.2) | 16 (80.0) | 23 (95.8) | 22 (91.7) | 23 (95.8) | 88.5 |
| Total | 78 | 66 | 89 | 79 | 92 | |
| Mean (%) | (68.3) | (70.0) | (78.4) | (70.0) | (81.7) | 73.7 |

accident (75.0%), and psychosocial aspects (70.8%), they were less conscious of the sociopolitical–legal (66.7%) and disease–health (50.0%) aspects of urban agriculture (Table 2). The people in Oysterbay, who were the more conscious, kept the most livestock, although in the study most people keeping livestock were conscious of the ways in which livestock damaged the urban environment. Most urban agriculturalists, therefore, lived in a contradictory situation; they recognized the damaging aspects of livestock activities and yet continued to keep animals.

Discussion

It is a general belief that a city is a dynamic place for industrial, commercial and formal work activities and not for agriculture. Because of this, the practice of keeping livestock begs for some explanation. A conceptual model is used that encompasses causes residing at four levels: government, ministerial, city council, and the individual (Fig. 2).

Government level: economic hardship and policies

National economic hardship is one of the main causes cited for keeping livestock. People earn money from milk sales to meet their basic and high human needs (Fig. 2). Tanzania’s dependence on its main export crops (coffee, cotton, tea and sisal) has made it extremely vulnerable; these have

declined both in the quantity exported and price in the world market. The country is among the 25 poorest in the world and the World Bank lists it as among the ‘debt distressed’ low-income countries. From 1977 to 1988, the gross domestic product (GDP) grew at an annual mean of 1.9%, below the population growth rate of 3.2% per annum (Bukuku, 1993; Mans, 1994; World Bank, 1994). The persistent economic malaise that continued in the 1970s to the early 1990s was of an acute shortage of foreign exchange and unsuitable balance of payments. Other problems were large budget deficits, high rates of inflation and the decline of urban income (International Monetary Fund, 1993; Sarris and van den Brink, 1994). In Tanzania, urban residents of the highest and medium-class households suffered the greatest real income decline (Bukuku, 1993; Sarris and van den Brink, 1994). Due to the persistent economic hardship in the country, the urban environmental degradation caused by keeping livestock is severe and likely to persist or worsen.

The importance of dairy cows in supporting the urban socioeconomic problems cannot be over-emphasized. For instance, of the 616 responses, 341 (54.5%) showed that people undertook urban agriculture (dairy cows, chickens and a few crops) because of economic hardship. This was confirmed by all 21 public officials interviewed. The distribution of the 341 responses in Oysterbay, Kalenga and Shabani Robert, Kinondoni Block 41 and Kinondoni Block A was 58, 56.1, 52.9 and 51.1%,

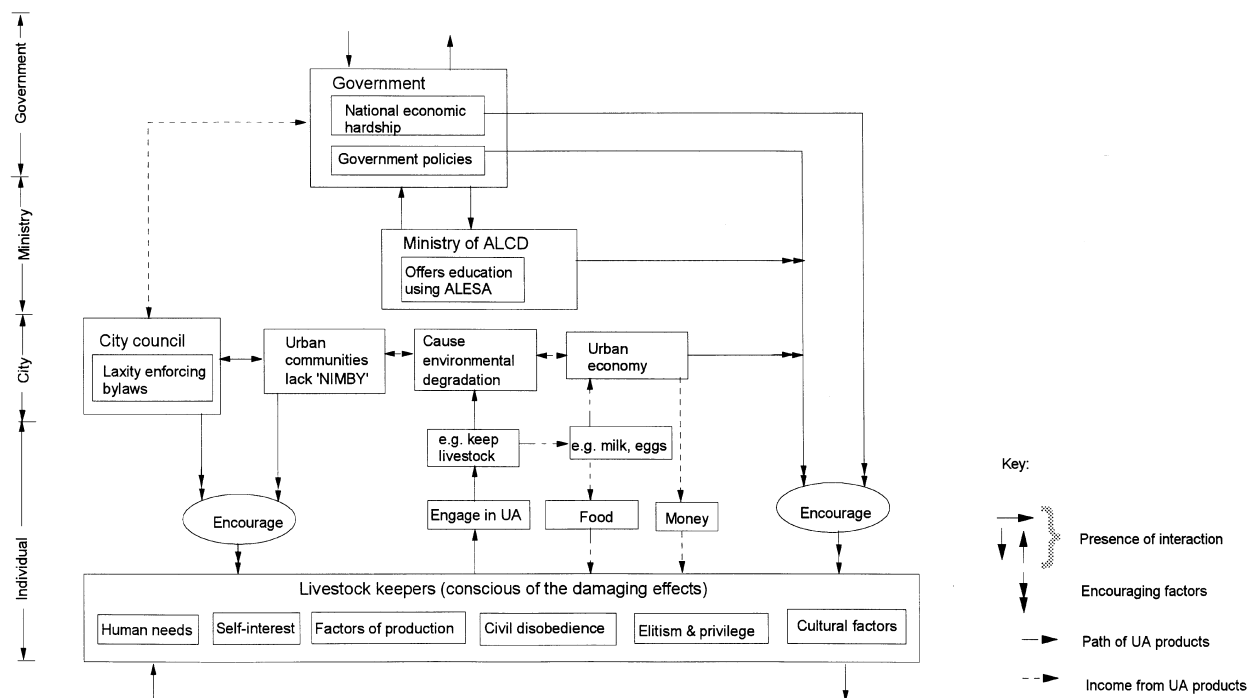


Fig. 2. Model showing the reasons why people persist in urban agriculture even when they are conscious of its damaging effects on the environment.

respectively. A person milking only four cows earned an estimated annual profit of T. Shs. 876 000 (US\$1825). At the end of 1993, this income was four to 12 times more than the annual mean salaries of low- and high-income earners. During 1993, in the urban wards, the estimated annual profit from milk sales produced by 5449 cows was T. Shs. 1.2 billion (US\$25 million). The huge profits earned from keeping livestock made most people ignore the aspects of environmental damage (Fig. 3). The City of Dar es Salaam was enduring a 26% annual inflation rate.

Government policies have partly contributed to the emergence and intensification of keeping livestock in the urban environment. During the 1970s and 1980s, the government, faced with a poor economy, had issued policies encouraging people to undertake urban agriculture. This was for peoples' self-sufficiency, to grow food to offset the rocketing inflation. Government and political leaders time and again exhorted urban people to produce food in their backyards and other open spaces. The policies have included *Siasa ni Kilimo* (Politics is Agriculture) in 1972 and *Kilimo cha Umwagiliaji* (Irrigated Agriculture) in 1974. Others were *Kilimo cha Kufa na Kupona* (Agriculture for Life and Death) in 1974–1975 and *Mvua za Kwanza ni za Kupandia* (First Rains are for Planting) also in 1974–1975. Yet others have included the National Economic Survival Programme (NESP) in 1981–1982, the National Food Strategy in 1982, the National Livestock Policy (NLP) and National Agricultural Policy (NAP) in 1983 and the Structural Adjustment Programme (SAP) in 1983–1985. There were ongoing structural adjustment programmes within the National Economic Recovery Programme (ERP) in 1986–1990s.

Ministerial level: unevenness of extension services

At the ministerial level, keeping urban livestock has been partly encouraged by agricultural



Fig. 3. Urban agricultural refuse lines the streets in Dar es Salaam, Tanzania. Cow manure and food wastes smell and attract flies and *Culex* mosquitoes.

extension or non-formal education to urban dwellers (Fig. 2). Agricultural extension (livestock and crops) '... is an educational with a dual goal: it brings information and technology to farmers and teaches them how to use it to improve their productivity; and it enables farmers to specify their own needs and provide feedback on the effectiveness of extension in meeting them' (Saito and Weidemann, 1990, p. 1). In the 1970s, the government, in a bid to fulfil the above policies, set up an urban agriculture extension service under the Ministry of Agriculture, Livestock Development and Cooperatives (MALDC). The MALDC, now using its Agriculture and Livestock Extension Service Agents (ALESAs), promotes keeping livestock and growing crops in the city. The ALESA visit urban dwellers and impart modern skills and knowledge (non-formal education) about agriculture (livestock and crops) so that their production will increase.

City council level

The city council's laxity in enforcing its by-laws has encouraged the keeping of livestock by most people (Fig. 2). It was in the early 1980s, when the government policies of encouraging urban agriculture, in particular keeping livestock, started to have negative effects on the operations of most urban councils and the physical urban environments. In 1982, to curb the latter, town, municipal and city councils, with government approval, re-enacted the moribund by-laws of 1949 for controlling animals in urban centres. These by-laws are known as the Animal By-laws of 1982 of the Local Government (Urban Authorities) Act and made under Number 8, Section 80 of CAP. 378. In the city, enforcing these by-laws has generally been problematic and the keeping of livestock has continued unabated. The reason is that most people keeping livestock are of higher statuses and they break the by-laws with impunity. In addition the city council has inadequate fiscal resources to apprehend defaulters.

The lack of city communities' initiatives to rise and protest against urban individuals who keep livestock has also contributed to the environmental degradation. There is little evidence of group resistance from neighbours and/or communities. The 'not in my backyard' (NIMBY) attitude (Brion, 1991) and the primary assumption that public opposition would be a main impediment to people keeping livestock that might damage the environments of others is not evident.

Figure 2 also shows that the availability of markets for the products encourages urban agriculture activities in the city. This is due to the continued rise in demand for urban agriculture products triggered by an annual 2.8% urban population growth both from rural–urban migration and internal growth. The livestock products (milk, eggs and broiler meat) are filling a need.

Urban agriculture products are sold to consumers and city institutions (schools, hotels, hospitals, bars, cafeterias and restaurants) and these are explicitly encouraging urban agriculture activities. In the city the intensity theory and the urban industrial hypothesis both support the proliferation of urban agriculture activities. The intensity theory, developed by von Thunen (Kellerman, 1983), predicted that there is more intensity of input use in agricultural areas that are closer to market centres. The urban industrial hypothesis (see Shultz, 1953) holds that the degree of economic organization near the centre of the matrix economic development offers opportunities that tend to enhance agricultural production possibilities.

Individual level: meeting human needs

Urban people understanding the damaging effects of animals to the environment keep livestock to meet their human needs (Fig. 2). People of higher status vigorously pursue this motive despite the fact that they are more aware of these damaging effects. Maslow (1954) maintained that people cannot be concerned about the higher human needs for recognition (status), achievement and self-realization until the lower basic needs for survival, safety and belonging have been met. Here, high human needs include paying for 'superior' social and economic goods such as buying a reconditioned car or pick-up truck, building a 'modern house', and buying a video recorder or a television set. A typical basic human need can be to provide for food. Of the 616 responses for undertaking urban agriculture given by the interviewees, 262 (42.5%) showed that they did it partly for nutritional reasons.

Self-interest is a major reason for keeping urban livestock. One way of explaining self-interest in the Tanzanian context is to look at the long-held policies (1960s–1980s) of *ujamaa* or socialism. During the *ujamaa* era, the opposite of *ujamaa* or Tanzanian socialism was *ubinafsi*, meaning 'selfishness' and 'individualism'. Individualism was hard fought then, but it is currently less so. People who keep more cattle than the permitted four allowed by the city council, even when they know they are causing environmental damage, do so because of their self-interests. It has been argued that people are always motivated by self-interest and differences in behaviour are only due to differences in opportunities (Lewin, 1991).

The expectancy theory (Vroom, 1964; Porter and Lawler, 1968) also helps to explain why people undertake urban agriculture. According to this theory, people are motivated to undertake urban agriculture if they believe their efforts will be rewarded and they value the rewards that are being offered. This is so with urban agriculture in Dar es Salaam. The reinforcement theory (Skinner, 1971), in which people behave in a certain way because they have learned at some previous time that

certain behaviours (e.g. urban agriculture activities) are associated with positive outcomes (e.g. huge profits), also reinforces urban agriculture activity.

In Dar es Salaam, dairy cows are expensive to buy and difficult to obtain. In 1993, a pure-bred heifer (a Friesian aged 9 months), cost approximately T. Shs. 200 000 (US\$416.7). People of higher statuses bought heifers because they had the money and knew government officials who sold them. Senior officials who keep dairy cows use the cheap and abundant labour to look after their enterprises. Livestock owners buy the easily available animal medications, mineral salts, animal feed and other concentrates from government, private animal clinics and drug stores. Some livestock keepers also buy the forage for feeding their cattle from small-scale vendors (Fig. 4). All benefit from the lucrative price paid for milk, sold mostly to the city hotels, restaurants, government, public institutions and private food catering services.

Many people keeping cows and knowing about their damaging effects are disobeying the city by-laws. There is a failure by the city council to enforce its by-laws and most dairy cows are kept by senior officials who break the by-laws with impunity (Fig. 2). According to Bay and Walker (1975), civic disobedience is a public defiance of a law or policy enforced by established government authorities and here carried out and persisted in against public ends. For instance, of those interviewed 75.9% said that they were aware of the city by-laws for controlling the keeping of animals. However, most agriculturalists disregarded these by-laws because of the city council's laxity in enforcing them. This was also mentioned by 85.2% of the 27 public officials interviewed. Such civic disobedience has increased because of the lack of support of the by-laws by most senior government and political leaders, most of whom also keep livestock.

A privilege is 'a benefit or advantage possessed by one person only or by a minority of the



Fig. 4. Animal forage gathered from Dar es Salaam's out-of-city limits is sold by a local dealer within the city.

community' (Webster's Dictionary, 1988, p. 796). Elitism refers to a condition held by 'a minority group that has power or influence over others and is recognized as in some way superior' (Abercrombie *et al.*, 1988, p. 84). In Tanzania, elitism and privilege are the preserves of people of higher statuses who have higher education and are often senior officials or politicians. For instance, these people use 'free' government transport and have access to other infrastructures such as government servants' quarters, water, electricity and road networks. In such ways these people are assisted with their livestock keeping activities.

Urbanization studies show that most people of African origin living in cities today are immigrants from rural areas through rural-urban migration (O'Connor, 1983; Hazlewood, 1989; Mabogunje, 1990). Studies on urban agriculture suggest that most urban agriculturalists have lived in towns and cities on average for 5–10 years (Freeman, 1991; Gefu, 1992; Maxwell and Zziwa, 1993). In Dar es Salaam, for instance, most members of the Pare, Ngoni, Chagga, Sukuma and Nyakyusa ethnic groups keep approximately 50% of the livestock partly because of 'cultural utility'.

Conclusions

Urban agriculture is of widespread occurrence, even though it damages the urban environment severely. In Dar es Salaam, urban farmers who know this persist in raising livestock within the city. There are various reasons why they persist. First, the national economic austerity affects people and can be severe for people at the lowest socioeconomic levels. Urban agriculture is thus encouraged by the government, to reduce complaints from urban dwellers about their low salaries and wages. Urban persons therefore undertake urban agriculture to subsidize their low income and to produce food, thus attempting to overcome the 26% annual inflation rate. Surprisingly, people of higher statuses who have more information about the damaging effects of livestock keep the most livestock in the city. Second, policies promulgated by the government also encourage urban agriculture in the city. Third, the extension services offered by MALDC personnel also encourage the keeping of livestock. Fourth, the city council is lax in enforcing the by-laws for controlling livestock because most people undertaking urban agriculture are senior government and ruling party officials. At the city level, it is difficult to organize opposition to the practices and the people damaging the environment. Finally, keeping livestock is encouraged at an individual level because of such factors as self-interest, human need (food and money), access to factors of production, lack of punishment for civic disobedience, a sense of elitism and privilege and cultural traditions.

Policy implications

It appears that environmentally sustainable development in most cities of the developing countries is unlikely without practising careful urban agriculture, particularly when livestock is kept. Maintaining a sustainable urban environment should be a community-based activity aiming at improving the urban dwellers' well-being and preserving it for future generations. For instance, in Dar es Salaam, sustainable city development will be achievable only if concerted efforts occur at four levels: governmental, ministerial, city council and the individual. An issue is to improve educational information about good practice. The environmental degradation in Dar es Salaam caused by keeping livestock could be reduced by embarking on intersectoral, participatory and interdisciplinary strategies. Some proposals can be listed as follows.

(i) When issuing policies the government should assess the short- and long-term effects on the environment and public health by liaising with the Ministries of Health, Lands, Housing and Urban Planning, the Dar es Salaam City Council and the National Environmental Management Council.

(ii) The government should enforce regulations that prevent the damage resulting from keeping livestock and should punish people found in violation without bias.

(iii) The government should revive the 1985 spirit of 'the green-belt movement' through the 'broad-acre policy' (people given a piece of land on the city periphery for farming). This includes planning and developing peri-urban areas so that urban livestock owners can move their animals there. These areas should be provided with further infrastructure (roads, water and electricity) and security.

(iv) The MALDC through the ALESA should move away from providing inequitable, top-down-oriented agricultural extension (non-formal education). Extension personnel should teach livestock owners to think about animal raising in terms of the issues of public health over both short- and long-term periods. Livestock owners should be required to reduce cows and to dispose of cow dung far away from residential areas. Livestock owners should learn about the interrelationships between the three animal elements: genetic potential, animal nutrition and animal yield.

(v) The city council should enforce its by-laws, in particular that of a person keeping a maximum of four dairy cattle under zero-grazing, without favouritism. Owners should cull old cows, bullocks and unwanted bulls from the current 6.68 animals kept per person. Ward councillors and local leaders should mount educational campaigns and invoke the NIMBY attitude among urban dwellers.

(vi) The government should commence and foster studies on the effects of livestock keeping on

people's health. For instance, emphasizing the extent to which livestock cause environmental degradation (tetanus, malaria, odour and dust) in the city. Such studies could be multidisciplinary and involve researchers from higher learning institutions such as Sokoine University of Agriculture, the University of Dar es Salaam and the Ardhi Institute.

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