

Impact of Illegal Urban Agricultural Activities on Bio-Diversity of Emakhandeni High Density Suburb of Bulawayo - Zimbabwe

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Abstract

This paper examines the impact of unsanctioned urban agricultural activities in Emakhandeni High Density Suburb of Bulawayo and its periphery and their implications for climate change and global warming. The researchers adopted the purposive sampling technique to interview 100 people who engage in illegal agricultural activities in Emakhandeni and its periphery, employees of Bulawayo City Council, the Local councillor and ward committee members. Field visits were also carried out to observe the impacts of unsanctioned agricultural activities on bio-diversity of Emakhandeni. The findings were that in spite of the existence of City Council By-Laws on Urban Agriculture and an Urban Agriculture Policy which was incorporated into the Bulawayo City Council Master Plan (2006-2015) the majority of the cultivators are operating outside these laws and guidelines. People both from Emakhandeni and other surrounding suburbs have parcelled out every available open space of land in Emakhandeni and its periphery and are engaging in unsustainable farming and animal husbandry practices, leading to progressive land degradation. There is massive deforestation which increases levels of carbon dioxide in the atmosphere owing to increased use of diesel driven generators and firewood due to electricity load-shedding. Stream-bank and slope cultivation is rife leading to massive soil erosion and siltation. Parches of cultivated wet lands have dried up thereby driving the water table lower in an already dry region, thereby increasing aridity. The use of pesticides and inorganic fertilisers is compromising ground water quality and threatening survival of flora and fauna downstream. It is recommended that politicisation of urban agriculture should be avoided to allow city fathers to actively supervise and monitor urban agricultural activities in Emakhandeni. This would minimise negative impacts on the local and down-stream environments thereby enhancing sustainable land use patterns and thus help reduce their negative contributions to climate change and global warming.

Key Words: Urban Agriculture, Global Warming, Unsustainable Agriculture, Land Degradation,

Introduction

Agriculture is the backbone of the Zimbabwe economy. Although traditionally

practiced by rural folk, of late it has been taken up by both unemployed and working urbanites. Urban Agriculture is carried out on undeveloped municipal land and takes the form of planting of seasonal crops such as maize, sweet potatoes, beans and cow peas, and even the keeping of goats, sheep and cattle. While in some cases this activity is sanctioned by council, in others it is practiced without authority. Bulawayo's Emakhandeni High Density Suburb and its periphery is one area that has witnessed extensive land clearance for agricultural purposes.

Research on the legal operational framework of Zimbabwe's urban agricultural sector is generally scanty. The Municipal Development Programme (2005) however traces the roots of official recognition of the importance of Urban Agriculture in Zimbabwe to the government's Municipal Enterprise Development Policy of 1985. This policy encouraged Local authorities to establish agricultural cooperatives in or near urban settlements. Subsequently, Environmental Impact Assessment Policy of 1997 called for Environmental Impact Assessments to be carried out before forestland is converted into urban agricultural land. This demand was based on the recognition of the negative impacts of unregulated urban agricultural activities.

Government of Zimbabwe's concerns with sustainability of Urban Agriculture is underlined by the provisions of Environmental Management Act (Chapter 20:27) which calls for deliberate efforts by stakeholders to help Local Authorities develop guidelines for Urban Agriculture, plan and coordinate support for it, as well as establish extension programmes to ensure it passes the sustainability test. While in the past Municipal governments have by and large looked upon Urban Agricultural activities as being incompatible with urban development, a lot has changed since the SADC Ministers of Agriculture meeting held in Harare in 2001. The Ministers noted that there were food shortages in most SADC countries. At the same time, the Ministers observed that Urban Local Authorities operated archaic, prohibitive and restrictive policies and regulations which prevented urbanites from exploiting undeveloped municipal land as a strategy for poverty alleviation.

Following the above observations, the Ministers adopted and signed a declaration in support of Urban Agriculture in the SADC region in 2003 (Municipal Development Programme, 2005). This Ministerial recognition took a more practical dimension through the declaration by Urban Councils Association of Zimbabwe's 61st Annual Conference which not only acknowledged that Urban and Peri-urban Agriculture contributed to urban food security, poverty reduction, local economic

development and sustainable urban development, but also encouraged local authorities in Zimbabwe to promote it in their cities and to develop appropriate incentives and other policy guidelines necessary for its sustainable growth (Mushamba, 2002).

Though many formal urban agricultural projects have been established to date and operate under official sanction, either with the help of donors or on council initiative, many agricultural activities are still being carried out illegally, especially in Emakhandeni High Density suburb. This research was motivated by the fact that illegal urban agricultural activities being undertaken in Emakhandeni High Density Suburb have made significant alterations to the landscape. It is the researchers' assumption that these activities negatively impact on the ecology of Emakhandeni High density suburb, and are making a significant contribution to climate change; the extent of which is the focus of this study.

Background to the Study

Bulawayo is Zimbabwe's second largest city. It was declared a municipality in 1897, and has for long been considered the best well-managed Local Authority in Zimbabwe. This is reinforced by Bulawayo City Council having won first prize in the Zimbabwe Customer Service Award in the public sector category for being the most customer focused local authority in the country in 2012 (NewsdzeZimbabwe, 2012). Bulawayo falls under agricultural region 3 which generally records erratic rainfall; as a result, Bulawayo often experiences regular water shortages. Following the closure of many firms in the 1990s owing to, among other factors, long-running droughts and unreliable water supplies, some firms relocated to Harare and others to neighbouring countries. By the early 2008, poverty levels in the city had increased significantly among its 700 000 inhabitants, with unemployment rising to around 80% (RUF Foundation, 2010). As a result, most people turned to informal means of survival and of raising income, urban agriculture being one of the most common. While in the past, Urban Agriculture was a pastime for struggling housewives and the unemployed, nowadays, even those in formal employment are scrambling for the small pieces of land available, while others even engage other people to work on their pieces of land for them (Ngena, 2012).

Bulawayo has a number of High Density Suburbs, among them Emakhandeni High Density Suburb, the subject of this study. Emakhandeni High Density Suburb is located in the West of the city. To the East of Emakhandeni High Density Suburb

lies Entumbane High Density Suburb, to the West is Luveve High Density Suburb, to the south lies Lobengula and Njube High Density Suburbs while to the north lies Cowdry Park High Density Suburb. Emakhandeni High Density Suburb has close to 5000 households. Its population however can well exceed 6000, given the high occupancy rates of lodgers per housing unit. The border between Emakhandeni and Entumbane High Density Suburbs is marked by a perennial stream of sewage effluent from damaged municipal sewer pipes. The suburb is also dissected into two units Emakhandeni High Density Suburb 'A' and Emakhandeni High Density Suburb 'B' by yet another stream of perennial sewage effluent. These effluent streams feed into Mguza River down-stream, a tributary of Shangani River which flows into the Zambezi River to the north. Many residents of Emakhandeni have parcelled out the land on stream banks and beds and any other available spaces of land and converted it into small plots where crop cultivation is taking place. Cultivated land ranges from small patches not more than a few square metres to a few hectares for planting maize, potatoes or groundnuts. Cultivation involves the use of hand held hoes, donkeys drawn ploughs and even hired tractors. In many cases, cultivation takes place even on land that was planned, surveyed and serviced by the city council, thereby disrupting the future plans of council.

The practice of Urban Agriculture in Zimbabwe is as old as urban development itself, the only difference being the change in nature and scale over the years. According to van Veenhuizen (2006) Urban Agriculture refers to the growing of plants and raising of animals within or on the fringes of land designated for town or city development, largely for the benefit of residents of that area. This includes crop husbandry activities such as cultivation of maize, vegetables, sweet potatoes, beans and other legumes, as well as animal husbandry activities such as rearing of cattle, goats, poultry, dairy and sheep. While in the past urban agriculture was regarded mostly as a pastime or backyard activity, increasing urban poverty has elevated Urban Agriculture to a national programme and strategy contributing towards urban food security, poverty reduction and local economic development.

Urban agriculture, according to van Veenhuizen (2006), is a response of the urban poor to inadequate, unreliable, and irregular access to food, urban poverty, hunger, and lack of formal employment and purchasing power. Van Veenhuizen further observes that urban agriculture is generally characterised by high competition for land and limited space, use of organic wastes and wastewater, as well as low degree

of farmer organisation. Urban agriculture is heavily influenced by urban conditions among which are local authority policies, poverty, and ecology and health policies of its locality. Generally based on temporary use of vacant lands, urban agriculture has become a permanent feature of many cities in both developing and developed countries. Urban agriculture has both positive and negative social, environmental, and economic impacts and externalities (Van Veenhuizen, 2006). On the positive side, urban agriculture contributes to urban food security and nutrition, improved health through access to fresh food, local economic development, social inclusion of the less empowered and the disadvantaged (e.g. women, children and the aged) and helps in turning urban wastes into productive resources. On the negative side, urban agriculture has the capacity to: a) contaminate local water sources through the use of chemical fertilisers and pesticides, (b) contribute to deforestation and siltation of water bodies, (c) destruction of wetlands, (d) harming of the fragile ecosystem through improper farming methods, and (e) contamination of crops with pathogenic organisms through access to poorly treated waste water.

Various governments worldwide are now responding positively to the phenomenon of urban agriculture (van Veenhuizen, 2006). Cuba, Argentina and Brazil for example, have come up with the 'Zero Hunger Campaign' programme aimed at boosting the urban agricultural sector, whilst countries such as Botswana, Zambia, Benin, and China are preparing policies seeking to promote orderly and sustainable urban agriculture (van Veenhuizen, 2006). The trend towards support for urban agriculture is also evident in a number of 'Declarations on Urban Agriculture' in which local and national level policymakers have stated their formal commitment to develop policies and programmes favourable to urban agriculture. Examples include the 'Quito (Ecuador) Declaration' by mayors of 22 countries which emanated from an international workshop on 'Urban Agriculture in the Cities in the 21st Century' held in 2000. The declaration sought to improve municipal policies and actions on urban agriculture. The 'Nyanga Declaration on Urban and Peri-Urban Agriculture in Zimbabwe' in which Ministers, Mayors, Town Clerks, Chairpersons of Council Committees, Councillors, Heads of Departments, Regional and Local Non - Governmental Organisations made a commitment to support urban agriculture (Mushamba, 2002) is also another example.

Deelstra, Boyd and van den Biggelaar (2006) report that, in the Netherlands politicians and planners are faced with many competing claims for the use of scarce

urban land. As a result, urban agriculture is only promoted as one element of land use combinations that offer other valuable functions such as combining agriculture with childcare and educational facilities. In the highly institutionalised planning systems common to most industrialised countries, realisation of multifunctional land use plans demands integrated planning between different levels of government. In Ecuador, the Municipality of Rosario implemented a project which led to the formulation and institutionalisation of an enabling regulatory and legal framework facilitating poor urban households' access to land for urban agriculture (Dubbeling, 2006). Urban Agriculture is also one component of Vancouver City Council (Canada)'s broad food –related policies (Mendes, 2006).

Land use planning, uses a number of models. The ecological model, in which the city is seen as a system of inter-related parts, seeks to maintain open and green spaces which act as lungs to purify pollutants from the environment. Dar es Salaam in Tanzania and Lusaka in Zambia have adopted this approach. The New Urbanism model, which is recommended by the World Bank, advocates for the reduction of the size of urban residential plots, the promotion of small agricultural plot sizes, the building of open spaces within the city as well as establishment of recreational areas. This model has been applied in Lilongwe (Malawi), Dodoma (Tanzania) and Abuja (Nigeria). The Collaborative or Communicative model seeks an all stakeholder and inclusive approach to urban agriculture. Urban planning in most developing countries has tended to be characterised by long-range comprehensive planning which is associated with rigidity and a lack of responsiveness to social issues and that this has negatively affected the integration of urban agriculture into urban planning. Such an approach is inappropriate given that the context for the argument for urban agriculture is rapid urbanisation and increasing urban poverty and food insecurity.

Urban Agriculture has also become such a topical issue given the fact that by 2050 urban dwellers will likely account for 86 per cent of the population in the more developed and 67 per cent in the less developed regions (UN Habitat, 2008). As such, integration of urban agriculture in urban planning is regarded as the panacea to the problem of urban development. According to Takavarasha (2003), the main reasons for the growth of Urban Agriculture are the desire by households to produce for the subsistence and enhancement of their incomes while also utilising the ready urban markets for their surplus produce. Many urbanites seek to exploit the readily available municipal land to produce foodstuffs that meet their cultural tastes and

ways of life while others simply take the activity as a hobby. But according to Takavarasha (2003), hindrances to Urban Agriculture include limited access to land, insecure land tenure, policies and regulations that are not supportive of the programme, lack of support services, lack of organisation of the farmers making it difficult to champion their cause, perceived and real negative environmental impact of the programme including the mishandling of agro-chemicals and improper disposal of agro-waste by agriculturalists. In addition, improper crop selection and negative externalities such as air, water and soil pollution, deforestation and soil erosion also lead to the condemnation of the activity. However, urban agriculture cannot be wished away as it has taken root as a common feature of land use and socio-economic system of most urban areas worldwide (Takavarasha, 2003).

According to van Veenhuizen (2006), three main dimensions of urban agricultural policy can be identified - the social policy dimension which refers to subsistence oriented types of urban agriculture, the economic policy dimensions which is related to market oriented types of urban agriculture; and lastly the ecological policy dimensions which refer to types of urban agriculture that have a multi-functional character. Besides provision of food and generating income, the ecological policy dimension plays a role in environmental management and provides other services demanded by urban citizens (Van Veenhuizen, 2006). Van Veenhuizen observes that, although urban agriculture takes place under varying socio-political conditions and policy regimes, urban policy makers need not only create a conducive policy environment, but also need to enhance access to vacant open urban spaces and to enhance the productivity and economic viability of urban agriculture by improving access of urban farmers to training, technical advice and credit. Local authorities thus can play a key role in facilitating urban agriculture by establishing an officer department to take care of this activity, or by setting up a multi-actor platform to organise this activity.

Whilst Bulawayo City Council has adopted the concept of urban agriculture, most of the projects that it has promoted have been formal, and these are supported by Non-governmental organisations such as RUFU Foundation and Municipal Development Programme and relate to market oriented types of urban agriculture where activities are undertaken by small scale family-based enterprises. These projects promote orderly urban agricultural programmes based on developmental models spearheaded by Nongovernmental organisations but exclude the social policy dimensions that take care of subsistence oriented types of urban agriculture that form part of the livelihood strategies of the urban poor and which are mainly

focussed on producing food and medicinal plants for home consumption (Van Veenhuizen, 2006). The response to unsanctioned urban agricultural activities has been to slash the crops, at times when they were already at tussling stage. Agricultural activities in Emakhandeni High Density Suburb are informal haphazard activities. Cultivation takes place almost everywhere and anywhere- around the house, in open spaces, along road side verges, vleis, water courses, stream banks and stream beds, on hill slopes, on old rubbish dumps, and along servitudes for electricity, water and sewer. Some residents keep goats and sheep which roam and forage in and around the neighbourhood of Emakhandeni High Density Suburb without restriction. This form of activity has negative implications for ecological sustainability and makes a contribution to climate change.

Chenje, Sola and Paleczny (1998:468) define climate as "... the type of weather that is particular to a region or area seen from a long term perspective". Climate change, according to the same authors refers to "... an alteration to measured quantities (e.g. precipitation, temperature, radiation, wind, cloudiness) within the climate system that departs significantly from previous average conditions and is seen to endure, bringing about corresponding change to ecosystems and socioeconomic activity." Chenje, Sola and Paleczny (1998:468). Of late there has been significant change in rainfall patterns worldwide. There have been longer cycles of drought and shorter rainfall seasons that directly and negatively impact on farming activities. This has increased poverty levels in communities mainly dependant on agriculture, among them the ever increasing urban population. "It is generally believed that poverty and environmental degradation are linked to a self-destructive cycle in which people cannot afford to take proper care of the environment," (Chenje, Sola and Paleczny, 1998:468).

Climate change is a by-product of human activities that release green-house gases such as carbon-dioxide, methane and nitrous oxide among others into the atmosphere. These gases are generated through animal exhalations, agricultural activities, savanna and fossil burning, manure management, forest and grassland conversion and poor land use patterns. According to Chenje, Sola and Paleczny (1998:468), Zimbabwe emits more methane, nitrogen oxide, nitrogen dioxide and carbon monoxide than it absorbs thereby making a contribution to climate change. Everyone citizen therefore, has an obligation to reduce their emissions. Technically, the interest in climate change stems from the fact that a warmer world cannot support biodiversity in its present form, and this may lead to the eventual extinction of the human race. The attempt therefore, to manage the effects of the actions of

human agricultural activities is based on the interests of self- preservation of the human race as a species.

This research is therefore informed and guided by the concept of sustainable agricultural practice. Sustainability, according to Chenje, Sola and Paleczny (1998: 483) refers to “The ability of an ecosystem to maintain ecological structure, processes and functions, biodiversity and productivity over time”. Chenje, Sola and Paleczny (1998: 483) define sustainable agriculture as “... agriculture which does not degrade the soil or other resources on which it depends”. Land, the resource upon which human kind depends for food, water, shelter and indeed its very livelihood, is a finite resource. Poorly managed it can become obsolete like any other resource; but well managed, it has the capacity to exist in perpetuity, and to sustain future generations indefinitely (Chenje, Sola and Paleczny 1998:484). Sustainable agriculture is that form of agriculture therefore which does not degrade the soil or other resources on which it depends. Unsustainable agricultural activities not only offset the ecological balance and lead to ecological disasters; they also negatively contribute to climate change and global warming. The provisions of section 140 of Environmental Management Act (1996) seek to ensure sustainable land use by directing that no person shall cultivate or destroy any natural vegetation or alter the soil or surface of a wetland within 30 metres of the naturally defined banks of a public stream, preservation or protection of beds, banks or course of a public stream or a water source without the written approval of the Board. This legislation seeks to preserve and protect stream banks and beds, and water courses, thereby reducing soil erosion, evaporation and lowering of the water table. Local authorities as planners, service providers, issuers of permits, law enforcement agencies and appropriate authorities, and polluters in their own right, are therefore seized with the responsibility to ensure sustainable land use in their areas of jurisdiction.

Purpose of the study

This study sought to identify the contribution of the agricultural activities of Emakhandeni High Density Suburb to ecological destabilisation and climate change and global warming. Specific objectives of the study were to identify- the drivers of urban agricultural activities in Emakhandeni High Density Suburb, the impact of these activities on the eco-system of Emakhandeni High Density Suburb, the contribution of these activities to climate change and global warming, and to

recommend ways in which agricultural activities of Emakhandeni High Density Suburb can be made sustainable.

Research Methodology

The researcher used mainly convenience sampling to choose participants in the research. This involved visiting plot holders as they worked in their plots and interviewing those that were willing to be included in the research. Judgemental sampling was also used to target specific plot holders, especially those whose plots lay in the stream banks and stream beds or whose size drew the interest of the researcher. Where participants were not available at plots that were of interest to the researcher, repeat visits were made until they were found. This way, the researcher was able to interview 100 plot holders. Interviews enabled the researcher to get information from plot holders on land tenure practices being practiced, as well as City Council interventions. Interviews also helped the researcher in defining the characteristics of plot holders, the drivers of Urban Agriculture in Emakhandeni High Density Suburb, the nature of agricultural activities being undertaken and the extent of official involvement in these activities. Field observations which involved the researcher moving from plot to plot helped the researcher in observing the physical state of the plots under cultivation, and their impact on biodiversity.

These data gathering techniques were considered effective since they were able to identify plots that were located in areas that contravened Environmental Management Agency Regulations and Bulawayo City Council By-laws and the rules of sustainable agriculture which inform this research. Through the snowballing technique, identified key informants would refer the researcher to someone else with relevant information on the subject under study. This way, 5 key informants, who included 2 Local authority officials, the councillor of the area and 2 members of the word committee of Emakhandeni High Density Suburb were identified and interviewed. Even though many of the research participants were fairly wary about the final outcome of the interviews, (many thought the research could lead to them losing their plots if the illegal activities were made public), many cooperated as they felt they had nothing to lose since this was not their land anyway, and one way or the other council was still going to repossess it.

Results and Discussion

Bulawayo City Council Urban Agriculture Policy

For a long time, Bulawayo City Council has mainly relied on the archaic Bulawayo (Public Health) By-Laws RGN 803/1966 and Bulawayo (Protection of Lands and Natural Resources) By-Laws RGN 676/1975 to control and regulate urban agricultural activities. Whilst the Public Health By-Laws mainly concerned themselves with regulating pollution of air, land and water bodies by making it mandatory for citizens to seek authority to keep animals and prohibiting the use of manure; section 10 of the Protection of Lands and Natural Resources states that no person shall cultivate any municipal land or plant, sow, tend, or reap any plant, shrub, bush, flower, vegetable, fruit or crop on any municipal land without the prior written approval of council. Relevant sections from these two pieces of legislation have since been co-opted into the Bulawayo City Council By-Laws on Urban Agriculture which seeks to develop urban agriculture in the city that is vibrant, diversified and environmentally sustainable for subsistence and commercial purposes. In terms of Bulawayo City Council By-laws, when one wants to engage in urban agriculture, they should follow the following steps:

1. Identify appropriate place and the source of water
2. Apply for permission through the Town Lands and Planning Committee
3. Be awarded lease agreement (normally for a period of 3 years or more)
4. When permission is granted one is not permitted to put up a permanent structure
5. The Town planners will confirm suitability of the place for Urban Agriculture
6. Cultivation should be at least 30 metres away from stream bank

While a number Urban Agricultural activities in Bulawayo conform to the requirements above and are receiving both formal recognition from Bulawayo City Council and financial backing from donors, the activities under investigation in Emakhandeni High Density Suburb are spontaneous and lack coordination. Due to lack of effective supervision of these activities, a general pattern of environmental degradation has thus taken root.

Characteristics of plot holders

One hundred plot holders were sampled using the snowballing and judgemental techniques. Table 1 below shows aggregate characteristics of plot holders that were sampled.

Table 1: Characteristics of plot holder sample

| Plot Holders | Total Dependants | 1 Spouse Working | 2 Spouses Working | Both working | 1 Plots | 2 Plots or more |
|--------------|------------------|------------------|-------------------|--------------|---------|-----------------|
| 100 | 418 | 40 | 8 | 52 | 28 | 72 |
| 100% | Average: 4 | 40% | 8% | 52% | 28% | 72% |

Source: Field data

Employment status of plot holders

Of the 100 plot holders families sampled, 40% have one working spouse, 8% of spouses are both working, whilst 52% of the plot holders are not formerly employed. This underlines the fact that for the majority, urban agriculture is a critical source of food and income. Of these 100 plot holders, 28% have 1 small plot, in many cases just a few square metres in size, whilst 72% are multiple plot holders with some having as many as 7 plots each. In terms of size, the combined acreage of plots for some plot holders is well beyond 5 hectares. Because of the vast sizes of some of these plots, some holders use donkeys (2%), hired labour (2%) and even tractors (1%) to till the land. Otherwise the rest, (95%) dig their fields using handheld hoes.

Of those families with 1% working spouse, 2% of the bread winners are widows, 2% are widowers whilst 2 are female single mothers. There is a strong correlation between unemployment and widowhood. A high number of the unemployed are widows (30% out of 52%) and these own several plots among them. The high number of widows and size and number of plots suggests the plots are their major sources of food. Also their poor educational level explains their lack of appreciation of issues to do with climate change and global warming. The high number of widows who are not working suggests the existence of a vulnerable group which is dependent on their urban plots for their sustenance.

System of plot allocation in Emakhandeni High Density Suburb

Only 1% of respondents claimed that they were allocated plots by councillors in the 1980s when Emakhandeni High Density Suburb was actually first established. The remaining 99% simply cleared their pieces of land without getting authority from anyone. Plot sizes were determined by the individual's ability to work the land and also limited by neighbour's plot boundaries. The majority professed ignorance of the role of the councillor in the assignment of plots of land. The majority began to cultivate their plots after the hunger of 2008 when they realised that those who had planted potatoes and other crops had benefitted from the unusually good rains; and had been able to weather the hunger better. The soil along the streams attracts people because it is fertile; and also because the perennial streams of sewage effluent that flow into them offer all year round water supply to the maize, sweet potatoes and pumpkins that are normally grown there.

Drivers of urban agricultural activities in Emakhandeni High Density Suburb

The following table shows the reasons cited by individuals as the reasons why they engage in Urban Agriculture in Emakhandeni High Density suburb. And because multiple responses were allowed, the reasons cited represent a combination of factors per household.

Table 2: Reasons for engaging in Urban Agricultural activities

| Reasons for engaging in urban agriculture | Percentage of responses |
|---|-------------------------|
| Important source of income and food | 73% |
| Poverty | 67% |
| Unemployment | 53% |
| Lack of monitoring and supervision by council | 51% |
| Widowhood | 30% |
| Availability of land close to the residence | 23% |
| Availability of inputs | 11% |

Source: Field data

Analysis of data obtained from respondents revealed that urban agriculture was an important alternative source of food (73%). Plot holders pointed out that those who have been able to access pieces of land have been able to increase the range of traditional foods available to them and this has improved their nutritional intake and increased the balance in their diets. Poverty (67%) came second on the list of the drivers for Urban Agriculture, while 53% cited unemployment as the major driver. Lack of supervision by city council staff came closely behind at 51%. Many plot holders were grateful that various politicians' had made public comments against the slashing of maize by city council; this had encouraged them to carry on with their agricultural activities. A high percentage of widowhood (30%) was also cited as a contributory factor to urban agricultural activities as most of these people lost their breadwinners. Proximity of plots to plot holders' houses, only a few minutes' walk in most cases, makes management of the plots an easy task. Availability of inputs such as seed maize and fertilisers and insecticides in affordable quantities is also a push factor. Plot holders can easily buy re-packaged seed, fertilizer and insecticides in quantities they need and which they can afford as these are normally sold both in town and in the suburbs by vendors. Some plots are large and yield better than average harvests compared to farmers in communal areas. This has also encouraged people to engage in this activity at the expense of their rural plots. Land is available at no cost to the plot holders, and because some of the land that is being cultivated is unsuitable for development projects means the agricultural activities may not be disturbed by developmental programmes for a long time, if at all. So it is worthwhile getting involved.

Types of crops planted

Plot holders practice mixed-farming to maximise on yields. However, every plot has a maize crop among which various other smaller food crops like legumes and potatoes are planted. In many cases, traditional vegetables such as gusha or derere (*triumfetta angolensis*), wild spinach (*nyevhe* and *mowa*) and black jack grow naturally in the fields. The following table shows the approximate percentages of crop content in the various plots that were studied.

Table 3: Types of crops cultivated and nurtured by plot holders

| Type of crop grown | Percentage in plot |
|--------------------|--------------------|
| Maize | 90% |
| Sweet potatoes | 4% |
| Groundnuts | 2% |
| Round nuts | 2% |
| Other | 1% |

Source: Field data

Though mixed farming is practiced, every plot has a maize crop among which other crops such as groundnuts, round nuts, cow peas, sweet sorghum (ipwa), sweet potatoes, pumpkins, water melons, okra, cattle melon (mashamba) and squash (mapudzi) are grown. The traditional vegetables are normally picked before weeding, and some are even left to grow with the maize crop and produce seed for the following planting year. Harvests range from 3-5 bags of maize per hectare depending on plot size, 10 kilograms of roundnuts, and 20 kilograms groundnuts on average.

Crop quality is affected by proximity of plots to each other. This facilitates cross pollination among various varieties of maize and this affects crop yield. Crop yields also suffer because those who plant are either old ladies who have no available labour force to support them, while other go to the fields after work or during weekends only. A lot of the food is also lost through thefts. Given the yields noted above, a family of five may take 6 months to go over a 10 bag harvest, meaning they have to supplement the remaining six months of the year. Generally this is a significant harvest, and may actually surpass yields obtained in many rural areas. This factor encourages people to continue searching for more pieces of land to maximise their yields. Sweet potatoes, groundnuts and round nuts are alternated as a substitute for bread. From time to time some of the crops, especially maize planted in stream banks and beds is slashed by council workers. This is usually done at tussling stage when most inputs including labour have been administered. Stray donkeys and other wild animals also reduce yields, forcing some residents to sleep in the plots as harvest approaches.

Ecological Impacts of Agricultural Activities

Poor land use patterns

Hill slopes, stream beds and stream banks have all gone under the hoe; trees and grass disappearing behind them, thereby exposing the soil to erosion and the downstream river system to siltation. This no doubt will eventually lead to a receding water table and drier conditions in the region. Ignorance of sophisticated issues like climate change and global warming means that these problems may go on unabated for a long time.

Destruction of wet lands

Wet lands have been converted into maize and potato fields. To drain off the excess water, potato ridges have been prepared down slope. As a result, wet lands have now become dry lands. The multiplier factor leads to the lowering of the water table, the destruction of the wetland biodiversity and its habitat. In addition, soil erosion and downstream siltation help increase aridity.

From Stream bank to stream-bed cultivation

Whilst many of the plots that were taken up prior to 2007 were few and lay on ground that is fairly level and well drained, after 2008 and 2009 people started cultivating on any piece of land that was available to them. As such some plots lie on sloppy ground, wet lands and on the stream bed itself. This was prompted mainly by the economic meltdown which saw many of the residents of Emakhandeni High Density Suburb scrambling to get a piece of land to grow supplementary food on or to augment their income from formal employment. Whilst council by-laws explicitly forbid stream bank cultivation, let alone stream-bed cultivation, the politicisation of Urban Agricultural activities has reduced the frequency with which council monitors this activity, and the slashing of maize planted in these areas has also been less frequent. Wet lands and stream banks and stream-beds have therefore become the latest victims of Urban Agriculture and there is evidence of serious erosion in these areas. From observations carried out in the research, many areas which prior to 2007 were perennial wet lands have since dried up due to deliberate drainage by plot holders who make down slope furrows to accommodate their sweet potato beds. The stream-bank cultivation, which has since graduated into stream bed cultivation are causing a lot of gully erosion. Loosened soil from the stream bank and stream bed is washed away and fills downstream pools before eventually finding its way to Mguza dam. Increased

siltation in this water reservoir reduces water storage capacity as well as water available for evaporation. Reduced evaporation leads to reduced humidity and hence rainfall.

Problem of eutrophication

Most of the land which is under cultivation is sandy in nature; to boost yields, 95% of plot holders use inorganic fertilizers and insecticides. Some of the fertiliser is donated to poor households by political parties and Non-governmental organisations. These organisations however do not interest themselves in where the fertiliser is applied. Pesticides are used sparingly (1%) given that there are no serious pest outbreaks being experienced. This is easily available in user friendly packs sold by vendors in the suburb and in town. Unfortunately because of the fact that soils are sandy in nature, most of the fertilisers are not fully utilised by the plants and end up being washed into the nearby streams through leaching. Eventually the fertiliser finds its way into the water bodies of Mguza, Shangani and Zambezi. Eutrophication eventually leads to growth of water hyacinth, which uses most of the oxygen in these water bodies and subsequently suffocating aquatic life. This ultimately reduces evaporation and hence reduced cloud formation.

Deforestation as a factor in climate change

Few trees remain where thick bush once dominated the landscape. The thick bush has given way to a sprawling carpet of green maize in summer and one of dreary brown maize stalks in winter. Owing to the reduced bush cover, the land is baked under the tropical sun, sapping deep into the already low water table; while wind erosion and other elements take their toll on the exposed earth. The indiscriminate cutting down of trees promotes accumulation of carbon dioxide in the air, an important factor in global warming. All agricultural activities are preceded by cutting of trees and clearance of bush and grass leading to reduced vegetation cover. Reduced vegetation cover exposes soil to weathering and increases water evaporation. Destruction of wind breaks owing to cutting down of trees exposes the elements and ultimately leads to desertification.

Generation of methane gases

Some residents rear goats and sheep for sale. The number of animals increases dramatically in December when people prepare to celebrate Christmas. Animal dung is associated with the generation of methane gases which contribute to global warming. Because of the ever dwindling grazing space owing to expansion of land

under cultivation, the animals are often seen gathered around open spaces where they are active catalysts of soil erosion. In their ongoing search for grazing land, the herders often come into conflict with cultivators who complain that the animals destroy their crops. The goats' voracious appetite also reduces plant cover - this reduces evapo-transpiration and negatively affects the rainfall patterns.

Carbon dioxide emissions

The area under cultivation in the study area is approximately 10 square kilometres, more than 50% of which was cleared after 2008. The cropping season is characterised by burning of grass across in all open spaces in the area under cultivation leading to vast amounts of carbon dioxide input into the atmosphere. Given that this occurs every year, the carbon dioxide input is significant enough to contribute to global warming.

Latent Negative Impacts of Urban Agriculture

Politicisation of Urban Agriculture

The topic on urban agriculture has now become a political hunting ground. In January 2011 Bulawayo City Council had to suspend the slashing of maize following political pressure from ZANU PF provincial officials who accused the council of lacking humanity and sensitivity following the slashing of maize in Makokoba High Density Suburb (NewsDay, 26 January, 2011). In response to attacks by The Minister of Local; Government, Rural and urban Development over the issue, the Deputy Mayor of Bulawayo councillor Mpofu hit out at both the Minister of Local Government, Rural and Urban Development Ignatius Chombo and Agriculture Minister Joseph Made respectively for attacking local authorities over the slashing of maize grown in undesignated areas when council was simply doing its job. Councillor Mpofu went further to say that both ministers were part of the government that had four years previously totally banned urban farming, yet now they were defending illegal activities (Newsday, 26 January, 2011). In Harare police even arrested 17 Harare City Council workers and charged them with malicious damage to property for slashing residents' maize despite the fact that they were implementing council by-laws. Minister Chombo is reported as having expressed revulsion on the basis that tall grasses in the same areas posed a far greater security

threat to the public than maize fields. Ambassador, Midzi, Harare ZANU PF provincial Chairperson also declared that maize slashing was a political war and accused MDC T councillors of deliberately sabotaging ZANU PF programmes since the latter had supplied inputs such as maize and fertilisers to the urban farmers, (New Zimbabwe 12 January, 2011). This political mudslinging has no doubt prevented council from pursuing efforts to enforce its by-laws on urban agriculture.

Conflict over ownership of pieces of land

Given that plot allocation is on the basis 'finders keepers', there are regular conflicts plot ownership. Where land lies fallow for a year it is assumed that the owner is no longer interested. Tenure is therefore not guaranteed in perpetuity. However owners often come back to claim their pieces of land and this creates social tensions which often take political dimensions. Although it has been suggested that the councillor may resolve these problems, politicians tend to play a political games which earn them votes.

Threat to infrastructure and future developments

Cultivation has become so indiscriminate as to threaten built-up areas and infrastructure such as roads and even the railway line and fly over as people are now cultivating along and around them. A lot of the cultivation has created gullies which are now a danger to people, animals and cars. Some residents in the city go to the extent of hiring tractors to till pieces of land in prohibited open spaces, including those earmarked for urban expansion. In some cases surveyed pegs have been removed by cultivators thus hampering development programmes.

Criminal Activities

Over the past few years, a number of criminal activities have been recorded in the areas where Urban Agricultural activities are taking place. Two murder cases were reported in the past year and police have issued warnings against people going to the plots alone. Three rape cases have also been reported in the area in the past year alone, with one woman being detained by her rapists for over four hours before being released. This is making it unsafe particularly for female plot holders to go out alone to their plots. During harvest times thieves are usually the ones who pick and

taste the first crop and this leads to suspicions against neighbours and also leads to conflict. These thefts are never reported to the police since the activities are regarded as illegal in the first place. Because Urban Agriculture has remained largely informal, the law does not protect the urban farmers who are then left to deal with the problems using traditional methods such as juju. In other cases plot holders have to guard their crops at night and are at the mercy of thieves who may attack them during the theft. A number of suspected thieves have received mob-justice and in some instances near fatal assaults have also been reported.

Health Hazards

Cultivating crops in sewage effluent that is not treated and which contains micro-organisms and bacteria has the potential of creating health hazards such as cholera, dysentery and diarrhoea. Yet this goes on unchecked.

Council Perspectives on Urban Agriculture

Council says it is committed to Urban Agriculture and has relevant By-Laws to show for it. Unfortunately it has not been intervening to ensure orderly process and sustainability of the programme in Emakhandeni High Density Suburb. Officials interviewed actually said that in some cases these activities are an advantage to the Local Authority in that they help clear land for future development at no cost to council. In addition, some even suggested that clearing of bush around the suburbs reduces the hide-outs for gangs and criminals. These views reinforce the view that the Local authority has no interest in minimising illegal Urban Agricultural activities and may in fact be encouraging them without regard to their impact on bio-diversity and climate change.

As a way of ensuring that residents' plant in designated areas, the Local authority has put white stones to indicate areas where cultivation is or is not allowed. Councillors have also been encouraged to meet residents to discuss the issues related to urban agriculture, including persuading them to collaborate with Parks staff

and council rangers. While in some areas meetings have been held, in others fear of losing votes has seen councillors failing to implement this directive. In Emakhandeni High Density Suburb the councillor noted at a council meeting that people had actually planted maize in a football field and would not listen when asked to stop. Council officials also pointed out that during the period 2007-2008 council had waived some of its by-laws on Urban Agriculture to allow survival of the people owing to drought and a poorly performing economy; people now took it as a right.

Conclusion

The researcher concluded that poverty is the main factor that has driven residents of Emakhandeni High Density Suburb into Urban Agriculture and that in many cases urban agriculture has become a form of employment for the unemployed, and a supplementary source of income for the employed. As such, urban agriculture can neither be ignored nor discouraged, a position supported by Hungwe (2003). Urban farming should thus be viewed as a means to a new destiny for the jobless in Emakhandeni High Density. The view by council that Urban Agriculture is a form of free labour which helps clear land prior to urban development projects overlooks the possibility that by the time development takes place, (at a time still indeterminate), the land under review would have become so degraded and unsuitable to accommodate the intended development purpose. The argument that Urban Agriculture helps clear criminal hideouts does not take into account the fact that the grass is often replaced by maize, which is apparently a taller and thicker form of grass and which provides even better cover for illicit activities. Some of the pieces of land are so small that agriculturalists have no motivation at all to spend lengths periods of time learning about sustainable agriculture. They view their activities as a mere pastime which does not deserve as much attention as to warrant spending their precious time; time which could be used to attend to other activities that would enhance their income. A lot of these activities go on because no one is stopping them.

Official interventions have concerned themselves with land ownership rather than sustainability issues. Urban agriculture has come to stay, and effort by the city fathers should concentrate on how to make it viable and sustainable, rather than eradicating it. Council is one of the main polluters through perennial inflows of

sewage effluent into the streams. This effluent has become a source of drinking water for birds and fish which many urbanites eat. During the rainfall season many fish are caught as they swim upstream and even find their way into some of the sewage ponds of the city where they are harvested and sold by some residents. This can also lead to long term medical problems as people consume contaminated food grown using untreated sewage effluent.

The politicisation of Urban Agriculture has led this activity to be undertaken haphazardly at a cost to the environment. Current Urban Agriculture activities in Emakhandeni High Density Suburb have negative impacts to bio-diversity and are making contribution to climate change. Some activities are threatening infrastructure like roads and even the fly over bridge itself as people are digging around its verges. Urban Agriculture has become a national problem which requires national solutions.

Recommendations

Given the prominence with which Urban Agriculture has been hailed as a strategy for overcoming Urban poverty, it is recommended that Urban Agriculture be encouraged but on a sustainable basis. Bulawayo City council should adopt an appropriate Urban Agricultural Model to guide its urban agricultural activities. This will ensure that its negative impacts on bio-diversity and impacts on the climate are minimised. Residents who are involved in Urban Agriculture in Emakhandeni High Density Suburb should be educated by Land development Officers on how to utilise land in a sustainable manner. Local authorities should employ urban agricultural assistants to help in the sustainable management of Urban Agriculture in Emakhandeni High Density Suburb. Politicisation of Urban Agriculture should be stopped to ensure sustainable Urban Agriculture activities. Environmental Management Agency as opposed to politicians should play a more active role in supervising urban agricultural activities. Residents should be educated on the phenomena of climate change and global warming as these concepts, though new, are important for sustainable land management. The local authority should start its campaigns against cultivating in prohibited areas well before the rains. This will ensure that when the rain season comes and agriculturalists begin their activities, the Local authority will not be forced to cut crops which are already thriving.

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