

URBAN FARMING, ITS RELEVANCE, SUSTAINABILITY AND POLICY IMPLICATIONS: A CASE STUDY OF GWERU AND MASVINGO URBAN AREAS

Tshuma Doreen T and Mashoko Dominic

ABSTRACT

The study investigated the effects, relevance, sustainability and policy implications of urban agriculture in Zimbabwe. Qualitative and quantitative data from a sample of 51 respondents was obtained using questionnaires, interviews and direct observation. These included farmers, non-cultivators and Environmental Officers. The results indicated that urban farming improves the livelihoods of people by augmenting meager incomes and boosting their nutritional levels. The study also found that farming is on the increase in urban centers, whose involvement had no professional and age boundaries, assisting in waste disposal and maximizing productivity on small pieces of land. However, pollution levels were found to be high and this could have an impact on climate change. The article concluded that urban agriculture was the cornerstone for the survival of many families in urban areas. On the basis of these findings, the paper recommends that the City Fathers formulate policies and regulations with urban farmers in mind, allocating them permanent land for farming, giving title deeds and Environmental Officers and Agriculture and Research Extension (AREX) workers educating the farmers, emphasizing the long term effects of their traditional methods of farming and helping them develop and implement innovative and appropriate farming practices.

Keywords: Urban agriculture, Sustainability, sustainable agriculture, Conservation farming, Livelihoods

INTRODUCTION

Urban farming in most African countries is a post colonial phenomenon. The democratization of institutions of governance saw an influx of immigrants from rural to urban areas. The massive population pressure on urban environments has directed increasing attention towards sustainable urban development. Agricultural activities in and around cities and towns contribute significantly to meeting the needs of these urban areas, providing employment to urban dwellers, especially women, and absorbing city wastes. According to Pryer and Crook (1998) urban factors which impinge on nutrition and health are high population densities, the prevalence of diseases, the need for mothers to work, and exposure to commercial food marketing focusing on processed foods

of lower nutritional value per unit cost. This means that the urban poor pay more for less, and their health and nutrition suffer. The capacity of this vulnerable group to supplement their nutritional value intake through growing crops using their own labor on land freely available is an increasing widespread practice in many developing cities (Bowyer-Bower and Tengbeh, 1997; Mazambani, 1982; Rogerson, 1992). As urban agriculture increases issues of sustainability must not be ignored.

Purpose of the study

The study sought to establish the extent to which cities vary in terms of their attitudes and beliefs towards urban farming. The study also intended to shed light on the feelings, thoughts and intentions of both urban cultivators and non-cultivators on the impact of farming on the environment. The sustainability and implications of urban farming were also sought. The major driving force of the study came from strong evidence from research findings which indicate that urban farming has a positive contribution on people's livelihoods, as well as its high contribution to the pollution of the environment. Thus this assessment would identify policy implications that could be drawn from valuable contributions made by various stakeholders involved in the study.

Conceptual Framework

Sustainability in agriculture refers to the ability of an agro ecosystem to maintain production through time, in the face of long term ecological constraints and socioeconomic pressures (Altieri, 1998). Blumenthal (2001) says that sustainable agriculture is the management system for renewable natural resources that provide food, income and livelihood for present and future generations while maintaining or improving the economic production and ecosystem services of these resources. An important feature of sustainability is the capacity of the agro ecosystem to maintain a non declining yield over time, within a broad range of conditions (Blumenthal, 2001). Most concepts of sustainability require both continued yield and the avoidance of environmental degradation. These two demands are often pictured as mutually incompatible. Agricultural production depends on resource utilization while environmental protection requires an acceptable extent of conservation. Sustainable agriculture integrates environmental health, economic profitability, and social and economic equity (Herald, 2009). However the following are some of the constraints to sustainable agriculture;

- Reduction in soil loss or long term environmental degradation is not tangible inducement for urban farmers to adopt sustainable agricultural practices when their immediate concern is simply feeding their families.
- Lack of awareness, not only at low levels but also at higher levels of the society. Even if urban farmers are willing and able, extension services are non-existent in urban farming.
- Lack of institutionalization of urban farming, no system becomes operational if it is not institutionalized.

LITERATURE REVIEW

According to Greenline (2001) an environmental magazine, Cuba has had to return to organic farming following the withdrawal of financial support from the former USSR. The policy includes an emphasis on urban agriculture and by 2001, 20 000 inhabitants in the capital city of Havana were directly involved in organic gardening. The city provides 30% of its own vegetables. In Bissau, the capital of Guinea-Bissau salt-water rice, the main staple food, occupies large expanses of land in and around the city and is the main subsistence crop grown there (Lourenco-Lindell, 1997). Swamp rice cultivation is carried out with ingenious traditional techniques the farmers have learnt from their ancestors. Few cash investments are made since rice farming households have limited access to cash. They used seeds from previous harvest, used traditional tools that are often borrowed and homemade, the salty water supplied the soil with nutrients and the main sources of labour were the farmer's household members and the compound it belonged to. Rice cultivation in Bissau is not a recent response of the urban poor to increasing economic hardship, but a historical land use in the area. Urban dwellers in Bissau also engage in other subsistence oriented activities, such as kitchen gardens and animal husbandry. The most common animals kept are chicken and pigs and the latter being sold more often than the former. Various types of vegetables are grown and some of it is targeted for the market. Women who are increasingly engaged in this activity are taking a lead in income generation in many households and this has improved their livelihoods in the household and the community at large (Lourenco-Lindell, 1997).

According to Pryer and Crook (1998) in the past urban agriculture was illegal in cities and towns in Zimbabwe. It was often criticized for causing a drying up of the urban water supply and for causing soil erosion. In a report by Bowyer-Bower and Tengbeh (1997) on environmental implications of urban agriculture in Harare, they cited changes in the hydrological regime in the area, vegetation change, chemical pollution resulting in eutrophication, crop toxicity and poor water quality and soil erosion resulting in increased costs maintaining urban infrastructure. In Africa, urban farming is often against urban land-use regulations, or banned for reasons of perceived negative environmental effects under existing environmental protection legislation (Drakakis-Smith, Bowyer-Bower, and Tevera, 1995). Municipal authorities in Zimbabwe have used legislation (dating back to the early 1950s) to repeatedly destroy crops prior to being harvested (The Herald, 1982; 1985; 1986; 1989; 1990; 1991; 1994). However in times of severe food shortages such as in the face of adverse climatic conditions such as drought, hailstorms, cyclones, the authorities may choose to be temporarily lenient to the cultivators. Food shortages that have lately become a common experience in Zimbabwe due to persistent droughts, economic factors, increased rural urban migration and other factors, more and more urban families have ventured into cultivating crops for their own use and for selling. In Harare some urban farmers have formed co-operatives to contribute money towards buying inputs such as seed and fertilizer (Herald, 2009). It would appear that urban farming has been legitimized and the Government has become supportive of peri-urban farming. Peri-urban field days have been

held in Harare and these have been supported by the Government (Herald, 2009). Urban agriculture has emerged globally as an important socio-economic activity among city residents, particularly in developing countries. The move by the Government to support urban agriculture is a positive way of enlarging the capacity of human settlements to become sustainable.

Urban farming has also proved to be important as a tool in waste management. Cities represent a completely artificial environment; they absorb vast quantities of resources from surrounding areas and create high concentrations of wastes to be disposed of. Urban farming helps in reusing of some of these wastes which are degradable and are used as manure. Realisation of the economic value of certain wastes promotes reuse, recovery and recycling. According to Middleton (1995) reusing a product, as opposed to discarding it obviously makes environmental sense, and the advantages of waste recovery and recycling have also long been recognized. Reuse is higher on the European Union's hierarchy of treatment techniques for solid wastes.

Research Methodology

The study was carried out in two cities of Zimbabwe, namely Gweru and Masvingo, with a total of 51 participants. A descriptive survey was used to collect quantitative and qualitative data using face to face interviews, questionnaires and direct observation schedules as research instruments. Questionnaire schedules were administered to 24 urban farmers who were selected on the basis of their socio-economic attributes, ranging from low income residential area (high density), medium income residential (medium density) to high income residential area (low density). A ratio of 5:4:3 was adopted by researchers to select participants for questionnaires who consisted of 12 urban farmers from each city. This way of selection was done taking into consideration population densities of the respective suburbs. Thus the procedure ensured that all participants had an equal chance of being included in the study (Denzin, 1978). Thus generalizability and external validity of data was ensured.

Questionnaires were quite appropriate as respondents were regarded as competent to complete them with minimum assistance from the researcher. Reliability was ensured because the questionnaire was pre-tested on two peri-urban farmers who then helped in editing questions in terms of wording and length. Final selection of participants was done on site since the research was done while farming operations were in progress, both during the week and on weekends.

A total of 15 face to face interviews were done to on site cultivators using the mother tongue and English technical terms where necessary. According to Tuckman (1998) qualitative research is done in a natural setting and the researcher is the key data-collection instrument this type of research methodology is based on the

fundamental beliefs that events must be studied in natural settings, that is be field based and that events cannot be understood unless one understands how they are perceived and interpreted by the people who participated in them. The interviews were considered suitable in this study in order to determine respondents' opinions, attitudes or trends of beliefs. This consisted of both closed and open-ended question items to allow elaboration on aspects from the questionnaire. Thus the interview served as a complementary data collection instrument. If the interviewer is skillful, Best and Kahn (1993), believe the interview can be regarded as a data gathering device which is often superior to others as people are more willing to talk than to write and confidential information may be obtained from respondents who might be reluctant to put it in writing.

Two environmental officers from both cities and 4 non-cultivating urban residents were also interviewed to give their views on urban agriculture. A total of 6 urban farmers were observed on site, while data concerning nature of their fields was captured by the researcher. The use of questionnaires, interviews and observation guide ensured triangulation of data collection, when the researcher uses multiple sources of data, different investigators and research methodologies to improve validity of data (Descombe, 1998).

Data Analysis

Data from the questionnaires, interviews and observations was analysed and then presented as numbers, percentages as well as in descriptive form.

RESULTS AND DISCUSSIONS

All 24 questionnaires given to the urban farmers were returned with most of them having completed all sections of the schedule. Responses throughout the questionnaire indicated that respondents did complete the survey in good faith.

There were approximately 4% more female respondents than males. The gender difference was not significant, indicating that both sexes were equally involved in urban farming. More than 80% of them were between the ages of 31 and 50 average range was in the 31-40 years category. The majority of the respondents (79%) indicated that they were married, (4%) were single, 13% were widowed and 4% were divorced. With regard to levels of education of the farmers, results indicated that 38% of them had Advanced level qualifications, 42% had Ordinary levels, 8% had reached Junior certificate level, 4% Grade Seven and 8% Standard Six. Their professional qualifications showed that 46% had degrees, 13% diplomas, 29% certificates and only 13% had no professional qualifications. Despite the sample being constituted by people with high levels of education and professional people, their involvement in urban farming was not disturbing. 97% of them were professionals ranging from

office workers, teachers, nurses to University Lecturers. The reason for involvement in urban agriculture was cited during interviews by most respondents as to supplement meager salaries. This view is in agreement with Miller's (1982) findings that urban people are forced to venture into urban farming where the need to subsidize their salaries/incomes. This is why of those having an income indicated that their salaries were below the poverty datum line. Most of the respondents (50%) had stayed in town for 16+ years. Although the survey was made up of some people who had just migrated from rural areas onto town (0-5 years), they supported the importance of urban farming and said that it improved their livelihoods and that it should not be shunned.

Related to the type of manure used by the farmers, the majority of them (83%) said they used inorganic fertilizers in their plots. The use of inorganic fertilizers by the urban farmers is due to the non-availability and high cost of artificial fertilizers. However, 17% of them indicated that they used compost manure instead. This practice could suggest that although most farmers were still using fertilizers, there was a general shift towards use of organic manure. This was also true of what farmers said that they manage their crops residue mostly by composting. Lungu (1999) argues that organic matter binds primary soil particles into stable aggregates, creating good soil tilth and reducing compaction, enhances plant nutrient and water retention unlike artificial fertilizers. The application of large amounts of chemical fertilizers to improve soil fertility can hardly ever increase yields to levels obtained on soils with many years of organic manure application.

The study found that most urban farmers (83%) had not encountered any problems with other urban farmers. Of those who indicated that they had problems (17%), they cited ownership and demarcation of plots as contentious issues. They said the problem of ownership was resolved by giving preference to the farmer who had occupied the plot first and subsequently used it for a long time. In the case of boundary disputes, the farmers had to agree and sometimes divide the field equally. These findings were consistent with what Hill (1984) found that urban farmers were often in state of land disputes. A few number of farmers (10%) who had been farming in urban areas for more than 15 years and above had from the period 1990 to 2004 had their crops slashed by the City Council. The reason of the shift to not slashing was due to many factors such as drought, the economic situation in the country and the call by the President of the country for urban dwellers to grow crops on open unutilized spaces (Herald, 2007).

Most of the respondents (88%), had fixed plots, while 12% of them were migratory. These could be some of the farmers who abandon their plots for a year or so and when they come back; they find the plots occupied by a different farmer. Most of the farmers (92%) carried out their activities on open spaces, 4% on parks and 4% on vleis (wetlands). This means that parks which had been set aside by the City Fathers for people to enjoy during leisure time are being destroyed to make way for farming. These findings were in concurrence with what one of

the Environmental Officers said that farmers carry out their activities on open spaces such as play centers for children, some encroach school yards, cemeteries and civic parks near the central business district, thereby destroying the aesthetic value of places.

A majority of the farmers had few and small plots. Fifty eight percent (58%) of them had single plots, 24% had 2 plots, and 9% had 3 plots while 9% had 4 plots. The plots were generally small, with most of them (71%) being less than 1 hectare in size and 29% of between 1-5 hectares. These findings were in agreement with Leppard cited in Herald (2009) research that in UK, during the First and Second world wars, small plots set aside by council and resident associations were placed under cultivation. From the suggestions given by the respondents, this data could help Municipal Authorities to halt the present uncontrolled and haphazard self allocation of plots. Results from the study showed that 92% of the farmers had allocated plots on their own, while a paltry 8% said they had been given by the government. Findings from the study indicated that these urban farmers were using modern forms of agriculture like use of certified seeds (96%) and spraying pests (90%). It was interesting to note that quite a number of them (4%) were using seeds from previous harvest and (10%) were using ashes to control pests, a practice Altieri (1998) argues that it ensures conservation farming. Most farmers (60%) indicated that they used simple farming implements such as hoes, shovels, spades and mattocks to prepare land for farming. Very few of them (2%) said they sometimes used ox-drawn ploughs. The usage of simple farm implements resulted in conservation as there is minimum soil disturbances as there would be no ploughing and harrowing. Some farmers were observed sowing seeds without ploughing. Although farmers did this practice unknowingly, this way the resource base is conserved and enhanced for future generations (sustainable agriculture).

On what urban agriculture involves, the majority of the respondents (92%) were of the opinion that urban agriculture did not cause land degradation. Instead they believed that since farmers use zero tillage, soil structure was maintained and thus soil conserved. However, most of them acknowledged the fact that urban farmers need advice from AREX workers so as to conserve the resource base. The study also showed that urban farming helps in treatment of waste. On interviewing one of the environmentalist said,

Challenges in waste and garbage management could be solved, and thus urban agriculture can help contain the garbage as it might be used to fertilize farming areas (from an interview)

These findings were in agreement with those by Miller (1982) that urban farming plays a pivotal role in waste management.

Most of the respondents (80%) indicated that land usage in town is maximized through urban farming. They also urged City Fathers to lease open spaces for farming. Non- cultivators interviewed indicated that urban farming

encourages lawlessness in cities. They cited that urban farming deprived residents of their open spaces and that the fields of maize provided cover for thieves and other crimes. A majority of them (60%) agreed that urban agriculture causes water pollution. One of the non-cultivators argued that due to urban farming there was evidence of eutrophication and siltation of rivers. Observations of rivers near the plots for example Mucheke and Shagashe rivers in Masvingo revealed that eutrophication was apparent as these were clogged with water weeds and hyacinth. These results were in agreement with those established by Loomis and Connor (1992), who argued that urban farming results in fertilization of aquatic ecosystems leading to sprouting of algae. Urban farmers sometimes over-apply artificial fertilizers in an attempt to maximize on yields per unit.

In relation to the types of crops grown, maize was on top of the list, maybe because it is the staple food in Zimbabwe. Crops such as sweet potatoes, roundnuts, sugar beans and groundnuts were also mentioned. Further questioning on how these crops were grown on such small pieces of land, most of the farmers said they do intercropping and crop rotation was also employed to revive the soils. One of the reasons cited by a farmer from high density area was of the opinion that it maximizes the use of land since he could harvest many crops within a small piece of land. Another farmer echoed the same sentiments,

by growing many crops within one field, I do not need a large piece of land to farm. With this small piece of plot, I can manage it efficiently even when I'm alone (from an interview).

These views were in agreement with the assertion by Altieri (1998) that in multi-cropping, total yields per hectare are often higher than sole crop yields. Some respondents said that intercropping of maize and legumes such as beans would encourage efficient use of resources, conserve soil and provide insurance against crop failure. The intercropping with legumes is recommended as these nitrogen fixing plants are important in providing the mineral to the soil. The low nitrogen supplying power of soils may result in large additions of nitrogen to soils as fertilizers to meet the nitrogen needs of high yielding non-leguminous crops. The use of nitrogen fertilizers may result in adding more nitrogen than crops and microorganisms in the soils can use and thereby leading to increased potential for groundwater pollution and eutrophication of rivers. These urban dwellers seem to be enlightened about the importance of legumes as they applied this practice. Some argued that if one crop fails early in the growing season, the other crops may compensate for the loss. Observations done around the plots revealed that maize plots were mostly intercropped with beans, groundnuts and sweet potatoes. This was true for both low and high density suburbs. One farmer said,

I have two pieces of land and in both plots I grow four or more crops in a season. However maize is my main crop (from an interview).

Results from the interviews with the environmentalists and non-cultivators revealed that urban farming was done haphazardly. Some cited that farming was done near streams or rivers, the central business district (CBD), as well as near infrastructures such as railways. To alleviate environmental problems, they suggested the need for deployment of AREX officials in these farming areas who according to them would equip farmers with proper methods of farming that do not destroy the environment. The non-cultivators also cited the increase in tree loss in the areas where cultivation was done. It was noted though that tree felling was undertaken largely by residents for the supply of fuel wood for urban households, either for home use or for sale. This was due to the daily load shedding of electricity in the urban areas. However, it was interesting to note that in both cities there were Mission Statements which focused on the conservation of the environment. One of the cities cited that they had a parks section that dealt with specifically environmental issues. The activities of this parks section were guided by the following mission statement;

To create and maintain, the beauty, value of the town and pleasant environment for the benefit of the local community and visitors
(from an interview.)

This shows therefore that open spaces which are left vacant by the City Fathers for aesthetic values, are being destroyed to make way for urban farming. To control the haphazard farming and its negative effects on the environment, the Environmental Officers suggested that farming be done in the peri-urban, far away from the CBD and these farmers be given fixed plots and be known by the council for environmental auditing purposes. City councils can also generate revenue from leasing the land to those interested in urban farming.

However, some non-cultivators acknowledged that urban farming enhances food security for the urban dwellers. In a similar view, one of the city council environmentalists echoed the same sentiments when he said that urban farming improves food availability for the people. He said most people including politicians do support urban agriculture but cautioned that the practice should be done in an orderly manner. According to Miller (1982) urban farming enhances the quality of life of the people who are mainly low income earners and that it was also part of the current economic transformation. To avert an environmental crisis, council officials suggested that the Ministry of Lands and Agriculture should allow AREX officials to work with the city councils and by-laws needed to be changed to suit current environmental issues.

All of the urban farmers agreed that city councils should lease open spaces to people who want to carry out urban farming, until a time they want the land for development. These farmers also wanted the Government to provide them with loans to buy inputs such as seeds and fertilizer. The argued that the prices of inputs were very high and

this is why they sometimes resort to using seeds from the previous harvest and manure from compost. According to the Sunday Mail (2010) a 10kg bag of maize seed costs between US\$20 and US\$30, while a bag of fertilizer costs between US\$30 and US\$40. These prices are considered extremely high by farmers compared to regional trends. In Malawi, for example, a 50kg bag of fertilizer costs US\$5 or less, while in South Africa, the price is US\$15 (Sunday Mail, 2010). This has seen farmers generally avoiding inputs from retail shops because the prices are shockingly prohibitive. The food and agricultural organization (FAO, 1995) reiterates this point when they say that for urban farming to prosper there is need for both financial and material support from the Government. Generally farmers supported urban farming by saying that it improved their livelihoods as it provides crops with high nutritional value such as groundnuts, beans and maize, which sometimes they would not be able to afford to buy with their low salaries.

CONCLUSIONS

Based on the above research findings the paper concludes that urban farming is a worthwhile activity which cannot be ignored in the context of improving people's livelihoods and as a tool in waste management. What comes out of this study is that there is now a growing interest in urban farming, especially among professionals. The study established that there is need for empowerment of urban farmers by providing farmers with inputs at their doorsteps at affordable prices. This in addition to their efforts in terms of labour, urban farming will play a significant role in promoting food security, health, nutrition and improving the general economy of the urban populace. Overall, this study articulates the importance and relevance of clear policy framework that legalizes urban farming from the responsible stakeholders. Clearly, issues raised by urban farmers in this study suggest the need for careful thought and reflection by the city councils in the delivery of urban farming. However, it was noted that in the future, urban farming need to be concentrated in peri-urban areas, far away from the central business district. It is only when urban farming is legalized and institutionalized that it can become successfully operational. At the moment concerned people and authorities argue that there is more of environmental distraction than sustainability. However with economically viable, environmentally sound, and culturally acceptable integration of efficient conservation farming techniques, an urban agricultural environment can significantly contribute to a sustainable future.

RECOMMENDATIONS

1. There is great need to sensitize farmers on the urgency of proper soil conservation strategies such as use of organic manure, contour ridges and zero tillage.
2. Further research should include the economic and social impact of urban agriculture to the city councils' waste management in view of current harsh economic conditions as well as climatic change.

3. Identification of approved cultivators should be done and these should be given some degree of security of land tenure. City councils should have a proper register of urban farmers and these should be given fixed plots. This would help when it comes to accountability by the responsible authorities.
4. Thus the Ministry of Agriculture need to liaise with the Department of Agricultural Extension services and city councils, in revisiting policies that incorporate urban farming in mainstream agriculture.
5. There is need for environmental conservation strategies that are non-degrading and which do not contribute to climate change for example ridging and furrowing for sweet potatoes and rough-ploughing for maize.
6. Agricultural extension services should be provided to the urban farmers. Farmers would be advised on good agricultural practices, suitable sites for farming, suitable crops, methods of cultivation, and soil conservation techniques.

REFERENCES

- Altieri, M.A. (1998). *Agroecology: The Science of Sustainable Agriculture*. London, Intermediate Technology Publications.
- Best, J.W. and Khan, J.V. (1993). *Research in Education*. Boston, Allyn and Bacon.
- Blumenthal, F. (2001). *Sustainable Agriculture in Developing Countries*. zero@mweb.co.zw.
- Bowyer-Bower, T.A.S. (1997). Conflicts for Resolutions and Suggestions for Consensus: Legalizing Urban Agriculture in Harare. *Geographical Journal of Zimbabwe*, No.28, pp53-58.
- Bowyer-Bower, T.A.S. and Tengbeh, G.T. (1997). Environmental implications of (illegal) urban agriculture in Harare: A preliminary report of field research. (1994/95) *Geographical Journal of Zimbabwe*, No.28, pp7-24.
- Denzin, N.K. (1978). *The Research Act*. 2nd Ed. Chicago, Prentice Hall.
- Descombe, M. (1998) *A Good Research Guide for Small Scale Research Projects*. Burchingham Open University Press.
- Drakakis-Smith, D., Bowyer-Bower, T. and Tevera, D. (1995) 'Urban poverty and urban agriculture: an overview of the linkages in Harare', *Habitat International*, Vol.19, No.2, pp183-193
- Food And Agricultural Organisation (FAO) (1995) *Understanding Farmers Communication Networks: An Experience in the Philippines*. Case Study 14 FAO Rome.
- Greenline (2001) *Zimbabwe's Leading Environmental Magazine*. No 21, December
- Herald (1982; 1985; 1986;1989;1990;1991; 1994; 2007; 2009) *Zimbabwe's Leading Newspaper*
- Hill, B.E (1984) *The Common Agricultural Policy, Past, Present and Future*. London, Methuen and Co Ltd.
- Loomis, R.S. and Connor, D.J. (1992) *Crop Ecology: Productivity and Management in Agricultural Systems*. Cambridge, Cambridge University Press.
- Lourenco-Lindell (1997) 'Food for the poor, food for the city: The role of urban agriculture in Bissau', *Geographical Journal of Zimbabwe*, No 28, pp39-48.

- Lungu, O.I.M (1999) Organic Matter, Soil Fertility and Traditional Cropping Systems in Zambia in Devlin, J.F and Zettel, T. (eds) Ecoagriculture: Initiatives in Eastern and Southern Africa. Harare, Weaver Press.
- Mazambani, D. (1982) 'Peri-urban cultivation within greater Harare', Zimbabwe Science News, Vol.16,No.6,pp.134-138.
- Middleton, N. (1995) The Global Casino: An Introduction to Environmental Issues. New York, oxford University Press.
- Miller, B. (1982) Zimbabwe Agricultural and Economic Review. Harare, Mardon Printers.
- Pryer, J. and Crook, N. (1998) Cities of Hunger. Oxford, Oxfam.
- Rogerson, C.M. (1992) 'Feeding Africa's cities: the role and potential for urban agriculture', Africa Insight, Vol.22,No.4,pp299-234.
- Sunday Mail (2010) Zimbabwe's weekly Newspaper
- Tuckman, B.W. (1998) Conducting Educational Research. New York, Harcourt.

AUTHORS:

- Tshuma Doreen T (Curriculum studies Department, Lecturer, Great Zimbabwe University)
- Mashoko Dominic (Curriculum Studies Department, Lecturer, Great Zimbabwe University)