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HOME GARDENS IN MSUNDUZA

– Urban agriculture as a contribution to food
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MSUNDUZAN KOTIPUUTARHAT- urbaani viljely ruokaturvan edistäjänä

Ruokaturva on ympäri maailmaa muodostunut suureksi haasteeksi ruoan hintojen noustessa ja väestön lisääntyessä. Etenkin kehittyvien maiden asukkailla on vaikeuksia turvata riittävä ravinnon saanti. Kaupungistuminen on kiihtynyt afrikkalaisissa kaupungeissa mikä on tehnyt ruokaturvasta yhä tärkeämmän aiheen kehitystyössä kaupunkialueilla.

Urbaania viljelyä on harjoitettu tuhansia vuosia ja se on yksi keino ruokaturvan saavuttamiseksi kaupungeissa. Urbanilla viljelyllä on sosiaalisia, taloudellisia sekä ympäristöllisiä ulottuvuuksia ja siksi se on kestävä ratkaisu urbanin toimeentulon turvaamiseksi. Urbaania viljelyä rajoittavia tekijöitä ovat muun muassa maanomistus kysymykset, saastunut maaperä ja terveysriskit. Eri toimijoiden välisellä yhteistyöllä ja esimerkiksi permakulttuurisilla ratkaisuilla ongelmia voidaan vähentää.

Opinnäytetyö koostuu 34 kotipuutarhahaastattelusta, jotka tehtiin kotitalouksissa Swazimaassa. Swazimaa on pieni, kahden muun valtion ympäröimä maa eteläisessä Afrikassa. Väkiluku maassa on noin 1,3 miljoonaa ja se on maailman viimeinen täysi monarkia. Haastattelut toteutettiin maan pääkaupungin, Mbabanen, epävirallisella asuinalueella, Msunduzan kaupunginosassa. Turun Ammattikorkeakoulu on toiminut alueella vuodesta 2004 yhtenä partnerina ja toteuttanut kehitysyhteistyötä paikallisen Pelastusarmeijan ja muiden toimijoiden kanssa. Kehitysyhteistyö on kohdistunut kuivasanitaatioon sekä ympäristöterveyteen.

Opinnäytetyön tavoitteena oli selvittää millaista kotiviljelyä alueella harjoitetaan, millaisia edellytyksiä alueella on kotiviljelylle, millainen merkitys kotiviljelyllä on ja kuinka asukkaat hyötyvät siitä. Haastatteluilla selvitettiin myös millaisia viljelytekniikoita kotipuutarhoissa käytetään ja kuinka asukkaat suhtautuvat ihmisperäisen lannoitteen käyttöön puutarhoissaan.

Tuloksista selvisi että haastatellut kotitaloudet harjoittavat kotiviljelyä lähinnä oman talouden käyttöön, ei niinkään myyntiin. Suurin osa haastatelluista mainitsi sekä terveys- että taloudelliset hyödyt kotiviljelyn syyksi ja kotiviljely oli tärkeä osa kotitalouksien selviytymisstrategiaa. Suurin ongelma kotiviljelyyn liittyen oli tilan puute, mikä on yleinen ongelma kaupunkialueilla.

ASIASANAT: urbaani viljely, ruokaturva, permakulttuuri, Swazimaa

BACHELOR'S THESIS | ABSTRACT

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World is facing a fundamental food security challenge, due the increasing food prices and population. Especially people in developing countries are struggling to feed themselves. In the recent decades, urbanization rates have been increasing in the countries of Africa and food security has become even bigger issue in development work in the urban areas.

Urban agriculture has been practiced thousands of years and it can be strategy for attaining sustainable food security in the cities. Urban agriculture has its dimensions of social, economic and environmental impacts and is therefore profitable strategy for sustainable, urban livelihoods. There are some limitations which can have impact on urban agriculture such landownership issues, polluted soils and health hazards which are solvable by Permacultural methods and other solutions.

This thesis consists of 34 household interviews in Msunduzi, Swaziland, about home gardening. Swaziland is small landlocked country in southern Africa with its 1, 3 million inhabitants and is the last full monarchy in the world. Interviews were conducted in Msunduzi which is the informal part of Mbabane, the capital of Swaziland. Turku University of Applied Sciences, local actors and other partners have been implementing development cooperation in Msunduzi since the year 2002, targeting dry sanitation and environmental health.

The object of the thesis was to find out what kind of urban agriculture is practiced in the area, what kind of inputs and resources there are for urban agriculture and how home gardeners are benefitting from urban food production. It was also found out what kind of techniques are used in the home gardens and how people are adopting the idea of using human based waste as fertilizer.

The results showed that interviewed households were practicing urban agriculture in the means of household consumption not for commercial purposes. Most of the interviewees mentioned both health and economic benefits and it came up that it is important coping strategy for many households. The most significant problem in the area was lack of space which is normal in urban settlements.

KEYWORDS:

Urban agriculture, food security, Permaculture, Swaziland

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1 Introduction

The idea of this thesis emerged when I was doing my practical training period in Msunduza the year 2009. The initial research idea was connected with land use and historical development, but lack of information sources and a need for closer study about home gardening changed the subject of the research.

Home gardening is one of the main objects in the dry sanitation project which have been implemented in the area since 2007. Gardening has been practised in the area for a long time and some training about gardening has been organized by the development projects. Previous researches made in Msunduza have shown that urban agriculture exists in the area but is relatively minor. The object of this research was to find out how people, who are practicing home gardening, are benefitting from it and what kind of experiences they have.

The research is based on semi structured interviews which were conducted in Msunduza the year 2009. The results were analyzed during autumn 2010 and spring 2011. Chapters 2-4 are shortly representing the theory of urbanization, the dilemma of expanding cities, urban agriculture and principle of Permaculture. Chapter 5 is introducing the research area. Chapters 6-8 are addressing the purpose and methods of the research and actual results with conclusion and future prospects.

My own interest about urban agriculture grew when I observed that residents of Msunduza are really practicing gardening in their small plots. Also the local Permaculture expert Bhekie Ngobese inspired me about organic gardening and especially about Permaculture by his own work. He helped me to construct the interviews and implement organic gardening workshop for the community members. I also want to address my compliments to the other local project workers, who were of big assistance during the interviews and getting familiar with the culture of Swaziland.

2 Development attempts in the urban settlements

2.1 From rural to urban settlements

Many sources have stated that urbanization in Africa has been relatively slow still in the 20th century compared with other continents in the world. As shown in the Figure 1, recent development in urbanization rates in Africa are showing rapid rise and it is estimated that sometime between 2020 and 2030, 50 to 60 per cent of African population, which means over 500 million, will live in the urban areas. As urbanization makes progress, the locus of poverty issues is slowly moving from rural to urban settlements. (Ambrose-Oji, 2009, 2)

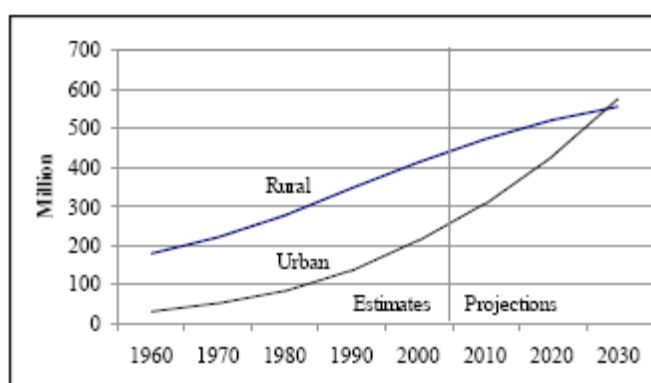


Figure 1: Urban and Rural Population in Sub-Saharan Africa, 1960-2030

(Source: Cush & Frayne 2009, 21)

Challenges like physical dualism and informal sectors are denouncing cities in developing countries but at the same time cities can create better wellbeing through closeness of services and challenges in economic structure. On the other hand, also distress and crimes are concentrating in the cities (Seppänen 2007, 206).

Swift and Hamilton (2001, 75) are pointing out that as late as in the 1980's it was assumed that urban areas were usually better off in terms of food security than rural areas. Food security in cities was ignored until the 1990's when researchers started to notice that people living in the cities have similar problems considering food security. According to Swift and Hamilton (2001, 75)

there are still some key differences between urban and rural food security issues; The main reason of urban food security is vulnerability to changes in food prices and salaries and since urban people spend most of their incomes on food, urban poverty translates quickly into food insecurity. Also Stern (2008, foreword V) points out the need of importance of development in food supply:

“Urban food supplies are not only an important and central policy issue, but in some countries they are the central policy issue.”

In addition the changes in food security challenges listed above Pretty and Hine (2001, 9) mention that increasing urbanization means that people will likely adopt a new kind of diet, particularly consume more meat. Also the media promotes western style food and all over spreading fast food restaurants are promoting the model of new diet which might not be healthy.

Seppänen mentions (2007, 207-208), in spite of all the problems and threats that rapid urbanization can cause, researchers have also reminded that in the urban areas of developing countries the initiative and survival skills of the people can even improve. The improvement of initiative develops when the disadvantaged learn how to unionize and earn one's keep by themselves. Also Mougeot (2005, 2) mentions that even though urban citizens might suffer from low living standards, cities are centres of information, ingenuity and collaboration which can be a useful tool for positive development activities and empowerment.

2.2 Needs of urban development

There are various challenges in the development planning and work in the urban area. Myllylä (2009, 106) is emphasizing that urban slums possess a multitude of socio-economic and environmental problems, which are still underestimated. Urban population living in the slums was in 2001, 61 per cent in Africa and will be rising when urbanization accelerates (Mougeot 2005, 1). Therefore development planning and activities in the cities become more relevant. Challenges might be different from those in rural areas but fundamentally the needs of people don't change. New urban settlements and

adaptation of old urban structures for growing population requires innovative planning and adaption of old knowledge to fit in new environment.

The participatory approach is vital, when planned and implemented different kind of development projects in the urban areas. There are no specialized methods for urban and rural areas, whereas the same principles can be used in both cases. According to Meares (1999, 92) participatory approach is seeking people's values and making those values to explicit to these people and their partners in the project. Social learning and participatory approach between the projects and farmers has been also a key to success in sustainable agriculture projects (Pretty & Hine 2001, 16).

The participatory approach is important in the urban areas, since people live close to each others and all actions of individuals or certain community can have effect on the whole community. In the research area for example, one leaking toilet tank in Msunduzu Township can contaminate the water source, where other residents get their drinking water, which of course is causing health problems.

Meares is asking (1999, 90): "*what combination of elements brings about long-lasting change?*" This question of sustainability should be made in the context of every development project. Meares is presenting the model for planning urban agricultural projects, which is based on common principles, known in every sector of the development work: "the interdependence of the land – and lifescape, full participation of intended beneficiaries, a planning and evaluation process rooted in the community's values and a method called "passing on the gift", designed that families and communities maintain the project through practical care and sharing." (Meares 1999, 91.)

Participatory methods were also used in Kampala case which is represented in the book of Healthy city harvest: Generating evidence to guide policy on urban agriculture. Cole, Grace and Diamond (2008, 38) mention that the benefits of the participatory approach are expediency and ethics. From the side of development theories, the participatory approach is suggested to be more

efficient than top-down implementation and it creates social capital and empowerment. (Cole et al. 2008, 38.)

Needs of urban areas are getting more complex and as Ambrose –Oji (2009, 4) mentions that urban agriculture can be an important tool for vulnerable transition from rural environment to urban settlements and offer a tool for socio-economic household adjustment to the urbanization process.

3 Urban agriculture

3.1 Urban agriculture in Africa

International Development research Center has defined urban agriculture as follows (see Mougeot 2005, 2):

“UA (Urban Agriculture) is an industry located within (intra-urban) or on the fringe (peri-urban) of a town, an urban centre, a city or metropolis, which grows or raises, processes and distributes a diversity of food and non-food products, (re-)using mainly human and material resources, inputs and services found in and around that urban area, and in turn supplying human and material resources, outputs and services largely to that urban area.”

The network of Urban Harvest is defining that urban agriculture is not only the maintenance of farms and gardens in an urban environment but can include livestock raising, water management and organic waste management. The network mentions also that urban agriculture has been practised in ancient civilizations as a way of life and now in modern times urban agriculture has been understood as a potential tool for supporting better health, income and livelihoods.

According to Mougeot (1999a, 15) urban food production increased enormously during the past decades as a response to insufficient, inadequate, unreliable and unaffordable food supplies from rural and foreign sources. The Urban Harvest network is also mentioning that already more than 800 million people are employed and getting incomes from urban and peri-urban agriculture and

that number of people related to urban food production will rise in the near future. (Urban harvest, Urban and peri-urban agriculture.)

Especially in African cities, studies from the 1980s and the 1990s show that participation in urban agriculture increased and case studies proved that it had become a major livelihood strategy for poor households and newly urbanized people. Most commonly cultivated crops are leafy vegetables and maize. (Crush et al. 2010, 7.) 2008-2009 research conducted in 11 Southern African cities showed that average a fifth (22 %) of the surveyed household in the poorest areas of the cities were producing some of their own food. Percentages were varying in side the region quite much, for example in Cape Town (South Africa) 5 %, Manzini (Swaziland) 11 %, Maputo (Mozambique) 23 % and Harare (Zimbabwe) 60%. (Crush et al. 2010, 14.)

Urban food agriculture has been paid attention only in the recent decades but it has been practised all around the world as long as cities have existed. Lee-Smith and Cole (2008, 3) are reminding that urban agriculture has been practised over centuries and not only in the poorest countries but in wealthy ones as well. They (Lee-Smith & Cole 2008, 5) also mentions that food production has been taking place in the cities since the dawn of human history and the separation between human settlements and food production has been a result of industrialization of agriculture. In addition Swift and Hamilton (2001, 77) represent that urban farming does not tend to be done by the poorest families or the most recent immigrants because they usually don't have access to land. Urban farmers are mostly women and urban food production contributes to household consumption, only occasionally to the markets (Swift and Hamilton 2001, 77).

Three different main groups of urban farmers can be found. The first group includes those who are members of the lowest socio-economic stratum and are cultivating because of the absolute need. The second group are those who produce food because they want to preserve their standard of living also during the inflationary times, crisis and reduces vulnerability to the possible breakdown of formal food channels. The third group which has been observed are small

scale entrepreneurs who are practising urban agriculture just for sale not for home consumption. (Crush et al. 2010, 10-11.)

3.2 Previous research made about urban agriculture

According Mougéot (1999a, 16) surveys on urban food production date back to 1950s when French geographers started to work in West Africa. Ellis and Sumberg (1998, 215) are mentioning that the number of research studies has been carried out in sub-Saharan cities since mid-1970s to the early 1990s, which has increased knowledge about the reasons and forces why residents of cities have been practising agriculture.

The first book, "Cities Feeding People", about urban agriculture was published by International Development Research Institute in 1994 and the results of the research made for the book, were startling and surprisingly consistent. After "Cities Feeding People" several other studies followed and year 1996 United Nations published the encyclopaedic volume on urban agriculture (Lee-Smith & Cole 2008, 8.)

There are many researches and other sources of information about urban agriculture especially on the Internet. Many organizations, from grass root level till international, multinational have made research about urban agriculture on many levels and from different kind of perspectives.

Institutions like Food and Agriculture Organization of United Nations (FAO), International Food Policy Research Institute (IFPRI), World Bank, World's Food Program (WFP), United Nations Population Fund (UNFPA), The United Nations Agency For Human Settlements (UN-HABITAT), United Nations Development Program (UNDP) are offering diverse sources of information in the forms of maps, statistics, reports, other publications etc. These big institutions have played major role specially when determining the fundamental terms concerning the urban livelihoods. Although in the case of urban agriculture, long before international agencies recognized urban food production, the governments of the South have been its main promoters (Mougéot 1999a, 18).

3.3 Benefits and problems of urban agriculture

Mougeot (1999a,16) mentions that urban agriculture has shifted from scientific curiosity to urban policy issue and a development tool in the same way as for example informal employment in the 1960s and 1970s. According to them, urban agriculture is a new coping strategy, the way people feed themselves in the cities. Urban agriculture makes fresh and nutritious food more readily accessible to residents of growing cities, where people have less time to prepare their own meals (Mougeot 2005, 26). Food and Agriculture Organization of United Nations', Right to Food (2005) is mentioning that urban food production and distribution should not be encouraged only as a coping strategy for crisis situations but also as of a part of a long term strategy for food security.

Although it has been acknowledged that urban home gardens exist and it is a profitable way to improve food security it is not recorded what the scale of food production in urban gardens is. Though the assumption is that kitchen and home gardens can be highly productive and diverse. Productivity is typically much higher per m² than field crops. (Pretty & Hine 2001, 98.)

As mentioned above urban food production has positive impact on household's nutritional level, but there are also other benefits which can be gained. Studies about hazards and problems in urban food production have also been made.

3.3.1 Social and health aspects

In addition to the measurable benefits of urban agriculture there are many qualitative benefits which cannot be measured or determined by numbers. The previous researches made about urban agriculture are showing some social and health (both physical and mental) benefits.

The former researches made in Sub-Saharan Africa have showed that families who are practising urban agriculture have been more food secure and eating more meals, maintaining more balanced diet year-around, their children are healthier and have a better nutritional status than in families who are not participating in urban food production (Mougeot 2005, 26). Moskow (1999, 77)

mentions some other social benefits of urban agriculture: sense of control of persons own life, aesthetic and therapeutic effects.

Social and economic issues are in many occasions related to each other. Especially for rural immigrants, urban agriculture can be important socio-economic coping strategy in the urbanization process (Ambrose-Oji 2009, 4). Ambrose-Oji (2009, 20) mentions that urban agriculture can be important to women who are seeking to maintain their cultural identity by growing and providing traditional food products for their households. Urban agriculture can also build social networks through farming, the self-worth, enjoyment and mental well-being, and the chance to use knowledge and skills.

In 1995, research about urban agriculture was conducted in Cuba, Havana. The research results were showing that gardener's sense of control in their lives was improving by the gardening and that it helped them to relax. Gardeners, who answered the questions, also mentioned that they get pleasure by spending time in their gardens, watching plants and being connected with nature. Some of these gardeners spoke about the importance of gardening to their health and social life. Also those residents who have moved from rural areas felt it important to continue their skills on agriculture in the city. (Moskow 1999, 80.) Except for greater food supply, Moskow (1999, 81) lists some community enhancements of urban agriculture, which were noticed in the Havana research; contributions to the whole nation, neighbourhood beautification and improved safety.

The same kind of social benefits were recorded in the research from Kampala, Uganda. Results showed that the stakeholders of the urban agriculture project considered many social benefits of urban agriculture; the benefits of physical labor, greening the city, self-esteem, community organizing and social capital. (Lee-Smith 2008, 26-27.)

3.3.2 Environmental aspects

In context of ensuring environmental sustainability in the future, United Nations Millennium Development Goals define that by the year 2020 there will be

significant improvement at least in the lives of 100 million slum dwellers (United Nations, Millennium Development Goals, 7D). Urban agriculture has its dimensions which can improve the state of the environment.

“The production of trees, shrubs, flowers and ornamental plants and food crops can beautify the city, cool its climate, curb erosion and absorb air pollution and odours.” (Mougeot 2005,12.) In addition to the better food security Meogeot (1999b, chapter 3.1) mentions some of the environmental and other benefits of urban agriculture: the productive use of urban open space, treatment and recovery of solid and liquid wastes, saving and generating incomes and employment and managing fresh water resources more effectively.

The need of few transportation and storage renders urban agriculture environmentally sound (Moskow 1999, 82). When food is produced locally, near the consumers, the time and energy used for purchasing the daily needs of the household reduces. Especially perishable products like leafy vegetables and dairy products get more affordable and keep fresh to the urban dweller when it is produced locally. When food is produced near, it is also eaten fresh, which enhances the nutritional value of it and also the need of packaging is reduced (Whitefield 2004, 27).

A big part of the urban waste consists of biodegradable waste and composting is a profitable way to handle it. In addition to waste recycling also nutrients can be recycled by composting the biodegradable household waste. Lee-Smith and Cole (2008, 6) are reminding that also human wastes have been used as a fertilizer for crop production and still are, for example big cities like Paris and London grew their vegetables in swamps or fields where human wastes were dumped. Mixed farming system, which includes crop production and animal husbandry, have been the basis of farming systems all over the world and usage of animal manure as a soil nutrient has been commonly practised. When human waste is composted, used and handled in the right way, it can be a source of a fertilizer. In addition waste recycling and reusing urban agriculture uses vacant land which would otherwise be used to garbage dumping and squatting (Del Rosario 2000 see Mougeot 2005, 12 according to).

Runge, Senauer, Pardey and Rosegrant (2003, 47) point out that one concern in agricultural needs for the future is the growing water shortage and the demand for irrigation water in developing countries. By the authors the demands of water for agricultural use is rising and will rise 13.4 percent till the year 2025, but actually the available water will rise only 4.4 percent. Therefore the usage of irrigation water should be made more effective. In the urban agriculture there are many possibilities to reduce the usage of water, recycle and re-use it, for example to harvest rainwater from the roofs and in some cases even to use waste water for irrigation.

In the case of Cuba it was also noticed that gardeners showed varying attachment to the environmentally friendly gardening methods and the reason was the variation of the skills in managing soil fertility and insect problems. Also the knowledge about composting and pest-control techniques was adding the enthusiasm about organic gardening. (Moskow 1999, 82.)

3.3.3 Economical aspects

Urban dwellers benefit from urban agriculture by growing their food and saving money because they don't have to purchase so much food from the markets. Annual savings can be even a correspondent to several months of a minimal salary. Also selling surplus harvest generates incomes which can be used to other basic needs. If the access to resources and services needed in cultivation exists, urban agriculture can build more self-reliant food supply systems but also be an integral component of income and employment strategy. (Mougeot 2005, 8.)

Poverty and food security are complicated phenomena which are strongly linked together. The research made about urban agriculture and household food security in Kampala, Uganda showed that there is a strong association between wealth and household food security. The findings showed that urban agriculture can have positive impact on urban poverty and household food insecurity. (Sebastian et al. 2008, 82.)

According to Drescher (1999, 74) the diversity of food and income resources are like buffer against household vulnerability. Home gardening creates that buffer in three ways: generates incomes, saves resources and creates a food supply. Drescher continues that home gardening is vital to understand household coping and survival strategies and thoroughly the effective design of food security strategies and the coping strategies for seasonal incomes and sustainability.

Studies from South Africa in the 1980s and in the 1990s showed that households which were producing some of their food were not only more food secure and had better nutritional status than non-farming households, but also could revenue and reduce monthly expenditure on food. Therefore these households could afford more to other basic household needs like health, education and clothing. (Crush et al. 2010, 8.)

3.3.4 Problems and restrictions

Urban agriculture has many benefits, but it has also shown that there are some potential risks and problems. Further in this paper certain problems of urban agriculture will be represented closer in the research results. The problems can be related to health, land ownership, agricultural inputs and resources.

Health risks are one of the biggest concerns when urban food production is taking place in the cities. Project results from Kampala suggested the most important health risks as follows:

“1. Bacteriological and toxic contamination from cultivation in wetlands due to poor sanitation and uncontrolled discharges from a variety of urban economic activities.

2. Bacteriological and toxic contamination from cultivation in areas where soil is polluted by garbage, run-off or other sources.

3. Bacteriological and toxic contamination of well water.

4. Transmission of disease from livestock to humans (zoonoses).

5. *Air pollution from industry and traffic.*

6. *Poor handling of waste and its use for farming (mixing of organic and inorganic)."*

(Cole et al. 2008, 27.)

An other remarkable problem in urban agriculture especially in African cities is landownership issues. The land which is used for cultivation is mainly informal and people who are practising gardening do not have legal access to it. In southern Africa, the most common means of accessing land are squatting, borrowing and user rights. (Crush et al. 2010, 8.) Insecure land tenure reduces residents' motivation to maintain soil fertile and keep plots aesthetic.

In addition there are some constraints which lead up to the low intensity use and abandonment of urban agricultural lands; Limited support services and access to productive resources (water, land etc.), lack of recognition by city authorities, official opposition or disinterest, lack of basic tools, low productivity and profitability. (Crush et al. 2010, 9.)

4 Permaculture solutions to the urban settlements

4.1 What is Permaculture?

Hemenway (2009, 5) is defining Permaculture as method which uses a set of principles and practices to design sustainable human settlements. According to him the word Permaculture is contraction of "permanent agriculture" and "permanent culture". The principles of Permaculture developed when two Australians, Bill Mollison and David Holmgren, in the end of the 1950s observed nature and indigenous cultures. Principles are based on the idea of mimic the nature when designing ecologically sound, productive landscapes. By understanding the natural ecosystems, which are almost always sustainable, also people can make their live more sustainable (Whitefield 2004, 3). Later on

Permaculture principles have been used also to other fields of planning such as designing buildings, energy and wastewater systems, villages and even in school curricula and business plans (Hemenway 2009,5). Permaculture methods can be used both in rural and urban areas and it can be practised as a subsistence farming or market-oriented (Madeley 2002, 43).

Madeley considers some principles of Permaculture and traditional systems: *"...nutrients were carefully recycled, the waste products of agriculture were fed to livestock, manure was put on land, and livestock carefully integrated with agriculture."* (Madeley 2002, 11.) By recycling the waste, resources return back into the system and reduce pollution.

4.2 What kind of solutions Permaculture offers to urban agriculture?

Hemenway (2009, 230) suggests that creating Permaculture home ecosystems in urban areas are similar to what could be used in rural areas, only strategies how to assemble and organize those techniques are different. Permaculture methods are aiming to create beneficial relationships which are minimizing the inputs, both of fossil fuels and human labor and maximize the outputs (Whitefield 2004, 49). Solutions from Permaculture principles are various, but especially practical solutions on the assets of home gardening can be used very effectively. It is serving the needs of people without degrading the natural environment. Once established, Permaculture system can be maintained using a minimum of materials, energy and labor.

Permaculture methods include techniques how to design garden by using the natural environment efficiently and using existing characters, how to build and maintain fertile soil, how to catch, conserve and use water and how to reduce harmful pests by natural way. Permaculture systems vary a lot but usually they involve the mix of trees, crops and the usage of mulches and integration of livestock and crops, the usage of green manures to protect and build fertile soils (Madeley 2002, 43). In addition what is the most important in urban settlements, Permaculture systems are space-saving, high-intensity design techniques (Hemenway 2009, 230).

Permaculture solutions and techniques are one way to sustainable agriculture and it has been attested that also in the urban environment sustainable techniques can improve the productivity of the land; For example in Cuba, the usage of sustainable techniques in home gardening have increased the total production from 4200t/year to 727,000 t/year (Pretty & Hine 2001, 98).

In the ideology of Permaculture, problems are transferred into opportunities and it is important to identify the strengths of the place where designing is implemented. Hemenway (2009, 230) emphasizes that great strength of the city is social capital which should be used as a resource also in urban home gardening; it can even be a solution to the dilemma of small space. Urban environment offers possibility to practise exchange economy within the community and therefore gain communal development and empowerment. Hemenway (2009, 231) reminds also that for thousands of years, food has been at the center of community creation and rituals of friendship, which makes neighbors trust each other.

4.3 Why Permaculture ideology is presented in this thesis?

The ideology of Permaculture methods is presented in this paper, because of its potential to urban agriculture solutions. Since urban environments can be very densely populated and vulnerable to environmental changes, Permaculture methods in urban agriculture are safer and more sustainable than modern cultivation techniques. In some parts of Africa (Botswana and Zimbabwe) Permaculture is already known and strong (Madeley 2002, 44) but in the research area it is not yet recognized, except a few members of the community. Even though Permaculture is not common knowledge yet, traditional systems both in northern and southern hemispheres have used all the principles of Permaculture, without putting a name on it (Madeley 2002, 11).

Permaculture, as a theory of how to design and maintain gardens, is a relatively new field, but as logical aggregate of simple principles put into words, it is used in this paper as solution to urban agriculture. Permaculture solutions are presented in this paper also because of affordability. Most of the residents cannot afford expensive tools or high agricultural and technical inputs in their

gardens. As Pretty and Hine (2001, 10) are emphasizing the hungry and poor need low-cost and readily-available solutions and practices to increase local food production and to ensure food security.

5 Research area

5.1 Swaziland

5.1.1 General information about Swaziland

Swaziland is located in the South-East of Africa, surrounded by South Africa to the north and Mozambique to the East. The size of country area is about 17 360 square kilometers (World Bank AFTU 1 & 2. 2002, 6). The capital of Swaziland is Mbabane, located in the North-East of the country.



Picture 1: Map of Swaziland

Source: Central Intelligence Agency, The World Fact Book

Swaziland has geographically four different regions; a low veld or bush veld to the east, middle veld, a high veld to the west and the Lubombo escarpment (up to 900 meters). Generally, climate is hot in the low veld and more temperate and wet in the high veld.(World Bank AFTU 1 & 2. 2002, 6.) Terrain in

Swaziland is mountainous with quite steep plains. 11 % of the land is arable, 7 % is forest and woodland and 62 % is permanent pasture. (World Food Program 2009.)

Swaziland is the last full monarchy in the world and got its independence from Britain in the year 1968. The ruler of the country is currently King Mswati 3rd. (Central Intelligence Agency 2010.)

Population in the country year 2010 was 1.354.051 from which 27 % is urban population (2008) and annual rate of change in urbanization is 1.7 %. Birth rate 27.12 births/1.000 population (2010) in country comparison it is in the world rank 51. Life expectancy for total population is 47.97 years. (Central Intelligence Agency 2010.)

As urbanization has increased, most of it has been unplanned and informal. More than 60 percent of the population living in the biggest cities Mbabane and Manzini are in informal and without legal title. Since urbanization has taken place unplanned, less than 50 percent of urban population has access to safe water and less than 20 percent are connected with the sewage network. Informal townships have in many cases formed on steep lands which is causing environmental degradation and pollution which easily spreads especially in natural water sources. (World Bank AFTU 1 & 2. 2002, 6.)

According to World Bank Swaziland country data mortality rate of under 5 years old children per 1000 in the year 2009, was 73 which is almost half less than total in Sub-Saharan Africa (World Bank 2011). Although the year 2009, HIV/AIDS was the highest in the world 25.9 % (age 15-49) as in the same time the percentage in Sub-Saharan area was average 5 %. (UNAIDS 2010.) Other diseases that are contributing to morbidity and mortality are tuberculosis, malaria, skin diseases diarrhea, cholera and acute respiratory infection (The Government of the Kingdom of Swaziland 2007, 68, 70).

The Global Hunger Index which is updated annually by International Food Policy Research Institute (IFPRI) ranks countries by using three interlinked hunger-related indicators: the proportion of undernourished in the population, the prevalence of underweight in children, and the mortality rate of children.

Global Index value of Swaziland was 10.8 in 2010, which means in the scale of Index, serious situation compared with the world situation. Since 1990, index value of Swaziland has increased by 14% which is one of the highest in the world. (International Food Policy Research Institute 2010.)

Another index which is commonly used in development research is Human Development Index, which is annually made by United Nations Development Program. Index combines three basic aspects of human development: the health, knowledge, and standard of living. The index of Swaziland is 0.498 which is a little bit over low human development label and rank 121 worldwide. (United Nations Development Program 2010.)

Swaziland is economically strongly linked to South Africa and is a member of the South African Customs Union (SACU) and the Common Monetary Area (CMA). Most of the market economy is based on wholesale and retail trade, agriculture and light industries. In addition country has some mineral resources like coal, asbestos and timber. (The World Bank AFTU 1 & 2 2002, 6.) The currency of Swaziland is following the South African rand and therefore subsuming Swaziland's monetary policy to South Africa. Country income level is lower middle (World Bank, Swaziland country data) and GDP per capita 2010 was \$ 4,500 which is ranked 154 in world country comparison (Central Intelligence Agency, The World Fact Book). Although the country is determined lower middle income, about 69 % of the population lives below the poverty line, and 48 % cannot even ensure their food security (The Government of the Kingdom of Swaziland 2007, 2). During the last few years the economy of Swaziland has shown weak performance which is the consequence of declines in key sectors like agriculture. Also changes in trade pattern, for example sugar, have worsened the situation (Swaziland Vulnerability Committee 2008, 1).

5.1.2 Food crisis

According to Runge and others (2003, 13) at the beginning of the twenty-first century there will be more than 800 million people who are chronically undernourished and food insecure. According to FAO and World Bank (see Runge et al. 2003, 17) in the area of Sub-Saharan Africa the number of the

hungry people has increased since 1969 to 1998, 72.2 per cent and new figures of estimated hungry people in Sub-Saharan areas is now 265 million people. In the whole world 1.02 billion hungry people (Food and Agriculture organization of United Nations 2009).

Koc, MacRae, Mougeot and Welsh (1999, 3) assign that despite technological advances that have developed the food production and distribution, hunger and malnutrition still threaten the health and wellbeing of people. They also point out that the problem is not only in developing countries but also in advanced industrialized countries like Canada, where each year about 2.5 million people depend on food banks.

The reasons for global food crisis are diverse and depend on the region, but also global grounds can be found; natural disasters, poor harvest, high domestic food prices, lower incomes and increasing unemployment due to the global economic crisis. (Food and Agriculture organization of United Nations 2009.)

According to the report of Food and Agriculture Organisation of United Nations, "The State of Food Insecurity in the World – Economic crisis – Impacts and lessons" (2009, Key messages) as the result of economic crisis, which has continued since 2008, developing countries are facing declines in remittances, export incomes, foreign investments and aid. These declines are causing unemployment and poverty which are leading to increasing hunger and malnutrition. In the same time when incomes are decreasing the food prices are staying relatively high in the poor countries.

Especially the area of Sub-Saharan Africa is the only region where the number of malnourished children will rise over the next 20 years. The slow development of food production has been the result of the fact that, over the past decade more than half of Africa's agricultural gains have come from cultivating more land, not from intensifying the agriculture. That has led to the losses of ecosystem biodiversity. (Runge et al. 2003, 50)

Runge and others (2003, 50) also state that agriculture in Sub-Saharan Africa should transform from subsistence to commercialized, since agriculture is still

mostly small scale farming, to fill the needs of growing population. This statement might be true, but as long as agricultural functions in Africa are under small scale farmers and world trade policies are determining the development, there are no possibilities for African farmers to move to commercialized agriculture and invest in high technology agricultural machinery. Therefore solutions to sustainable food production should be found from other sources than modern commercialized agriculture.

Also Swaziland is suffering from the same problems as other parts of the world and according to the World Food program Swaziland operations brief (2009,1) factors which are contributing to food insecurity are declining income opportunities, extreme poverty, high levels of unemployment, high food prices and impact of HIV/AIDS. Almost 70% of population in Swaziland are still food insecure and at the household level has worsened since 1992 (The Government of the Kingdom of Swaziland 2007, 80).

Swaziland Annual Vulnerability Report Assessment & Analysis Report (2008, 6-32) mentions some of the reasons to food insecurity; For example significant declines in rains since 2008, rise in prices of agricultural inputs, international food prices, poor access to safe water and especially the HIV/AIDS rates which are very high in the country. The report is mentioning that there are some improvements for example in maize production but as most of the food is imported the sharp increases in food prices are causing food insecurity especially in urban areas.

Bongfiglioli (2007, 7) mentions some facts of multidimensionality of the food insecurity which can be addressed also in Swaziland; low productivity due the droughts and the adequacy of the farmland, weak institutions through lack of democracy and inadequate resources in agricultural extension services, lack of access to productive resources which occurs in Swaziland through the dependency on imported food from South Africa, market failure and inadequate policies.

Also Swift and Hamilton (2001, 75) remind that residents of urban areas are dependent on purchased food and spending 60-80 % of the incomes on food,

therefore households are vulnerable to the price changes and declining terms of trade. Ambrose-Oji (2009, 3) also defines reasons to food crisis and uncertainty about the security of urban food supply, unpredictable oil prices and weaknesses in global financial and economic systems but also climate change.

5.2 Msunduza

Msunduza is a township, located on the outskirts of Mbabane which is the capital of Swaziland. It is one of the oldest informal settlements in Swaziland and started to accelerate in the 1980s. Nowadays it is a partly informal township and therefore lacking many basic infrastructure elements like working sewage systems, roads, waste management, sanitation, clean water etc. Informal communities in the area are Msunduza, Gobholo, Mncitsini, Maqobolwane, Mncozini and parts of Corporation (APPENDIX 1).

5.2.1 Population and services

The population in Msunduza is approximately 16 000. Msunduza is one of the poorest areas in Mbabane and most families living in the area are the lowest income households. Many homesteads in the area are led by elder people or not have grown ups at all. Actors in the area are the residents, City Council of Mbabane (municipality) and Community Leaders (the traditional leaders of area). There are 5 schools, some shops, Msunduza market, the Salvation Army clinic and some other services in the area.

5.2.2 Specific problems

Msunduza generally has the same problems as Swaziland. Msunduza as one township of the city, has the lowest income households, many of them the most vulnerable stratum of the society. High HIV/AIDS rates and mortality rates among young, working age people have created a problem of orphans and elders who live alone in poor conditions. Other health problems are tuberculosis, diarrhoea, mental issues and malnutrition. As the health issues are a major problem in the area, the only clinic which is maintained by Salvation Army of Swaziland lacks the resources to offer health services for all residents

of Msunduzi. Although there are other health services around the city more far away.

The township of Msunduzi does not have a proper infrastructure which has led to major health hazards. Existing sewage systems are leaking to the soil and contaminating water sources. People are relieving themselves nearby dwellings because of lack of sanitation. Waste management is unsubstantial and recycling of materials is not possible since adequate recycling services do not exist in the area. Although, some efforts to recycling, have been implemented in the area by development projects. Some schools for example, in the area, have built recycling centres in the school yards and give education on how to reduce waste and recycle it.

Many of the houses are in poor condition and constructed by traditional stick and mud technique, which is very vulnerable to heavy rains (The World Bank AFTU 1 & 2 2002, 7). As a point of development, the problem is also the high migration of people. Many dwellers live in the area in rented apartments and are not staying for longer periods. This rapid movement of dwellers is causing unwillingness to develop the area. Also communication between Msunduzi residents, leadership and City Council of Mbabane is not working as it should.

Land ownership issues are also complex and sensitive issues in the informal areas of the city. Swaziland has three different kinds of land tenure forms: freehold, crown and Swazi National Land. Most of the informal areas are on Swazi National Land which is administrated by traditional chiefs on behalf of the King. Traditional chiefs have the right to allocate land to people, but it does not confer permanent rights. Generally, these unsurveyed and unregistered lands cannot be used for raising capital. (The World Bank AFTU 1 & 2 2002, 13.) In Msunduzi, there are areas where City Council have made development plans and some plots which already have existing settlement are under threat to become demolished.

5.3 Turku University of Applied Sciences in Msunduza

Since the year 2004 Turku University of Applied Sciences has been operating together with by implementing two development cooperation projects. Besides of the other development work, Turku University of Applied sciences launched the Environmental Health Education Project the first time the year 2004 and has got further funding. The other development cooperation project Msunduza Dry Sanitation Project, started the year 2007 and funding is approved till the end of the year 2011. Dry Sanitation Project is funded by the Finnish Ministry of Foreign Affairs.

In the Msunduza Dry Sanitation project Turku University of Applied Sciences is cooperating in Finland with Global Dry Toilet Association of Finland and the local partners in the project area are Salvation Army of Swaziland, City Council of Mbabane and local communities (residents, Community leaders etc.).

The project is aiming to yield information about the technical and cultural adequacy of dry sanitation, education needed and other environmental and health benefits of dry sanitation for example in home gardening. The project plan of Msunduza Dry Sanitation Project is listing the main objects of the project:

Objective 1. Improved sanitation hygiene

Objective 2. Increased composting and home gardening

Objective 3. Increased livelihood and participation in the project area

Objective 4. Improved know-how of applicant

6 Introduction to the research

6.1 Purpose of the research

This research is focusing on home gardens in Msunduza, where the Dry Sanitation Project is taking place. The important development object in the project is to improve the living conditions of Msunduza residents. More closely

this object means improvement of well-being in environmental health, security, nutritional situation/food economy, income and participatory opportunities.

Since composting and home gardening are one of the objects in Msunduzi Dry Sanitation Project, this thesis is useful for further work and evaluation in the project concerning home gardening and sustainability. To ensure the sustainability of dry sanitation in the area, nutrients should be recycled after composting the toilet material. Profitable is if recycling can be done locally, near the sanitation facilities. The purpose of this thesis is therefore to find out what kind of benefits urban agriculture has and which problems are restricting home gardening in the area.

As shown in the theory part of this thesis, home gardens and urban food production are and will be significant opportunities in the globalizing world where food crisis is feasible phenomenon in many countries, also in Swaziland. According to Mougeot (1999a, 11) a growing number of countries have seen the possibilities of urban agriculture and it has made urban food suppliers more self-reliant and households less food insecure. Despite the fact that urban agriculture has received growing interest there are still some information gaps, which are complicating urban food production and consumption.

6.2 Sustainable livelihood approach

As mentioned in the Declaration of Human Rights, article 25 food security is a basic right for every human being:

“Everyone has the right to a standard of living adequate for the health and well-being of himself and of his family, including food...” (The General Assembly of the United Nations, 1948). Also United Nations Millennium Goals Target 1.C is emphasizing that proportion of people who suffer from hunger should halve between 1990 and 2015.

Definitions of the food security have been rewritten for decades. 21st century Food and Agriculture Organization defined food security as follows: *“Food security is a situation that exists when all people, at all times, have physical, social and economic access to sufficient, safe and nutritious food that*

meets their dietary needs and food preferences for an active and healthy life” (Food and Agriculture Organization of the United Nations 2003, 28).

Important perspective to the research subject was local food security in the aspect of household and individual access to food, not national food supply, as Maxwell (2001, 13) distinguishes food security to the level of individual way to survive.

The concept of sustainable livelihoods considering about food security has been taking to account when analyzing the results of the interviews. Instead of reflecting only how the residents of Msunduzi could get nutritious food, other aspects as social and environmental have been taking account for the sake of sustainability in the future development. In the case of food security, sustainable livelihood approach differs from “food first” approach in many ways. Davies 1996 (see Maxwell 2001, 19) has described that “food first” approach priority is food at the top of a hierarchy of needs, whereas “sustainable livelihoods” approach priority is food as on part of a jigsaw of livelihood needs. Also in Davies’ (1996) comparison one aspect is the relationship between food security and environment; Difference between approaches is that in “food first”-approach, environment has been degraded to meet the immediate food needs whereas “sustainable livelihood” -approach preserves environment to secure the future (see Maxwell 2001, 19).

Food security is wide issue which has many influential background facts. Different kind of global and local policies and practices are determining if the food security taking place in the society. As mentioned above, in this thesis, the concept of food security and its sustainable livelihood aspect is in the background of the research.

There are many solutions to ensure the food security. The aim of this thesis is to introduce urban food production in the scale of home gardens as one solution to the way of better food security and livelihoods in the research area.

6.3 Initial hypothesis and research problems

Before the actual field work was carried out, it was clear that in the research area most of the home gardens are very small scale, considering the restrictions of environment and size of living space. Also it was assumed that people living in the area have partly migrated from rural areas and are still familiar with cultivation techniques and self-sufficient life style.

Because of the character of the area as one of the poorest area of the city it was suspected that people living in the area cannot afford big investments on agricultural inputs and that some needed resources are not available to all residents, such as fertilizers, water and tools. Because of the lack of agricultural inputs it was assumed that residents are using traditional and ecological techniques which do not require so much investment.

The household garden research concentrated on households which already have gardens, to find out what kind of experience residents have about home gardening. Only one of the interviewed households had a dry toilet.

The aim of the research were to determine the role of home gardens for households; agricultural resources and inputs residents are using and the contribution of gardens to households in Msunduza. The other aim was to find out the main limitations and problems of urban home gardening. It was also observed what kind of home gardens can be found in the project area, which crops are planted and what kind of gardening techniques are used in the area.

In relation to dry sanitation, the object was to find out if residents were interested to use manure from dry toilets as a fertilizer and their attitude towards dry sanitation.

6.4 Research methods and schedule

The field study was carried out by using semi structured interview technique and observations on the research side. Semi structured interview means that the questions are the same for all interviewees but the order of questions can be different and that answers are not bounded to pat answers (Hirsijärvi &

Hurme 2004, 47). The data was gathered during spring and summer 2009 in Msunduza, Mbabane. With the help of local project workers, who are named sanitation experts, 34 interviews were conducted in the research area. Interviewees were chosen from each six informal communities in the area by observing the plots and home gardens. Only those homesteads which already had a garden were chosen, because the aim was to find out experiences about home gardening. If needed, local project workers helped with translation and local customs, which are important in Swaziland when entering someone's home. The Questionnaire was made as a semi structured interview and a list of topics (APPENDIX 2) was as a basis of the interview.

After every visit to communities, some observations were written down about the characteristics of the area, the condition of environment and people who were interviewed. Research sites were also documented by taking pictures. Interview analysis was done by using qualitative methods during autumn 2010 and spring 2011. During the writing process, a lot of information has been gained about urban agriculture and especially about Permaculture and ecological solutions to urban areas by the participation of seminars, lectures and different kind of meetings.

7 Results

7.1 Resources

All the 34 Msunduza residents who were interviewed live in relatively small plots, except for one who was the headmaster of a school and answered questions about the school's big gardens, which are used for educational purposes in the school's curriculum. The sizes of home gardens among the interviewed homesteads were ranging from small wall side raised beds (Picture 2) till 100m² sized backyard gardens. The age of the gardens was varying from some weeks to more than ten years, average time about 4 years. The owners estimated the time used for work in the home gardens, to be from half an hour

to some hours per week, depending on the size of the gardens and other factors such as a source of irrigation water.

Most of the interviewees (21) were using seedlings in their garden and other ways to grow up vegetables were seeds (5) and transplanting (3). Three irrigation sources were found: tap (19), river (4), and stream (4).



Picture 2: Raised garden bed next to the house wall

Photographer: Jaana Oikarinen-Mapengo

7.2 Gardening techniques

7.2.1 Crop varieties

The amount of crop varieties which were grown in the home gardens were varying from 1 till 10, average 4 different varieties. As seen at the Table 1 the most common varieties that were cultivated in the gardens were annual vegetables, three green leaves of which are edible, such as spinach, cabbage and lettuce.

Table 1. Crop selection in the home gardens

| Type of plant | Out of 34 interviewees |
|---------------|------------------------|
| Spinach | 26 |
| Cabbage | 19 |
| Lettuce | 15 |
| Onion | 14 |
| Tomato | 10 |
| Beetroot | 9 |
| Maize | 9 |
| Sugar cane | 7 |
| Chili | 6 |
| Pepper | 5 |
| Herbs | 4 |
| Strawberry | 4 |
| Banana | 4 |
| Carrot | 3 |
| Fruit tree | 2 |
| Sweet potato | 2 |
| Cassava | 2 |
| Pumpkin | 2 |
| Beans | 2 |
| Greens | 1 |
| Granadilla | 1 |
| Guava | 1 |
| Pineapple | 1 |
| Avocado | 1 |
| Potato | 1 |

Four (4) interviewees mentioned that the harvest from the garden is very good and all of these four home gardeners have been practising gardening for more than ten years. Most of the interviewees could not determine how much harvest they get from their home gardens, but as observed during the field work, the purpose to grow food is for their own consumption and the harvest from the gardens is relatively small.

The selection of the crops at the home gardens of Msunduza was quite scarce and included mainly exotic crops. Crop varieties which are planted have a significant impact on nutritional value of food, which is consumed within the household. Shiva illustrates in her article about Globalisation and food security (2002, 44) that industrial breeding and agricultural biotechnology have been responsible for reduction of the nutritional value of food. According to her,

industrial agriculture has been displacing diverse high nutritional value crops to lower nutritional value crops. The article points out that reduced calorie intake in the diet is contributing to global food security and the starvation of two-third of the world's population. In the case of African cities, indigenous African vegetables have lost ground at dining tables and have been replaced by exotic crops like maize and wheat.

Ambrose-Oji suggests that traditional African indigenous vegetables can have a much greater contribute to urban food security than exotic crops, which have been introduced to African citizens by foreigners. African indigenous vegetables are mainly leafy vegetables which have been tested and proved that they are richer in nutrients than many exotic vegetables. (Ambrose-Oji 2009, 12.) Compared with exotic vegetables African indigenous vegetables are faster maturing, less needy of pesticides and fertilizers, more tolerant of marginal soil and nutrient conditions (Ambrose-Oji 2009, 15).

The most of the everyday calorie intake of residents of Msunduza is based on commercialized vegetables and crops like maize and wheat. Also the usage of such crops as sugar cane is harmful for teeth. Considering that calorie intake is quite one-sided, residents would benefit by growing vegetables which are enriching their daily meals. The Swaziland Poverty Reduction Strategy and Action Plan is suggesting protection and cultivation of indigenous crops and vegetables as a strategy for food security and improvement of nutrition, (The Government of the Kingdom of Swaziland 2007, 83-84).

Crops and plants like spinach, beans, herbs and fruits of a different kind can already be found in the list of crop selection (see Table 1.), in addition, African indigenous vegetable would make important contribution to the nutritional values of daily meals. Indigenous vegetables like legumes, imbuya, ligusha etc. have been traditionally used in Swaziland.

It was a bit surprising that only 1 out of 34 interviewees was growing cassava, which is a very common root crop in many parts of Africa. The benefits of growing cassava have come to knowledge and it would also be profitable to cultivate it in Msunduza. Cassava is a root crop which can also grow well in

marginally fertile soils and is well resistant to climate changes. In addition cassava produces more food energy per unit of cultivated land than any other crop and can be left unharvested up to four years, which makes it good makeshift if other crops fail. (Madeley 2002, 22.)

As health issues are a major problem in the area, calorie and nutrition intake have an important role in the wellbeing of Msunduza residents and therefore the home gardens and crop selection can have a significant effect on health. "Living well with HIV/AIDS" -manual (World Health Organization & Food and Agriculture Organization of the United Nations 2002, 9) points out that good nutritional status is very important already from the time a person gets infected with HIV. The manual is also mentioning that a healthy balanced diet from the beginning of the infection can reduce weight loss which is a common sign of AIDS and good nutrition will reinforce the effect of the drugs taken. In addition good nutrition will keep person living with HIV/AIDS longer in the work and active live. (World Health Organization & Food and Agriculture Organization of the United Nations 2002, 10.)

In addition to crop selection, interviewees were questioned about cultivation techniques: Usage of fertilizers and chemicals, knowledge about organic gardening techniques such as mulching, crop rotation, companion planting and opinion about composting.

7.2.2 Fertilizers and chemicals

Fourteen (14/34) interviewees answered that they do not use any fertilizers in their gardens. The most used fertilizer was chicken manure (8/34) and a fertilizer from the shop (7/34), also four (4) answered they are using compost material as a fertilizer. Chickens are quite common domestic animals in Msunduza therefore the usage of chicken manure is reasonable if it is available without extra costs or transport. Some interviewees mentioned the usage of a fertilizer they buy from the shop; in this case it was not found out what kind of fertilizer shops are selling in the area, but most likely it contains chemicals and nutrients of different kind. Most of the interviewees (25/34) told that they are not

using any chemicals in their gardens. The chemicals mentioned were fertilizers or pesticides.

7.2.3 Companion planting, mulching, crop rotation

Organic gardening techniques are quite well known in the area and it can be seen from the answers but also when observed the gardens in the field. Interviewees were asked if they know something about companion planting, mulching or crop rotation and if they are using these techniques.

As seen in the Picture 3 companion planting is used in some home gardens. Companion planting blends different plant varieties which enhance each other (Hemenway 2009, 177). The other similar technique is intercropping which means mixing different varieties together to save space and work together to deter pests (Hemenway 2009, 175). Intercropping is using resources like light, water and nutrient more efficiently, because plants have different requirements. Intercropping is therefore also a coping strategy if one crop fails and provides effective cover to soil and reduces the loss of soil moisture (Madeley 2002, 27).

Crop rotation means that diverse crops are planted in the same field, changing every year. Chosen crops come from different genus, species, subspecies or variety than the previous ones. The main purpose of crop rotation is to improve or maintain the soil fertility, reduce erosion, the usage of chemicals and pests, spread the workload, reduce the risk of weather damage and increase productivity. (Peel 1998.)

Mulching is a natural way to protect and build the soil. It can make big difference in the productivity of land. Mulching conserves soil moisture, keeps down the weeds and keeps plants roots cool. The organic or inorganic materials which can be used as mulch are for example: bark, wood chips, shredded leaves, newspaper and inorganic: crushed stone and plastic. (Relf 2009.)

12 out of 34 interviewees mentioned that they know something about a companion planting and some are also using it. 7 out of 34 interviewees said they do not know what kind of technique companion planting is, but it was

observed that the technique was already implemented in garden. Crop rotation was familiar to 21 interviewees and 15 knew something about mulching.



Picture 3: Companion planting in the Msunduza home garden.

Photographer: Jaana Oikarinen-Mapengo

7.2.4 Composting

Interviewees were also asked if they know something about composting and what they think about it. 20 out of 34 knew about composting and 10 of them told that they already have a compost. Many of them were very conscious of the benefits of composting:

“Composting is good way to recycle waste and it is good for soil.”- Female

“It is a good way to enrich the soil.”-Young male

As seen from the results of interviews, organic gardening techniques were quite well known but for some gardeners the terms were not familiar even though they were already using the techniques. This can be construed that people have learned how to cultivate organically because all farming has been organic before and knowledge about organic methods have come from their family members or other community members.

Benefits of using organic cultivation techniques are various and the interviewees were taking them positively. When practised successfully, there is

no need for chemicals, that could be harmful for environment and health and require money to supply.

7.3 Identification of benefits and future plans

The residents who were interviewed concurred with the reasons to have home garden and what benefits they get when practising home gardening.

9 out of 34 interviewees mentioned that they were cultivating in their plots to get some extra food. Many of them said that the reason for gardening is somehow economic (18/34). Economic benefits were explained that the need to buy food from markets decreased and when selling crops. Also four (4) interviewees mentioned that they get a better quality of food and one (1) person answered that they were just interested in gardening.

“Everybody should be taught how gardening is helping to fight against starvation.” – Young male

Other reasons to own gardens were related to health, social and cultural benefits of urban agriculture such as the intake of vitamins, desire to continue the tradition of rural areas, help others, to keep oneself busy at home, for school assignment and spiritual reasons.

“...it (gardening) teaches me and makes me understand where I come from, also heals me, makes me happy when I see the results”. -Young male

Many (14/34) interviewees did not have any specific future plans related to their home gardens. One of the interviewees expressed himself why he does not make plans: *“because I’m living just for today”*. In many African cultures, this argument can be seen as a common way how life is disposed to. Although most did not have any future plans, there were gardeners who also had very specific plans which can be identified into some different grounds; 3 out of 34 interviewees mentioned that they have been planned to start to cultivate more for commercial purposes, in other words to sell crops from their garden. The most common plan (9 out of 34 interviews) was to cultivate more or different kinds of vegetables if resources, especially the space of the garden, are

improving. 6 out of 34 interviewees mentioned that they would like to improve their cultivation techniques such as mulching, crop rotation and utilizing chicken manure. Also two (2/34) interviewees said they would like to learn more about home gardening techniques.

7.4 Problems and solutions

7.4.1 Space

Interviewees mentioned 18 different limitations or problems they have related to home gardening. The most common answer when asked about problems was that the space they are practising gardening, is too small. Lack of space for gardening is a common problem in urban and semi urban areas. People living in the urban areas have enthusiasm for gardening but space is very limited. The solution to this problem can be more administrative and social than practical. If the community is enthusiastic to plant and cultivate, municipality of that area could give spare plots for community members for gardening. In Msunduzi, a good example is a group of young community members, Mncitsini Youth, who have been organized to be an active group in their community. As one activity group have started a community garden project in their own community. Leadership of their community have donated a plot for them for gardening. Although the plot is situated on a very steep hill and is very difficult for gardening, the leadership have given them a chance to show what they can do and practise their activity. An other example about community gardens in the area is the local school where they have gardening as a part of their curriculum (Picture 4). Students are learning gardening in practice in the school's gardens and community members can buy surplus products. As mentioned in the Permaculture chapter 4.2 social capital is the answer for lack of space. Cooperation between members of community in the form of exchange economy and utilisation of different resources of city can compensate small cultivation space.



Picture 4: School's community garden in Msunduzi

Photographer: Jaana Oikarinen-Mapengo

Practical solutions can also be found to the space problem. Different kinds of intensive gardening techniques for urban settlements have been invented; especially Permaculture solutions for urban settlements like vertical, container, square-foot and rooftop gardens, raised (Picture 5) or keyhole (Hemenway 2009, 38, 240) garden beds. In addition interplanting and polyculture save space and intensify productivity. Interplanting technique means that in one place, several plant species, which physically fit together, are combined, such as carrots, onions and lettuce. (Hemenway 2009, 241.)



Picture 5: Raised garden beds, behind a rain water collection tank

Photographer: Jaana Oikarinen-Mapengo

7.4.2 Animals

The second biggest problems were chickens 7/34 and cows 3/34 wandering in the communities. These animals have free access to many gardens and thereby they eat plants and crops. Since the traditional custom is that animals can wander free also in the urban areas, the solution to this problem is proper fencing and protection of gardens. One interviewee also mentioned that lack of fencing is a problem for him. This means that he can't afford to buy a fence around his garden. A simple solution to these problems of the wandering animals and fencing is innovation and usage of recycled and natural materials which are available to everyone and frequently without expenses. Picture 6 shows a good example of one solution of a recycled fence, made out of sticks and plastic found at surroundings. Although the solution is not very aesthetic but it works and can also ease the waste problem especially in the case of plastics which is not decomposing material.



Picture 6: Fencing innovation in Msunduza home garden

Photographer: Jaana Oikarinen-Mapengo

7.4.3 Pests

7 out of 34 interviewees mentioned pests as a problem and one (1) mentioned that pesticides (meaning commercial pesticides) are too expensive to buy. Permaculture and organic gardening methods offer various affordable solutions to pest for every gardener.

As mentioned in chapter 7.2.3 companion planting and crop rotation are good and affordable techniques to prevent pests. Some plants are also secreting compounds that repel specific pests that live in the soil or just above it; for example garlic repels aphids, deer and rabbits; peppermint repels insects and mice (Hemenway 2009, 136, 190, 202). Most insects are actually either helpful or neutral. So taking care of biological diversity and balance in the garden will help to prevent harmful pests, because there will also be beneficial, predator insects, which will take care of the harmful ones. (Hemenway 2009, 151-152.)

7.4.4 Seedlings

One of the noticed problems is high-priced seedlings (4 out of 34) which 21 out of 34 interviewees are using in their gardens. Only five (5) interviewees were using seeds and three (3) transplanting. When using Permaculture principles

and organic techniques seeds of the plant can be kept and used next year. As mentioned in the chapter 4.2 the most important strength of urban areas is social capital. Also in the case of seedlings residents could practise exchange of their extra seedlings among each other and therefore save some money. Collection and storage of seeds from own garden for next growing season would be economically beneficial.

7.4.5 Soil fertility

Problems connected with soil fertility were also mentioned in the interviews. 3 out of 34 interviewees mentioned that they have problems with soil and two (2) that the problem was somehow related to composting. Firstly soil fertility can be ensured by using crops which are suitable for the environment and soil type in the area but also using the composted material.

As Permaculture experts suggest, the usage of compost, mulches and cover crops help the soil fertility:

“Organic matter buffers pH problems, restores nutrient balance, lightens clay soils, helps sandy and silty soils hold moisture and nutrients, fluffs and aerates compacted earth...”(Hemenway 2009, 239).

Especially composting is an affordable and beneficial technique since it is also reducing the waste by recycling biodegradable waste into the soil. For urban areas where space is scarce there are excellent compost solutions. Hemenway (2009, 232) suggests a worm compost bin, which is a space-saving soil technique for urban houses and even for apartments.

7.4.6 Water

3 out of 34 interviewees mentioned the availability of water as a problem and one (1) said that water is expensive for him. Permaculture solutions to water shortages or other problems are various. By saving, collecting and reusing, problems with irrigation can be minimized. Whitefield (2004, 95) suggests 8 different ways how to use less water in the garden; by adding humus, the soil's ability to hold water increases and less water is lost to the drainage. Humus

also improves the structure of the soil. Mulching reduces evaporation from the soil. Planting perennial species makes the use of existing water better, because of the extensive root system which fills the soil throughout the year. Ensuring the polyculture makes the usage of water more efficient than in monocultures, since the root shapes and depths are different among the plants. Matching the plants in the suitable place, will guarantee that each plant gets the moisture it needs. Building up the wind shelters for garden reduces the evaporation. Usage of efficient irrigation techniques, such as drip irrigation and sheep hose reduces the amount of water needed. For steep slopes building swales also intensifies the irrigation. Planting in an open space instead of containers will reduce the usage of water, since plants grown in containers normally takes more water than in the open ground. (Whitefield 2004, 95-96.) Especially for Msunduzi steep plots building swales would be a good way to slow down the runoff of the water and store water in the landscape. Besides reducing the amount of needed water, suitable solutions are rainwater harvesting and re-usage of grey water. Usage of waste water suits the best for example for fruit trees and must be used carefully, otherwise it can cause a possible health hazard. Collecting rainwater from the roofs can be done in most households (Whitefield 2004, 97) although the tanks (Picture 5) can be too expensive for the poorest households.

7.4.7 Other problems

Other problems which came up more sparsely were stealing, amount of light, waste in the soil, administrative problems, bad harvest and availability of manure.

Even though the problem of the waste in the soil did not come up strongly from the interviews, it is a visible and big problem in the area. Interviewees might not consider it as a problem because they are already used to see waste everywhere in the environment and hazardous toxics which are originated from waste cannot be noticed by the bare eye. As seen in the Picture 7 gardens in Msunduzi are often set up next to waste dumping sites or even on them. In some communities of Msunduzi small scale business as garages and smelting houses are creating a possible source of pollution. Soils in the cities often

contain lead and other unknown poisonous residues from manufacturing (Hemenway 2009, 237). Permaculture solutions to contaminated soils can be found. By adding organic material into soil, removing and replacing the former soil and usage of fungi and mushrooms, which accumulate toxics, are profitable ways to transform the soil into a healthy form (Hemenway 2009, 239). A simple and affordable solution to avoid toxics is to grow vegetables in containers (for example built out of recycled materials, like car tires or recycled timber) or in raised beds, where soil is separated from ground soil.



Picture 7: Many gardens have been set up nearby waste dumpsite or even on them.

Photographer: Jaana Oikarinen-Mapengo

An other problem which came up in consideration by observing the environment was erosion. Only one of the interviewees mentioned erosion as a problem in his garden but as shown in the Picture 8 the erosion is a remarkable problem due to the mountainous environment. Especially the water causes a run-off of fertile sediments and this can be seen in the answers as a problem with soil. There are many solutions to prevent erosion; for example building terraces and usage of abutments for cultivation beds. Also the indigenous techniques of land husbandry have been used in urban settlements to prevent erosion. As

mentioned in the chapter 7.2.3 run-off of nutrients and erosion can also be prevented by crop rotation, mulching and companion planting.

Prevention of erosion on steep land plots can be done by construction of hillside terraces and planting indigenous trees, which are preventing soil erosion, improving soil fertility and preventing sediment and the water run-off. In the case of Ethiopia (Reij & Waters-Bayer 2002, 31), a farmer was using trees named gesho (*Rehminus perinoides*), juniper (*Juniperus procera*) and African Olive (*Olea africana*) which are also all suitable for climate in Swaziland. These wood species are frost, drought and wind resistant and therefore suitable for prevention of erosion (PlantzAfrica.) Madeley (2002, 136) mentions, a widely used plant in Africa, called mucuna (*Mucuna pruriens*) which helps to control soil erosion and improve the physical, chemical and biological properties of the soil.



Picture 8: Erosion is one of the problems in the home gardens of Msunduzza

Photographer: Jaana Oikarinen-Mapengo

7.5 Fertilizer from dry toilets

24 interviewees answered that they could use composted toilet waste in their garden as a fertilizer and only two (2) said absolutely no. These two interviewees who weren't ready to use manure were worried about the health issues. One interviewee said that because she lives nearby a composting dry toilet which is built at the public meeting point, it would be easy for her to get manure from that toilet. Rest of the interviewees were not informed about dry sanitation, therefore they were not aware about the dry toilets and possibility to get fertilizer from them.

8 Conclusions and future prospects

8.1 Validity, reliability and ethics of the research

As Hirsijärvi, Remes and Sajavaara (2009, 232) mention, validity and reliability are not used in qualitative research in the same way as in quantitative research and because these terms have developed in the context of quantitative research the usage in qualitative research should be avoided. However, reliability and validity are an important part of every research and they should be acknowledged also in context of qualitative research.

Time for the background research about the subject was scant because the subject matter which was initially planned changed on the spot due the lack of local information sources. Therefore expertise about the subject was defective when the interviews were conducted. Although the knowledge about subject was shorthanded it was recognized that urban agriculture is strongly related to the development projects in the area and the questions made were adequate for the purpose.

Interviews were conducted with the help of available local project workers who acted as a translator if needed. Perhaps in some cases, answers were not translated as a whole and some misunderstandings about questions were observed. There were also a couple of interviewees who were not willing to

answer the questions. The reasons for unwillingness to participate in the research might be diverse; It is possible that residents of Msunduza are not conscious enough about the reason why foreign students inspect the area all over again and maybe they assume that local municipality is behind the researches. Other reasons could be that some practices are forbidden in urban area or subjected to license and residents are not willing to tell about their businesses. There is a strong possibility that people are cultivating land they don't have tenure and therefore they are afraid of eviction.

It was not found out very clearly how much gardens are producing food for the households. The influence of the urban agriculture on food security could have been clarified by asking where interviewees obtain their food and what normal meals consist of.

Question about dry sanitation and the willingness of the use of composted human waste as fertilizer was also a complicated question. Most of the interviewees answered that they could use it in their gardens, but in reality can be opposite. One reason for the positive result could be the fact that the interviewees thought that they could get a dry toilet from the project by answering in a right way.

When the interviews were made in the research area it could have been more exact and accurate when explaining the purpose of the research and give more time to the interviewees to answer. Although some interviewees were demure to answer and therefore the usage of participatory methods could have brought some more accurate and reliable information and elicit information about issues which were not taken into account at all.

All together it was profitable that before interviews there was a lot of time to get familiar with the local culture and customs. The time spent in the area, before the interviews, was about 4 months. If the time in the field would have been shorter, maybe there would have been even bigger problems and the analysis of the results would have been inaccurate.

8.2 Urban agriculture as a part of sustainable livelihood in Msunduza

Results of the research showed that residents who have a home garden are benefitting from it in many different ways. It is not surveyed how many households in its entirety are practising home gardening in Msunduza, but previous researches have showed that the number is not big. The initial hypothesis about the scale of home gardening proved to be right, in the way that home gardens were relatively small and production was for household consumption not for commercial purposes. Also the presumptions about the agricultural inputs and techniques were right; organic gardening methods were in use and usage of chemical is minor.

Since home gardening is known in the community it is not difficult to promote it for those who are not yet practising it. In addition to educating new gardeners, the residents who are already producing food in their homes could be educated on organic and Permaculture farming techniques to gain maximum benefit from their gardens without degrading the environment. Usage of different crop varieties, composting and organic gardening techniques would benefit and intensify existing gardening.

Not only teaching of residents but also community leaders and municipal workers would be profitable to take account to ensure the sustainability of the urban agriculture activities and projects. Especially in the case of landownership issues it is essential that all stakeholders of the area are communicating and cooperating directly. Education could be implemented not only by teaching but also by using participatory methods, learning by doing in community gardens, workshops and with the help of local innovators of organic agriculture, which already exist in the area (Picture 9).



Picture 9: Organic gardening workshop in Msunduza, Spring 2009

Photographer: Jaana Oikarinen-Mapengo

The development of urban agriculture in Msunduza is important for ongoing Dry Sanitation and Environmental Health Education projects but also for the sustainable future for local livelihoods. In Dry Sanitation Project home gardening should have been more addressed when sites for new toilets were decided. At the moment, only two dry toilet owners have a home garden. Need for proper sanitation in many vulnerable groups is absolute necessity but if the sustainability of the project is not considered when toilets are built, the objects of the project cannot be met. Therefore home gardening should be promoted more, especially among the households where toilets are already built.

The results were in the line of other previous research cases and showed that urban agriculture has some benefits for the residents of Msunduza and although there are many concerns and matters to be developed, urban food production has potential to contribute urban livelihoods. Urban agriculture cannot secure the food security alone but it can reduce the food insecurity and vulnerability of urban dwellers.

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Question sheet for Msunduzu communities about home gardening

These questions are made to lead the conversation when visiting gardens sites in the communities.

Date:

Visitors:

Community:

Name of garden owner:

Plot:

1. How long you have had your garden?
2. Why do you have garden?
3. How big is your garden?
4. What are you planting?
5. How much crops you produce?
6. How much you use time in your garden per week?
7. Who is taking care of your garden?
8. From whom you have got help for your garden?
9. What are the problems in your garden? And which factors are limiting your gardening?
10. Do you have any plans for your garden? If yes, what kind of plans?
11. Do you sell something which is grown in your garden?
12. How much incomes you get from your garden?
13. How is your garden helping you?

Gardening techniques

14. Are you using any fertilizers?
- if yes, how much?
15. Do you know about crop rotation? Are you practising it in your garden?
16. Do you know about mulching? Are you using it in your garden?
17. Do you know about companion planting?
18. Do you use any chemicals in your garden?
19. What do you think about composting?
20. Can you use composted toilet waste in your garden?

21. Something you would like to add?