

**URBAN AGRICULTURE PROJECTS:  
CASE STUDIES IN THE CITIES OF WINDHOEK, NAMIBIA AND  
BERLIN, GERMANY**

**A THESIS SUBMITTED IN FULFILLMENT  
OF THE REQUIREMENTS FOR THE DEGREE OF  
MASTER OF SCIENCE**

**OF  
THE UNIVERSITY OF NAMIBIA  
AND  
HUMBOLDT UNIVERSITY, BERLIN**

**The Department of Biological Sciences**

**by**

**Carolyn Tischtau (201102193)**

**March 2013**

Main Supervisor: Prof. Dr. H. Hoffmann

Co- Supervisor: Prof. Dr. I. Mapaure

**Abstract**

The protection of biodiversity within cities is becoming more crucial by the increasing number of people living in urban areas. Within this study urban agriculture projects (UAP) are analysed according to their ability to face this challenge. It was uncertain if UAP exist in Windhoek, this study proves that they do. This research was undertaken in two cities: Windhoek, Namibia and Berlin, Germany under special consideration of two main research questions: (1) Does UAP have the ability to maintain local crop diversity? And (2) Can UAP be the source of alien invasive species impacting the surrounding area? A combination of different methods was necessary to gain a holistic overview about the phenomena, including: Expert interviews, questionnaire survey, field work and desk study. The study furthermore points out that stakeholders motivation is the main variable influencing the management purpose and biodiversity in UAP. In Windhoek, the motivation is shaped by hard factors (income generation and food supply), while in UA is undertaken due to soft factors (social, ecological and political reasons) in Berlin. These factors are directly influencing the biodiversity within the gardens. In Windhoek crops are grown in order to sell them, consequently a lot of one of its kind is planted. In Berlin's case studies ornamental plants are part of the gardens as well as crop plants which enriches the biodiversity to a great extent. The origin of seeds is also affected by the motivation and knowledge of the stakeholder: In Windhoek awareness of local species is lacking. In opposition to this the awareness is present and local varieties are every so often on focus in Berlin. Consequently a potential exists to conserve local varieties in Berlin, but not in Windhoek.

No alien invasive species could be identified in Berlin. In Windhoek 5% of the species and varieties in the gardens were declared alien invasive species. Consequently, it can be stated that the investigated UAP are not a potential source of alien invasive species.

## Table of content

|                                                       |           |
|-------------------------------------------------------|-----------|
| <b>1. Introduction .....</b>                          | <b>1</b>  |
| <b>2. Literature Review.....</b>                      | <b>4</b>  |
| 2.1. Access to resources .....                        | 11        |
| 2.1.1. Land.....                                      | 12        |
| 2.1.2. Water .....                                    | 13        |
| 2.1.3. Finance .....                                  | 13        |
| 2.2. Environment .....                                | 14        |
| 2.3. Urban Agriculture in Windhoek.....               | 18        |
| 2.4. Urban Agriculture in Berlin .....                | 22        |
| 2.5. Statement of the research problem .....          | 25        |
| 2.6. Objectives of the study .....                    | 27        |
| 2.7. Hypothesis of the study .....                    | 28        |
| <b>3. Materials and Methods used .....</b>            | <b>29</b> |
| 3.1. Samples .....                                    | 33        |
| 3.2. Interviews and Questionnaires .....              | 35        |
| 3.3. Field work in the UAPs .....                     | 38        |
| 3.4. Data analysis.....                               | 40        |
| <b>4. Results .....</b>                               | <b>40</b> |
| 4.1. Preliminary list of current UAP in Windhoek..... | 41        |
| 4.2. Case studies in Windhoek .....                   | 42        |
| 4.2.1. Garden of Hope .....                           | 42        |

|         |                                                  |    |
|---------|--------------------------------------------------|----|
| 4.2.2.  | NEYO .....                                       | 45 |
| 4.2.3.  | Dr. Sam Nujoma Garden of Hope .....              | 48 |
| 4.2.4.  | Cultural background in Windhoek .....            | 53 |
| 4.2.5.  | Stakeholders in Windhoek.....                    | 53 |
| 4.2.6.  | Availability of resources in Windhoek.....       | 58 |
| 4.2.6.1 | Land .....                                       | 58 |
| 4.2.6.2 | Water.....                                       | 59 |
| 4.2.6.3 | Tools .....                                      | 60 |
| 4.2.6.4 | Seeds .....                                      | 62 |
| 4.2.6.5 | Professional advice .....                        | 63 |
| 4.2.6.6 | Pesticides .....                                 | 65 |
| 4.2.6.7 | Fertilizer.....                                  | 66 |
| 4.2.6.8 | Finance.....                                     | 67 |
| 4.2.7.  | Farming methods .....                            | 70 |
| 4.2.8.  | Management purposes .....                        | 74 |
| 4.2.9.  | Biodiversity .....                               | 77 |
| 4.2.10. | Origin of seeds.....                             | 78 |
| 4.2.11. | Invasive Species .....                           | 78 |
| 4.2.12. | Potential to conserve crop plant diversity ..... | 80 |
| 4.3.    | Case studies in Berlin .....                     | 81 |
| 4.3.1.  | Spreegarten.....                                 | 82 |
| 4.3.2.  | Rosa Rose .....                                  | 85 |

|           |                                                  |           |
|-----------|--------------------------------------------------|-----------|
| 4.3.3.    | Bunte Beete e.V.....                             | 89        |
| 4.3.4.    | Biodiversity in Berlin .....                     | 92        |
| 4.3.5.    | Potential to conserve crop plant diversity ..... | 92        |
| 4.3.6.    | Summary: Results from Windhoek and Berlin .....  | 94        |
| <b>5.</b> | <b>Discussion.....</b>                           | <b>95</b> |
| 5.1.      | Cultural background .....                        | 96        |
| 5.2.      | Stakeholder .....                                | 97        |
| 5.3.      | Availability of resources .....                  | 103       |
| 5.3.1.    | Land.....                                        | 103       |
| 5.3.2.    | Water .....                                      | 106       |
| 5.3.3.    | Tools.....                                       | 107       |
| 5.3.4.    | Seeds.....                                       | 108       |
| 5.3.5.    | Professional advice.....                         | 109       |
| 5.3.6.    | Pesticides .....                                 | 112       |
| 5.3.7.    | Fertilizer .....                                 | 114       |
| 5.3.8.    | Finance .....                                    | 114       |
| 5.4.      | Farming methods .....                            | 115       |
| 5.5.      | Management purpose .....                         | 116       |
| 5.6.      | Biodiversity .....                               | 118       |
| 5.7.      | Invasive Species .....                           | 119       |
| 5.8.      | Potential to conserve crop plant diversity ..... | 120       |
| 5.9.      | Problems with the field study .....              | 124       |

|                                                                                              |            |
|----------------------------------------------------------------------------------------------|------------|
| 5.10. Statement on the practical applications and implications of the research findings..... | 125        |
| <b>6. Recommendations .....</b>                                                              | <b>126</b> |
| 6.1. Suggestions for further research.....                                                   | 129        |
| <b>7. Conclusion.....</b>                                                                    | <b>130</b> |
| <b>8. References .....</b>                                                                   | <b>132</b> |
| <b>9. Appendix .....</b>                                                                     | <b>152</b> |
| Appendix 1 – Questionnaire Windhoek.....                                                     | 152        |
| Appendix 2 – Revised Questionnaires Windhoek .....                                           | 156        |
| Appendix 3 – Interviews Windhoek .....                                                       | 165        |
| Appendix 4 – Data Species Windhoek.....                                                      | 169        |
| Appendix 5 – Interview Berlin Spreegarten .....                                              | 170        |
| Appendix 6 – Interview Berlin Rosa Rose.....                                                 | 171        |
| Appendix 7 – Interview Berlin Bunte Beete .....                                              | 172        |
| Appendix 8 – Data Species Berlin .....                                                       | 174        |

## Table of Figures

|                                                                                     |    |
|-------------------------------------------------------------------------------------|----|
| Figure 1: Map of Africa - Namibia .....                                             | 19 |
| Figure 2: Map of Namibia - Windhoek.....                                            | 20 |
| Figure 3: Map of Germany - Berlin .....                                             | 23 |
| Figure 4: Community gardens in Berlin.....                                          | 24 |
| Figure 5: Overview of the UAP in Windhoek, Namibia.....                             | 42 |
| Figure 6: Seedling trays in Katutura youth center .....                             | 43 |
| Figure 7: Melon planting in NEYO .....                                              | 46 |
| Figure 8: Dr. Sam Nuyoma Garden of Hope .....                                       | 49 |
| Figure 9: Income per month per gardener in the Dr. Sam Nujoma garden of hope.....   | 51 |
| Figure 10: Use of (funding's) money.....                                            | 52 |
| Figure 11: The age of the cultivators in the UAP in Windhoek. ....                  | 54 |
| Figure 12: The personal status of the cultivators in Windhoek in %. ....            | 54 |
| Figure 13: The employment status of the cultivators in the UAP in Windhoek. ....    | 55 |
| Figure 14: The personal income of the cultivators in the UAP in Windhoek in %. .... | 55 |
| Figure 15: Reasons for cultivators to do UA in Windhoek.....                        | 57 |
| Figure 16: Origin of knowledge.....                                                 | 58 |
| Figure 17: Source of water.....                                                     | 60 |
| Figure 18: Number of tools in each garden in Windhoek.....                          | 61 |
| Figure 19: Source of seeds .....                                                    | 62 |
| Figure 20: Source of training. ....                                                 | 63 |

|                                                                                                                                            |     |
|--------------------------------------------------------------------------------------------------------------------------------------------|-----|
| Figure 21: Absolute numbers of answers indicating the institutions providing support during the starting phase of projects. ....           | 65  |
| Figure 22: Do you sell your products? .....                                                                                                | 67  |
| Figure 23: Place of selling.....                                                                                                           | 68  |
| Figure 24: Use of profit.....                                                                                                              | 69  |
| Figure 25: Farming methods .....                                                                                                           | 70  |
| Figure 26: Beds with drip-irrigation in NEYO .....                                                                                         | 72  |
| Figure 27: Absolute numbers of answers confirming the cultivation of different crop varieties at the three investigated institutions. .... | 72  |
| Figure 28: Reasons for plants growing .....                                                                                                | 73  |
| Figure 29: Purpose of the project.....                                                                                                     | 74  |
| Figure 30: Knowledge about project existence .....                                                                                         | 75  |
| Figure 31: Problems in the garden .....                                                                                                    | 76  |
| Figure 32: Similarity of the projects in Windhoek.....                                                                                     | 77  |
| Figure 33: Country of origin of seeds .....                                                                                                | 78  |
| Figure 34: <i>Schinus terebinthifolius</i> – Brazilian pepper tree in NEYO.....                                                            | 79  |
| Figure 35: Spreegarten .....                                                                                                               | 82  |
| Figure 36: Rosa Rose garden .....                                                                                                          | 85  |
| Figure 37: Bunte Beete garden.....                                                                                                         | 89  |
| Figure 38: Similarity of the projects in Berlin .....                                                                                      | 92  |
| Figure 39: Seedtime in NEYO .....                                                                                                          | 109 |
| Figure 40: Application of pesticides in Dr. Sam Nuyoma garden of hope .....                                                                | 113 |

|                                                                        |     |
|------------------------------------------------------------------------|-----|
| Figure 41: Drip irrigation system in the Otjomuise project school..... | 115 |
|------------------------------------------------------------------------|-----|

## Table of Tables

|                                                                                  |     |
|----------------------------------------------------------------------------------|-----|
| Table 1: Time frame of the research including methods and instruments .....      | 30  |
| Table 2: Categorization of the questionnaire .....                               | 36  |
| Table 3: Investigated UA projects in Windhoek.....                               | 41  |
| Table 4: Native species in the gardens in Berlin.....                            | 93  |
| Table 5: Summary of the case studies in Windhoek and Berlin – a comparison ..... | 94  |
| Table 6: Overall groups of UA cultivators in Windhoek and Berlin .....           | 101 |

### **List of Acronyms and Abbreviations**

|      |                                             |
|------|---------------------------------------------|
| DC   | Developing countries                        |
| DWI  | Degree of weed infestation                  |
| FAO  | Food and Agriculture Organization           |
| GLV  | Green leafy Vegetables                      |
| GMO  | Gen manipulated organisms                   |
| GoH  | Garden of Hope                              |
| HDC  | High developed countries                    |
| HDI  | Human development Index                     |
| MAWF | Ministry of Agriculture, Water and Forestry |
| NGOs | Non-governmental organizations              |
| UA   | Urban agriculture                           |
| UAP  | Urban agriculture projects                  |
| UNEP | United Nations Environment Programme        |
| UAP  | Urban and peri urban agriculture            |
| PUA  | Peri urban agriculture                      |

## Acknowledgements

First of all I would like to offer my gratitude to my supervisor, Prof. H. Hoffmann, who has supported me throughout my thesis with her patience and knowledge whilst allowing me the room to work in my own way. Deepest gratitude is also to my co-supervisor Prof.

I. Mapaure.

I would like to thank my *Biodiversity ladies*: Mandene M., Margrete M., Saskia W. and Tabitha D. for the never ending support. Without them this thesis would have remained a dream.

I would like to thank the staff from the *Biodiversity management and research* for their help and support. Especially: Nicole, S., Thomas, G. and Prof. U. Zeller for their help and support.

I owe my deepest gratitude to the *Ministry of Agriculture, Water and Forestry*, especially: Kanguvi, Ruben and Paulina for their help and kindness.

Special thanks to my family and friends, especially: Erika N., Gabrielle B., Heike A., Imke H., Jutta N., Kenneth M., Leonie T., Maria B., Merle B., Nicola A., Patrick D., Phillip B., Pia J., Udo N. und Wiebke W..

**Declarations**

. I, [Carolín Tischtau], declare hereby that this study is a true reflection of my own research, and that this work, or part thereof has not been submitted for a degree in any other institution of higher education.

. No part of this thesis/dissertation may be reproduced, stored in any retrieval system, or transmitted in any form, or by means (e.g. electronic, mechanical, photocopying, recording or otherwise) without the prior permission of the author, or The University of Namibia in that behalf.

. I, [Carolín Tischtau], grant The University of Namibia the right to reproduce this thesis in whole or in part, in any manner or format, which The University of Namibia may deem fit, for any person or institution requiring it for study and research; providing that The University of Namibia shall waive this right if the whole thesis has been or is being published in a manner satisfactory to the University.



Date.....

[Carolín Tischtau]

## 1. Introduction

“As more and more people [are] making cities their home, cities will be the arenas in which some of the world’s biggest social, economic, environmental and political challenges will be addressed, and where solutions will be found” (UN, 2005, p.3).

Since the turn of the century the quantity of people living in and around cities outnumbers the amount of people living in rural areas, and this number is increasing steadily (Drescher and Iaquina, 2002). The United Nations (UN) publication on the *World Urbanisation Prospects the 2011 Revision* states that between 2011 and 2030, the urban areas of the world are expected to gain 1.4 billion people. Subsequently, by the year of 2030 59% of the world's population will live in cities (UN-Habitat, 2011). This implies social, economic and environmental challenges. Urban and peri-urban agriculture (UAP) could prove as an essential tool for facing these challenges. Whereas, urban agriculture (UA) “can be described as the growing, processing and distribution of food and nonfood plant and tree crops and the raising of livestock, directly for the urban market, both within and on the fringe of an urban area” (Mougeot, 2006, p. 4).

UA has long been dismissed as an unconventional activity that has no place in cities. Nevertheless, its potential is beginning to be realized. According to Redwood (2009) UA “is found in every city, where it is sometimes hidden, sometimes obvious. It is a long-established livelihood activity that occurs at all scales from the small family-held market garden to the large agri-business located on the fringe of a city” (Redwood, 2009, p. 1). UA is in essence about self-sufficiency as it involves creating work, income and food. Additionally, transport requirements and costs are low or non-existent and a market for

the products already exists, to mention only some of the advantages. Many people, especially in DC (developing countries), who move to urban areas, do not find the jobs and opportunities they are looking for. Hence, UA can be seen as a common survival strategy used by the poor to deal with food insecurity and poverty (Smit, Ratta and Nasr, 2001). Additionally, natural settings in urban areas can help promote social interaction, physical activity and mental health (Roetman and Daniels, 2008). Concurrently, more and more people, especially in cities of the so called highly developed countries (HDC), have the desire to grow their own vegetables in order to break with existent food production chains and markets, to feel closer to nature or to simply live healthier.

Nonetheless, it needs to be considered that although UA offers enormous potential, producing food in cities is not free of problems (Redwood, 2009). For example, hygiene is a major concern. The different stages involved in the production, transport, processing and the eventual selling and consumption of the food, increases the likelihood of health risks to creep in at any one of these points (Mougeot and Munro-Faure, 2007). A study in Kigali, Rwanda can serve as an example here: Amaranth grown near marshes polluted with industrial waste contained high concentrations of cadmium and lead (FAO, 2012).

However, in times of crisis, UA has become one reaction to deal with food insecurity, particularly for the poor, which influenced Redwood (2009, p. 4 & 5) when he drew the following conclusion: “As it turns out, the macroeconomic climate has been a significant influence in upsetting food security throughout the world.” The increased number of kitchen gardens during and especially after the First and Second World War in Germany can serve as an example here (Schwarz, 1988).

Smit (1996) predicted that UA would be practiced by 400 million urban dwellers in 2005 (Based on data from 1993). It is the only existing global estimation. In 2005 the estimated quantities supplied by UAP were thousands of metric tons and millions of liters of- fresh food like GLV (Green leafy Vegetables), milk, fish or poultry consumed by city inhabitants (Kang'ethe, Njehu, Karanja, Njenga, Gathuru and Karanja, 2010; Mougeot, 2005; Mougeot, 2006; Smit et.al. 2001). These numbers demonstrate that UAP is making a significant contribution to urban food supplies. Mougeot and Munro-Faure (2007, p. 4) concluded in 2007 that “While much of the produce is for self-consumption, increasing amounts are also sold for income and are a source of fresh produce for those who would otherwise have no access to it.”

This master thesis focuses on urban agriculture projects (UAP) – UA practiced in groups on public/open spaces - under special consideration of social exploration and ecological challenges. In particular, the different stakeholders and the dissimilarities in terms of management of these UAPs, in Namibia's capital city, Windhoek and Germany's capital city, Berlin, were examined. In terms of ecological challenges it concentrates on the origins of seeds, the impact of UAPs on local crop plant diversity and the potential impact of alien invasive species on the surrounding areas. More precisely two ecological related questions are in focus:

- (1) Does UAP have the ability to maintain local crop diversity?
- (2) Can UAP be the source of alien invasive species impacting the surrounding area?

It should be noted that this thesis is focusing on ecological rather than the socio-economic impact of UAPs.

First of all a detailed review of the literature concerning UA will be conducted. The literature review of UA includes a presentation of the UAs development, with special consideration of access to resources, and then moves on to look at their relationship with and upon the environment. Additionally the current states of UAP in Windhoek and Berlin are going to be analysed. Finally, the literature review ends with a discussion of the current problems faced by these projects. In the following part the objectives and hypothesis are demonstrated.

The thesis then moves on to present the research process and the Materials and Methods used. More precisely, the methodology consisting of six main data collection techniques: questionnaire survey, expert interviews, field work, direct observation, internship and desk study will be described in detail. In the following chapter results are statistically analysed and presented, followed by a discussion. Subsequent practical applications and implications of the research findings will be stated and a conclusion will be drawn. The thesis will end with suggestions for further research and a conclusion.

## **2. Literature Review**

Urbanization – “the increase over time of the proportion of the total human population that is urban as opposed to rural” (Davis, 2011, p. 20) - is the most significant demographic trend to appear over the twentieth and twenty-first centuries. This phenomenon is intensely affecting social lifestyles, food supply and biodiversity among others. Cities all over the world have emerged as the major form of human settlement. In 2007 over 50% of all of the world’s population was living in urban areas for the first time in human history. By 2015 there will be nine mega-cities -“defined as cities with

populations of at least 10 million” (Mougeot, 2006, p. 3) - each with more than 20 million inhabitants according to Engelhard (2006). There is nothing new about the fact that “as urban areas grow in population, they expand outward, often overwhelming the natural environment, destroying ecosystems, and drawing resources from well beyond their defined limits. Further, they depend on immense imports of food, energy or other resources” (Mougeot, 2006). Consequently, conferring to Deelstra and Girardet (p.1) “there can be no sustainable world without sustainable cities” and UAP is only one of many tools that can be employed in order to turn cities into a more ecological sustainable environment.

UAP includes the growing of plants, the raising of animals for food as well as other uses within cities, towns and surrounding areas. Related activities such as the production and delivery of inputs and the processing and marketing of products also fall under the category of UAP. The variety of production systems, within UA ranges from subsistence production and processing at household level to fully commercialized agriculture (FAO, 2010; Redwood, 2009; van Veenhuizen, 2006). UA “can involve anything from small vegetable gardens in the backyard to farming activities on community lands by an association or neighborhood group” (FAO, 2010, p. 1). UAP is generally characterized by closeness to markets, high competition for land, limited space, use of urban resources such as organic solid wastes and wastewater, low degree of farmer organization, mainly unpreserved products and a high degree of specialization. Additionally, it is characterized by supplying perishable products such as GLV, fresh milk and poultry products. UAP has to a large extent complemented rural agriculture and by increasing

the efficiency of national food systems (Mougeot and Munro-Faure, 2007; Redwood, 2009; van Veenhuizen, 2006). Obviously, UAP alone cannot solve the ecological problems of growing cities, but it helps to protect the environment in a variety of ways. The improvement of air quality is one example of the positive effect UA can have upon urban settings - the cultivation of every available piece of open space reduces pollution and improves air quality. The fact that less food has to be transported into the city further contributes to making cities more economically and environmentally sustainable (Deelstra and Girardet; Mougeot, 2006).

On the other hand negative health impacts – in particular linked to poor food quality - may have a dangerous effect on nutrition. Some examples of the disadvantages or even dangers linked to UA are the contamination of produce through waste recycling or air pollution which results in a lack of hygiene in food processing and marketing activities. Furthermore, transmission of a zoonotic disease or the leaching of agrochemicals into soils and waters can occur (Crush, Hovorka and Tevera, 2010; Egal, Valstar and Meershoek 2001; Mougeot and Munro-Faure, 2007). In general agriculture can affect health through infectious diseases according to IAASTD (2009). More precisely, approximately 75% of emerging diseases are zoonotic. Another example is the fact that 35% of marketed foods have detectable levels of remains of agrochemicals: 1-3% is above the legally defined tolerance levels in the USA (Smit, Ratta, Nasr, 1996). In this sense UAP “can be an environmental polluter and at the same time be affected by harmful substances derived from other sources” (Bopda et al., 2010, p. 50).

UAP has been part of cities since the first human urban settlements (Mougeot, 1999; Mougeot, Gasengayire, Lee-Smith, Prain and de Zeeuw, 2010). Nevertheless, in the past most cities have to a large extent ignored or forbidden UAP. However, this stance is changing and its acceptance in a lot of cities is growing (Mougeot, 2006; Redwood, 2009; van Veenhuizen, 2006). It “became a topic of research and policy interest in the 1990s” (Mougeot, et. al., 2010, p. 267). Mougeot, et. al. (2010) offer the following explanation for the sudden and relatively late increase of attention towards UA. According to them concentration increased mainly because UA became simply more visible in urban areas, but also because it had “moved onto the radar screen of an environmental movement that was paying growing attention to urban areas from the 1970s.” While in the 1970s UA was an expression of self-determination; it is now widely recognized by international bodies like the FAO (Food and Agriculture Organisation) and the UN as a means to make city life more sustainable. The international community started to address the problem that was caused by urbanization, trying to find solutions in order to achieve urban sustainability. The *Report of the World Commission on Environment and Development: Our Common Future* by the UN was one of the first UN publications emphasizing the potential of UA for sustainable urban development (UN, 1987; Mougeot, 2006). The following abstract is taken from this UN report in order to demonstrate the level of attention that was being paid to UA already in 1987: “Governments should also consider supporting urban agriculture (...) Officially sanctioned and promoted urban agriculture could become an important component of urban development and make more food available to the urban poor (...) It can also

provide fresher and cheaper produce, more green space, the clearing of garbage dumps, and recycling of household waste” (UN, 1987, p.174). In addition to this many organizations like the FAO, UN-Habitat and UNEP (United Nations Environment Programme’s) were beginning to take UAP more seriously. *The Global Report on Human Settlements 2011* highlighted that “urban agriculture can be an important component of local economies and food supply” (UN-Habitat, 2011, p. 64). Development becomes visible not only in the international agreements mentioned above, but also in regional ones. One example is the comment from the ecologist, Crispin Maseva, on the Conference on Urban and Peri-urban Agriculture in East and Southern Africa in 2003: “Policy makers and senior managers need to be made aware of the issues that need to be addressed to promote urban and peri-urban agriculture” (Mushamba et al., 2003, p. 12).

In the contemporary world UAP is being practiced on an ever increasing scale. In cities there are often areas which are less suitable for housing but are good to produce food (Deelstra and Girardet). Especially in DC UAP is a good implement to fight hunger and poverty. On average the urban poor spend 60-80% of their income on food (Egal, Valstar and Meershoek 2001; Mougeot, 2006; Nasr and Ratta, 1999). Between 2000 and 2010, the number of slum dwellers in DC increased from 767 million to 828 million and it is likely to reach a total of 889 million by 2020 (UN-Habitat, 2008). According to UN-Habitat (2008) 32.7% of the world’s urban populations in developing regions live in slums. The defining characteristics of slums are substandard quality structures, a lack of basic services, overcrowding and social exclusion (UN-Habitat, 2011). “UAP

contributes to poverty alleviation both through a reduction of expenditures and through an increase of income and plays a significant role in household food security” (Mougeot, 2005, p. 1). UAP can therefore be regarded as one strategy to attain the first of the eight Millennium Development Goals (MDG) signed by 189 countries in 2000. MDG 1 calls for the eradication of “extreme poverty and hunger” (Jensen, 2011, p. 11). It can be unequivocally declared that UAP contributes directly to this goal: the two major forces driving the poorest city dwellers to become urban farmers are, firstly, the critical need for a reliable source of fresh food and, secondly, the hope of improving their precarious financial circumstances (Mougeot, 2005). Investigations into a handful of cities in East and Southern African countries (Eritrea, Ethiopia, Kenya, Tanzania, Uganda and Zambia) found out that approximately 25 million of the 65 million urban inhabitants got some of their food from UA. The prediction for these countries is that by 2020 no less than 35–40 million urban citizens will depend on UA (Denninger, Mats, Egero and Lee-Smith, 1998; Kang’ethe et. al., 2010; Mougeot, 2000).

Unfortunately, there “is no doubt that enormous numbers of urban farmers, mostly very poor and usually women, produce food in urban areas, with insufficient policy support” (Mougeot, 2005, p. 12) In many cities UAP is forbidden or seriously restricted but continues to exist without controls or permits. These results in problems with resources such as water, land, access to training or credit because there is no accompanying policies and laws supporting the development UAP. “Without security of access to land, there is no incentive to invest in the land”, so Mougeot and Munro-Faure (2007, p. 21). Policy towards UAP is necessary not only because its support is contributing to cities

whilst regulating the health and environmental aspects, but also because it facilitates the access to essential resources. Additionally, it must be ensured that the regulations for UAP do not add too many costs as this will hinder production efficiency (Mougeot and Munro-Faure, 2007).

When analysing the social impact Ellis and Sundberg (1998, p. 221) noted that UA “claims too much by equating all food production in towns with improved food security for poor people and it offers too little by failing to consider the role of rural-urban interactions in explaining the survival capabilities of the urban poor.” Additionally, Tevera (1999) argued that there is little proof that the poor derived much benefit from UA primarily because very poor urban residents or new arrivals in a city have limited access to land. Furthermore, they tend to move residence too often in order become involved in UA.

It seems clear that historically and contemporarily “mass urbanization and a rise in urban poverty are central factors in the development of UA” (Frayne, 2005, p. 37). In HDC UA is practiced today mainly as revival of an ecological urban custom or for the social purpose of collectivism. UA as a food supply strategy for the urban poor in these countries plays a minor role contrary to DC.

This thesis focuses on gardens exploited by groups. Whereas, in this sense community gardens as well as intercultural gardens are pooled under the synonym UAP The first community gardens were created in New York during the 1970s, local citizens cleared the areas around their land and started planting flowers, herbaceous perennials and vegetables (Schwiontek, 2008). In Germany around 100 intercultural gardens arose. This

concept brings together people with very different life histories and nationalities looking after a garden together (Schwiontek, 2008).

The crucial aspects of UA will be dealt with and looked at in more detail in the following. A separate subchapter will be dedicated to each one of the essential aspects of UA. There will be a chapter on the access to the main resources (land, water and finance) and a second subchapter on the environment. The literature review will end with a closer look on the status of UA in the two investigated cities Windhoek and Berlin.

### **2.1. Access to resources**

The productivity and profitability of UA is directly dependent on the ability of accessing essential resources. The most important environmental inputs required for UA are land and water. “Low availability of clean water, and most particularly, high pressure on land, represent major constraints for urban farmers” (Mougeot and Munro-Faure, 2007, p. 56). Further, limited access to credit facilities can be identified as the most important social input. Additionally, inputs like seeds, tools, fertilizers or pesticides and also access to training and information. Furthermore, a lack of legitimacy and political factors can play a significant role, “where UAP lacks policy support, it often means that producers are not able to access official sources of assistance” (Mougeot and Munro-Faure, 2007, p. 17).

Their relative importance of the inputs consequently changes depending on the particular conditions.

### **2.1.1. Land**

Urban development and resulting pressure on the land is putting UA under pressure. “In many cases, they grow illegally on waste land, roadsides, temporary vacant building lots etc.” (Mougeot and Munro-Faure, 2007, p. 17). “This can either be due to lack of choice or due to lack of knowledge where land is available since many cities have large areas of temporarily unused [land]” (Redwood, 2009, p. 9). Access to land is limited by increasing urban extension and upward pressure on land markets. UA is often occurring on lands that are designated for development, where construction has not yet started (Mougeot and Munro-Faure, 2007; Redwood, 2009).

As cities grow, the use of land for UAP activities comes into conflict with city planners since the value of land for sale is generally far higher than its value for production of food (Mougeot and Munro-Faure, 2007). In Germany for example, parks and cultural institutions are classified as luxury and public property. They often do not make any profit and in some cases the cities even need to subsidize them. Consequently, it is more financially attractive for governments to use the space for profit making schemes such as car parks or leave the land unused. But more sustainable urban areas are needed. UA does not need a lot of space, it can be combined with other land-uses. For example: in school yards or in areas close to rivers where no housing would be suitable. Unfortunately, at present not many city planners pay attention to UAP: “Access to affordable housing, public transportation, employment and health are issues that require urban planners. Food security is one area in which few planners have yet to deliberately apply a similar rationale for intervention in urban planning” (Gabel, 2005, p.107).

### **2.1.2. Water**

Access to water is a similar and perhaps even more important issue than access to land, “since plants can be produced under hydroponics systems without the use of soil, but not without the use of water” (Mougeot and Munro-Faure, 2007, p. 17). Nevertheless, these two resources often go hand in hand. Non-existing ownership can force especially poor farmers to make use of marginal lands with water of low quality (Faruqui et al, 2004; Redwood, 2009), as small amount of waste water can be suitable for agriculture by providing nutrients that contribute to crop growth. However, when improperly used it “poses health risks both to the farmers who are in direct contact with the waste water and also to the consumers from the risk of eating vegetables irrigated with waste water” (Mougeot and Munro-Faure, 2007, p. 17). A study by Nasinyama, Cole, Lee-Smith (2010) conducted coliforms and *E. coli* in significant numbers in most samples from contaminated (waste water use) sites. “Control sites, that did not use wastewater were less contaminated with coliforms and *E. coli* compared to the sewage-contaminated sites” (Nasinyama, Cole, Lee-Smith, 2010, p. 173).

As a result of a lack of time and resources within this thesis the problem of wastewater cannot be analysed.

### **2.1.3. Finance**

Another major issue driving UA is income. It is obvious that without proper funding many urban dwellers, especially in DC, cannot afford resources like tools, seeds or pesticides. It is known that women play a particularly important role in UAP. Mkwambisi (2009) stated that female-headed households are more efficient in terms of

farming. But, women often experience problems in accessing inputs, like credit or access to land that often results in lower production which results in less income. This is especially problematic due to the fact that the profit from the harvest is often used for other basic needs; such as schooling for children (Hovorka, 2005; Lee-Smith, 2006; Mougeot, 2005; Mougeot and Munro-Faure, 2007). Consequently, “with fair access to resources and services, UA can be an integral component of income and employment strategies, while also building more self-reliant local food supply systems” (Mougeot, 2005, p. 11).

In Europe financing opportunities are more accessible. Programmes such as Urban II (Urban II, 2008) provide credit for agricultural projects. In addition to this, funding in Germany can be acquired via the city redevelopment programme West/Ost (Stadtumbau West/Ost) (BBR, 2008).

## **2.2. Environment**

Globally, agriculture in general is facing challenges in terms of population growth, urbanization, degraded environment or climate change, to name but a few. Consequently, Galluzzi, et al. (2011, p. v) recommend, that “Agricultural production systems need to focus more on the effective conservation and management of biodiversity and ecosystem services in order to address the twin objectives of environmental sustainability and food security.” UA can, although only on a small scale, go some way to address this recommendation. Authors, like Bohn and Viljoen (2011); Deelstra and Girardet (2000); Mougeot (2000); Rasper (2012), Spiaggi (2005) state that UAP is not only providing food production and self-employment, it also helps to

improve the microclimate in cities, conserve soils, minimize waste and improve the nutrient recycle. UAP can supplementary improve water management, biodiversity, the O<sub>2</sub>–CO<sub>2</sub> balance, as well as the environmental awareness of city inhabitants. Consequently, it reduces the use of primary energy in production as well as distribution: “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” (Mougeot, 2005, p. 12). Additionally, these locations can support indigenous species that are adapted to local climatic and soil conditions and provide food and habitat for native wildlife with minimal maintenance requirements, “The impacts of urbanization on native species are poorly studied, but educating a highly urbanized human population about these impacts can greatly improve species conservation in all ecosystems” (McKinney, 2002) Nevertheless, Roetman and Daniels (2008) states that in order to generate biodiversity-positive outcomes in urban areas it needs to be consider that, cities have “substantially altered and novel water flows, exhibit idiosyncratic soil compaction and composition and remaining natural habitat has been fragmented” (Roetman and Daniels, 2008, p. 3). This influences the biodiversity potential.

This thesis focuses primarily upon agricultural diversity. Whereby, “The genetic resources for food and agriculture, including all cultivated and domesticated varieties, their wild relatives and managed of wild animals and plants” (Biodiversity in German development cooperation, 2010, p. 32) will be analysed. Furthermore, the components providing ecological services, like pollinators will also come under consideration. Besides, the components providing ecological services, like pollinators. As the

Conference of the Parties of the Convention on Biological Diversity 2010 in Japan highlighted: “strategies, actions, agricultural practices and approaches, and an enabling environment that promote the conservation and the sustainable use of biodiversity for food and agriculture is of utmost importance“ (Galluzzi, et.al. 2011, p. v).

Sustainable agricultural production in general, but also in cities, can be reached among others through farming methods that are orientated on ecosystem-based approaches aimed at increasing sustainability of production systems. This includes a high level of crop genetic diversity, on farms as well as in seed banks, which in turn increases and maintains production levels and nutritional diversity through the variety of agro-ecological conditions. Favourable here is an ecosystem-approach strategy, including the crop diversity that is sustained with an accompanying diversity, like wild pollinators. And an adaptation of production system management strategies is necessary. This includes no soil disturbance, the maintenance of a mulch covers as well as cover crops in order to increase the biological activity and diversity of the production system. For that reason, good farming practices, such as pest management strategies that follow an ecosystem-based approach to increase the sustainability and crop diversity, is fundamental (Galluzzi, et. al., 2011).

Essential for a sustainable use of agro diversity and its conservation are seeds. Since the 1980s small seed producers are bought off by the big companies. Today, seed production and farming are two different processes. In 1975, 7,000 seed producing companies made up no more than 0.5% of the world market. Compare that with contemporary figures and the top ten of the world’s biggest seed company’s control 73% of the world’s markets –

of which, three of these are in possession of over the half. Namely: Monsanto (23%), DuPont (15%) and Syngenta (9%) (Rasper, 2012), and they are first and foremost chemical companies. These monopolies have ecological and social consequences. For example, these companies are selling hybrid (sterile) varieties making the farmers dependent on them hence they are not able to save seeds for the next year. For most parts of the world this brings not only major social consequences, but also, ecological ones too. Breeding is not possible, hence no adaptation to the changing climate is possible in the next generations, and therefore the gene pool is perpetually reducing. As this thesis is focusing on ecological aspects, the social-economic impacts and morally critical practices of these companies cannot be discussed here. The focus is rather on how it can influence the local crop diversity.

Urban areas can include traditional as well as alien species. Important here is the preservation of existing natural and remnant vegetation or UA as a way to incorporate biodiversity in urban developments (Roetman and Daniels, 2008). Alien invasive species can occur naturally or by human intervention such as exploration, colonization, trade and tourism. They are species that have been introduced into an area outside their normal distribution, either by accident or on purpose, and have invaded their new home, threatening biological diversity and human well-being (CBD, 1992; Shrine, Williams and Gundling, 2000).

Furthermore, it is necessary to explore the relationship between biodiversity, sociocultural diversity and UA. As well as assessing the impacts of UA on the sustainable development of cities (Smit, 2000; Spiaggi, 2005).

This thesis is mainly looking at income people get from the garden rather than funding they receive from outside.

### **2.3. Urban Agriculture in Windhoek**

According to Mougeot (1999) and Tevera (1999) UA has been growing in many African countries since 1970. This growth can be explained by fast urbanization, bad domestic food-distribution systems, employment cuts, rising inflation, sinking purchasing power of the middle class, negligent urban regulation and civil wars. Furthermore, the growth of UA in Africa can be related to immense currency deflations in the late 1980s and early 1990s (Drakakis-Smith, 1995; Maxwell, 1999; Mougeot, 1999). It is estimated that Africa is on average one-third urbanized today. UA is already one aspect of the transformation of African cities: “The process of urbanization is seen as being slower in southern Africa than elsewhere and as having been hindered by the slow industrial growth and limited employment opportunities of the past decade” (Frayne, 2005, p. 44).

In terms of policy development of UA in Africa the Harare Declaration is one of the most significant. Signed in 2003, “by ministers of local government and agriculture, it commits their intention to develop UA in five African countries (Kenya, Malawi, Swaziland, Tanzania and Zimbabwe)” (Redwood, 2009, p. 6 & 7). This thesis focuses on the African country Namibia (Figure 1).



Figure 1: Map of Africa – Namibia ([www. maps.pickatrail.com](http://www.maps.pickatrail.com))

The country got independence from South Africa in 1990. Although it has made significant progress – particularly in facing social problems - it “continues to face economic, environmental, and social problems. There still exists a great disparity between rich and poor, and barriers are apparent between races due to differences in language and education” (Bridge, Brown, Robichaud and Thistle, 2006, p. 1). Namibia has a total area of 824.268 km<sup>2</sup> supporting a population of 2.1045.900 (2011) (UN-HABITAT, 2008; National Planning Commission, 2012). The UN-Habitat (2011) states, that the estimated level of urbanization (the percentage of the total population living in urban areas, as defined by the country) in Namibia in 2010 was 38%, and will rise to 51.1% in 2030. This occurs mainly because of rapid migration of rural population in search of employment into urban environments. The results are the ever expanding

informal settlements in the urban areas. The rate of estimated slum dwellers in 2007 was 33.6% (UN-Habitat, 2011).

Windhoek (Figure 2) is by far the most important urban center in the country with an area of 645 km<sup>2</sup>.



Figure 2: Map of Namibia – Windhoek ([www.unicef.org](http://www.unicef.org))

Most of the people who migrated to Windhoek ended up living in shacks in the informal settlements of Katutura. Today it is an official suburb of Windhoek, divided into over 50 communities (Bridge et.al., 2006) and has a population of 199,300 (340,900 being the total population of Windhoek), “Katutura is still inhabited primarily by blacks and coloreds, and now consists of lower, middle, and upper class neighborhoods” (Bridge et.al., 2006, p. 5). It was “estimated that about 97% of the people living in these informal settlements earn an income less than the minimum subsistence level for Windhoek” (Dima et al., 2002, p. 13).

The growth of the population in Windhoek is placing great pressures on the city’s resources, the greatest of which being on water. Not only resources are under threat,

unemployment is one of the biggest social problems in Namibia. The large arrival of migrants, combined with a lack of job opportunities, has caused the unemployment rate in the Windhoek area to rise up to 33.5%. For the youth (15-34) it is even higher with 43.6% (NLFS, 2008).

As the most arid country in Africa, Namibia's agricultural base is fragile. Mainly as a result of weak links to available markets and high competition with imported products (NPC, 2012a). More than 50% of vegetables and fruits sold in urban centers of Namibia are imported from South Africa. Additionally, 19% of the total population of Namibia is undernourished (FAO, 2011). To attempt to deal with this, Namibia has "implemented a market-share promotion initiative through the Namibia Agronomic Board, which contributed to an increase from 7% to 32.5% in the consumption of locally produced fresh horticultural produce" (NPC, 2012a, p. 107). Between 2006 and 2007 Namibia's horticultural production rose by 36% from 41.210t to 56.003t. In general, the yearly demand is estimated at 120,000 t. The main crops are: Onions, Tomatoes, Potatoes, Cabbage, Watermelons and Sweet melons (MAWF, 2007). With the objective of improving the eating habits of the local population and of reducing imports from South Africa, the MAWF (Ministry of Agriculture, Water and Forestry) is supporting several initiatives to improve vegetable production within cities. However, no proper policy relating to UAP exists. This absence severely complicates the intensification and development of UAP (Dima et al., 2002; Ogunmokun, 2005). Furthermore, opportunities for UAP to strengthen local food security are limited and UAPs face problems in ensuring cities' economic and environmental health.

Nevertheless, UA is undertaken in Windhoek, according to Frayne (2005). Although it is limited in incidence and scale UA is evident in Windhoek. This is confirmed by Dima et al. (2002) who stated that UAP is practiced by over 70% of the residents of Windhoek. Furthermore, over 23 types of vegetables and fruit trees are grown in urban and peri-urban agriculture systems in Namibia, according to Katjepunda and Kamupingene (2007). International organizations are involved in the development of UA in Namibia as well. The MAWF, with the assistance of FAO and donor support from Belgium, established a microgarden demonstration at the Windhoek Multipurpose Youth Resources Centre (Garden of hope). The MAWF was given \$255.996 for the period from Oct. 2001– Dec. 2007 by the FAO to integrate urban and peri-urban horticulture development in Namibia (FAO, 2011).

As mentioned earlier, it is well-known that households in many cities in the world engage in UA to improve food security. It is therefore important to quantify the extent to which UA is practiced in Windhoek, thus appreciating how it can potentially contribute to food security, conservation of biodiversity in cities and help in the protection of local crop varieties.

#### **2.4. Urban Agriculture in Berlin**

The first urban agricultural activities were embarked upon more than 150 years ago in Germany, called allotment gardening. This involved subdividing a piece of land into a few, or up to several a hundred, parcels that are assigned to individuals or families for non-commercial gardening. The plots are rented out by a community gardeners

association. This is contrary to other community garden types where the entire area is farmed collectively by a group of people (Groening, 1996).

Today a different form of UA in cities occur, for example: home-, family- and backyard gardens (attached to a private house), community gardens (often on public or semi-public grounds), institutional gardens (run by schools or hospitals, etc.), open field plots (small holders, especially peri-urban, owned or rented) or rooftop gardens. They can further be distinguished into: intercultural-, generation-, neighborhood-, guerilla-, woman-, study gardens, kids-farms or permaculture projects (de Zeeuw, 2005; Kropp, 2011; Müller, 2011; Rasper, 2012).

Berlin (Figure 3) has an area of 892 km<sup>2</sup>. 3.4% of this is abandoned areas. 4.2% are declared as farming land. 18.3% as forest and 6.7% water areas. Berlin has 3.427.114 inhabitants and an unemployment rate of 12.2% (Amt für Statistik Berlin-Brandenburg, 2011).



Figure 3: Map of Germany – Berlin ([www.aifsabroad.com](http://www.aifsabroad.com))

Between 100 and 160 intercultural gardens exist in Germany with the goal of integration by `working together` (Kropp, 2011; Müller, 2011; Rasper, 2012). Today, at least 20

community gardens exist in Berlin alone (Figure 4). Often gardens integrate economic, social and political aspects (Arndt, Haidle and Rosol, 2004).

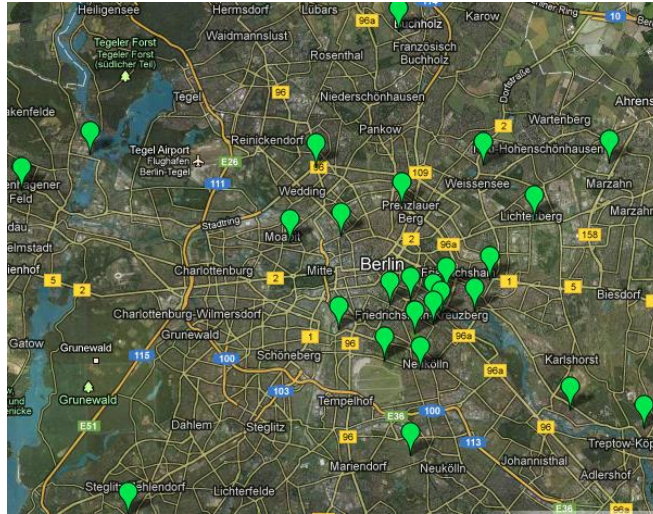


Figure 4: Community gardens in Berlin (www.maps.google.com)

Reasons and forms of UA in Berlin differ. Nevertheless they have gardening, joint caring of space and that they are somehow public, in common with one another. Mostly flowers, trees and shrubs are grown but also fruits and vegetables (Arndt, Haidle and Rosol, 2004).

Self-determination, community, being outside, to be with children and the need to do something meaningful and productive, are the predominant motives for these projects. Furthermore, ecological food and a smaller ecological food print (Rudloff, 2011). Whereas the Ecological Footprint “accounts for the flows of energy and matter to and from any defined economy and converts these into corresponding land / water area required from nature to support these flows” (Wackernagel and Rees, 1996, p. 3).

As in Namibia no clear policies exist for UA in Germany. Except in Berlin, its Agenda 21 explicitly named intercultural gardens as sustainable development goal (Abgeordnetenhaus von Berlin, 2006).

## **2.5. Statement of the research problem**

In Namibia little research on UA has been pursued. Since the improvement of UAP's status in Namibia relies heavily upon a proper understanding of the county's UA, this poses a serious problem. With regard to the comparison of UAP in DC and HDC, very little literature can be found. This is particularly alarming since networking and learning from each other is essential in order to face rising food prices, the lack of nutrient supply and the loss of biodiversity in cities. In Berlin the research and publications about the topic have rapidly grown in the past decade. The comparison of Windhoek (representing a city in a DC) and Berlin (representing a city in a HDC) demonstrates how respective cultural backgrounds affect the way UA is practiced. Whereas, "A culture is a configuration of learned behaviors and results of behavior whose component elements are shared and transmitted by the members of a particular society" (Linton, 1945, p. 32). This thesis focuses on the farming methods and varieties of plants used within a particular society. The comparison also shows in what way the influence of a different availability of resources (water, land, tools, seeds, professional advice, pesticides, fertilizer and finance), farming methods and management purposes in UA differ from city to city and can lead to very different results. This knowledge is important, not only in order to develop a broader picture about UAP in general, but also in order to be able to improve its status and show its potential. In this context Mougeot (2005, p.7) makes

the following statement: “Data about UA are few and far between. A more systematic effort is needed to improve the breadth, periodicity and consistency of statistical monitoring on UA production”. Additionally, van Veenhuizen (2006, p. 11) stated that “although generalizations about urban farming systems can be made, it is difficult to make comparisons between the various farming systems in different cities, especially due to a lack of data.” The aim of this thesis is to contribute to tackling this lack of information.

With the increase of the number of people living in urban areas, the protection of biodiversity will become even more important. Biodiversity and its protection are not only necessary in order to provide food supply, but it would also ensure the conservation of species and their recreation. UAPs have the ability to secure food and conserve crop diversity, but only if it is recognized and well promoted by policy makers. Ecosystem services need to be protected in rural as well as in urban areas. The loss of biodiversity in many agricultural production systems has left them vulnerable and dependent on continuous use of external inputs. This loss limits the future capacity of agriculture to respond or adapt to changes, such as increased urbanization or reduced land, water and resource availability (Galluzzi et. al., 2011). Nearly no information is available about ecological aspects in these gardens. Subsequently this thesis focuses on the ecological aspect of (1) crop plant diversity and (2) alien invasive species: (1) Research conducted on the impact of UA on local crop diversity is weak and needs to be improved. Appropriate knowledge is necessary in terms of food security and conserving crop varieties. UAPs can be of a high ecological and economical value, but this can only be

recognized with a good inventory. (2) If UAPs turn out to be the source of alien invasive species (which may occur in the form of a pest) it is important to investigate the source of the problem in order to find a way to deal with it. Of course it is not possible to look at ecological processes in an artificial system without taking humans into consideration as well. Nevertheless, the focus in this thesis is on ecological parameters.

This study aims to improve general awareness of the benefits of UAP in Namibia. Apart from that, it also strives for an increase of awareness on a political and legal level.

This study will provide a holistic overview of the UAP in DC and HDC in terms of management. The results have the potential to contribute to improving the projects and the networking between countries, as “cooperation between countries is a promising avenue for mutual learning on how to promote positive policy change in quite different sociocultural and legal-institutional settings” (Mougeot, 2005, p. 22).

This study’s main goal is to reveal the potential of food supply and conservation of biodiversity within cities.

## **2.6. Objectives of the study**

The objectives of the study can be divided into ecological (1) and social purposes (2):

### **1. Ecological objectives:**

- a) to document and compare crop plant diversity in the different UAPs (species richness, species composition, biomass and degree of weed infestation) in Windhoek and Berlin
- b) to document and compare the origins of seeds cultivated in the different gardens in Windhoek and Berlin

- c) to identify the potential of invasive plants from those inventoried in the agriculture projects in Windhoek and Berlin
- d) to determine the impact of UAPs on the potential conservation of crop plant diversity

## 2. Social objectives:

- a) to produce a preliminary list of current UAPs in the urban areas of Windhoek
- b) to analyse and compare the different management purposes and stakeholders of UAPs in Windhoek and Berlin

### **2.7. Hypothesis of the study**

The hypotheses are also divided into ecological (1) and social purposes (2).

#### 1. Ecological hypotheses:

- a) Crop plant diversity (species richness, species composition, biomass and degree of weed infestation) is different within UAPs in Windhoek and Berlin because of the different cultural backgrounds, availability of resources (water, land, tools, seeds, professional advice, pesticides, fertilizer and finance), farming methods and management purposes of the UAPs.
- b) The origin of seeds cultivated in the UAPs differ from project to project within Windhoek and Berlin because of the different cultural background, availability of resources (water, land, tools, seeds, professional advice, pesticides, fertilizer and finance), farming methods and management purposes of the UAPs.
- c) Crop varieties planted in the UAPs can become invasive because some of them have the potential to spread out.

- d) UAPs have the potential to conserve crop plant diversity due to specific management purpose.

## 2. Social hypothesis:

- a) The management of UAPs differs within Windhoek and Berlin due to different cultural background, availability of resources (water, land, tools, seeds, professional advice, pesticides, fertilizer and finance), farming methods, management purposes and personal motivation of the stakeholder of the UAPs.

## 3. Materials and Methods used

This chapter aims at explaining the research methods and materials employed.

Most of the work about the UAP in Windhoek was inspired by an internship at the MAWF. This work experience was instrumental to develop a sound and integrative research design as it allowed active engagement with the day-to-day visits of the UAP in Windhoek. Literature on UAPs in Windhoek is very rare and maps do not exist. The internship was able to compensate for this lack of information. Only by working at the MAWF was it possible to locate the projects in Windhoek and to contact the different stakeholders. Due to the regular visits it was possible to get a good understanding of the different projects and build rapport with the staff. An insight into how the projects were planned, managed and accomplished was gained. Moreover, the direct experience of working for the MAWF increased the researcher's awareness of the problems Namibian stakeholders face with regard to UAP in Windhoek. It should be stated here that the requirements in terms of support and time were better in Windhoek than in Berlin.

The following table gives the reader an overview of the research phases (including a time frame, the location and the materials and methods used).

Table 1: Time frame of the research including methods and instruments (Carolin Tischtau)

| Phase and location                                                                               | Methods and Materials                                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
|--------------------------------------------------------------------------------------------------|-----------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>I</b><br><b>Development of the proposal</b><br><b>June – December 2011</b><br><b>Windhoek</b> | Surveying of the object of study and approximation to the topic | Literature review<br>Newspaper and Internet research                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|                                                                                                  | First visits to ensure projects are present in Windhoek         | Exploitative visits due to statements of articles or people<br>First contacts with MAWF<br>Mailing experts in order to find gardens                                                                                                                                                                                                                                                                                                                                                                  |
|                                                                                                  | Adjusting hypothesis and methodology                            | Feedback through Summer school                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| <b>II</b><br><b>Field work</b><br><b>Windhoek</b><br><b>May – August 2012</b><br><b>Windhoek</b> | Inventory existing UAP in Windhoek                              | Internship MAWF                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
|                                                                                                  | Excess to the gardens                                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
|                                                                                                  | Contacts with gardeners                                         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
|                                                                                                  | Choosing case projects                                          | Purposive sampling design                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
|                                                                                                  | Field work                                                      | Data is based on complete (100%) sampling within the three projects.<br>Measuring of garden,<br>Investigate stakeholders<br>Investigate species richness and composition<br>Investigate degree of weed infestation<br>Inventoried and categorized species and varieties<br>Investigate tools, seeds, pesticides and fertilizer used<br>Investigate origin of seed due to visiting the stock of the MAWF<br>Investigate farming methods<br>Investigating the origin of the seeds in store of the MAWF |

|                                                                                                      |                                                                                                                                                                      |                                                                                                                                                                                                                                                              |
|------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                                                                                      |                                                                                                                                                                      | Investigating the origin of the seeds in shops of Agra, Starke Ayres and Agrigronambia                                                                                                                                                                       |
|                                                                                                      | Identifying of specimen                                                                                                                                              | Herbarium Windhoek                                                                                                                                                                                                                                           |
|                                                                                                      | Questionnaires and interviews                                                                                                                                        | 19 Questionnaires (gardeners)<br>5 Expert interviews (3 stuff from MAWF<br>1 stuff from seed supply companies; 1 city of Windhoek)                                                                                                                           |
| <b>III</b><br><b>Field work Berlin</b><br><br><b>September – October 2012</b><br><b>Berlin</b>       | Choosing case projects                                                                                                                                               | Literature review<br>Internet research<br>Newspaper research<br>Attending of: lectures; Plenums meetings;<br>Runder Tisch meetings, Working Group Research                                                                                                   |
|                                                                                                      | Field work                                                                                                                                                           | Data is based on complete (100%) sampling within the three projects.<br>Measuring of garden,<br>Investigate species richness and composition<br>Inventory and categorize species and varieties<br>Investigate tools and seeds<br>Investigate farming methods |
|                                                                                                      | Interviews                                                                                                                                                           | 3 interviews with contact persons in the garden                                                                                                                                                                                                              |
| <b>IV</b><br><b>Desk study</b><br><b>December 2011 – November 2012</b><br><b>Windhoek and Berlin</b> | Literature review<br>Internet research about projects<br>Identifying data<br>Analysis of field data<br>Analysis questionnaires<br>Investigate alien invasive species | Library<br>Literature review (Excel; Primer)<br>Excel<br>Literature and Internet research                                                                                                                                                                    |
| <b>V</b><br><b>Output</b>                                                                            |                                                                                                                                                                      | First preliminary map of UAP in Windhoek<br>Written thesis<br>Information communication to Master students at HU Berlin and interested people<br>Co-working with the MAWF in order to communicate the detected problems and recommendations of the gardeners |

As it becomes apparent from the table a mix of methods was used. In general, the approach is best described as inductive, explorative and qualitative. The main methods used can be summarized as:

- Expert interviews: in-depth interviews conducted both personally and via the telephone,
- Questionnaire survey: set of closed and open ended questions
- Field work: in the different UAPs, including direct observation and seed/plant sample categorizing
- Desk study: in particular for literature review and on UAP in Berlin

The combination of different methods was necessary to gain a holistic overview about the phenomena of UAP in Windhoek and Berlin. This paper wants to examine how both environmental and social variables contribute to the recognition of UA as a tool to ensure a more sustainable development of urban areas in the future. Thus, both social science methods as well as natural science practices were integrated. Redwood (2009, p.10) supports this methodical approach for a holistic perspective: “Being such a broad topic, UA requires variety in the types of methods used in enquiry.”

The combination of interviews, questionnaires and field work is recommendable in order to develop a general overview as well as to get some in-depth perspectives on the topic. This way it is possible to compare the different results, to verify the given information and arrive at a final conclusion that is based on various sources. The question about the origin of seeds can serve as one example here: Some gardeners indicated that they got their seeds from China but research within the store of the MAWF showed that the seeds

did not come from China but South Africa. Furthermore, the conducted interviews with the seed supply companies revealed that the companies in question obtain all of their seeds from South Africa as South Africa constitutes their single source of seed supply.

It needs to be stressed that so far the academic community has neglected the issue of UA in Windhoek and there is little material available on the topic. The focus of the data collection for this thesis was consequently on Windhoek and Berlin serves more as the comparison part.

The following section will provide a reflection on these data collection techniques. Rather than giving detailed descriptions of the different methods, the main focus will be on the selection criteria and the various challenges encountered.

### **3.1. Samples**

Windhoek is almost ten times the size of any other urban place in Namibia and it is the home of every different ethnic groups. Consequently this city was selected as the field of research. Most of the growth in the city and its highest social diversity occurs within the township *Katutura*, where the research was undertaken. Three projects with a purposive sampling design were chosen. These projects in Windhoek were:

- (1) Dr. Sam Nujoma Garden of Hope
- (2) Garden of Hope
- (3) NEYO

Consequently Berlin, as the capital of Germany and biggest city, was chosen as the counterpart for Windhoek. The three projects chosen with a purposive sampling design in Berlin were:

(1) Rosa Rose

(2) Spreegarten

(3) Rote Beete

Time, information and funding limitations did not allow a wider coverage.

Purposive sampling is a technique focusing on particular characteristics of a population that are of interest, which will best enable the researcher to answer the research questions. The advantage is that generalizations from the sample that is being studied are possible. On the negative hand side it can be highly disposed to the researcher preference and can so be lacking representativeness (Guarte and Barrios, 2006).

Accessibility and willingness to cooperate affected the selection. The After-school Daycare Center in Windhoek for example is temporarily out of service and could therefore not serve as a case study.

Unlike in Windhoek, in Berlin a broad awareness of UA already existed in terms of academic, media and general public awareness. Consequently the work could build on already existing findings.

The research (in Berlin as well as in Windhoek) focused on small-scale production sites that did not exceed 1000 m<sup>2</sup> and were exploited by a group of 30 cultivators or less. The whole sites were analysed, every species was recorded, identified and categorized and every gardener had the opportunity to answer the provided questionnaire.

This type of sampling - case studies - has been chosen to provide a kind of background information that is needed in order to get a complete understanding of the area of research. In addition to that it is important to not only look at the numbers but also

seeing the context and human factors behind the data collected (IFAD, 2008). The strengths of the sampling-case studies are:

- Can be really detailed and provide important background information
- Closer perspective
- Suitable for complex situations where many variables interconnect and are likely to vary across different populations

The weaknesses of this method can be:

- Generally not considered to be representative
- Subjective and holding a risk of losing focus
- Generalization of the results can be difficult

(Dawn Kirkland, 2008; IFAD, 2008; Hofstee 2006)

### **3.2. Interviews and Questionnaires**

A total of five expert interviews were conducted in Windhoek. There is no scientific consensus on the notion of what constitutes an “expert” within the scientific community. Expert is a vaguely defined term within expert interviews. Some authors define them as people who are “highly skilled, professionally competent and class-specific” (Harvey, 2011, p. 432). The definition of who is an expert and who is not results from the specific research question. For this paper experts were defined as people who have specific knowledge and/or are involved in UA in both cities.

Interviews in Windhoek were carried out with three staff members from the MAWF who were asked to give information about the projects, about problems occurring and also technical, legal and organisational issues. Whereby, the interviews were not conducted

in the “normal way” - one interview where all questions are asked at ones. It appeared to be more informative to rather ask questions when clarification was needed or specific questions occurred during the visits and work within the projects. Therefore, the interviews conducted with the MAWF can be seen as a mix of direct observation, field work and interviews, rather than as a standard interview (Appendix 3).

Interviews were further conducted with a person from the municipalities in Windhoek in order to obtain further information about land zone planning. Furthermore, one employee of the seed company *Agrigronamibia* was interviewed about their focus on local crop diversity, the variety of their seeds and the seeds country of origin (Appendix 3).

Supplementary, 19 questionnaires were distributed. The questionnaire for Windhoek consisted of 60 closed-ended and open-end questions (Appendix 1). It was conducted in two languages: English and Oshiwambo. Whereby a questionnaire “is a form with questions used to gather information from respondents” (IFAD, 2008, p.12). Questions were designed to collect information at individual levels ajar the hypothesis. The questions were divided into five categories, depending on the nature of the desired information:

Table 2: Categorization of the questionnaire (Carolyn Tischtau)

|                    |                     |                                               |                       |                                    |
|--------------------|---------------------|-----------------------------------------------|-----------------------|------------------------------------|
| Personal questions | Personal motivation | Social Aspects about the project – management | Financial information | Crop diversity and farming methods |
|--------------------|---------------------|-----------------------------------------------|-----------------------|------------------------------------|

Some of the answers from two questionnaires needed to be translated back from Oshiwambo to English with the help of a native Oshiwambo speaker. Ten interviewees responded to the English questionnaire, nine to the one in Oshiwambo.

The questionnaires for Berlin were adapted to the respective information situation and were shortened whenever the required data could likewise be accessed via literature and internet research, the questionnaires for Windhoek aimed to gather information from scratch.

The way how the questionnaires were distributed differed as well. In Windhoek they were given to the cultivators as a print out and collected a couple of days later. In Berlin they were sent by e-mail. Sending the questionnaires by e-mail proved to be the only possible way as it was unlikely to meet the German gardeners in the gardens in person as it had been the case in Windhoek. On the grounds of the fact that the gardeners in Berlin did not respond to the questionnaires, the method was changed. Interviewing one person of every selected garden in Berlin proved to be the only way to obtain the desired information. Whereby, the interview questions were structured like the questionnaire but did not include the questions which could already be conducted due to other research (Appendix 1). Consequently the interviews are not comparable but closed the knowledge gaps about the projects and are so important for the results which then can be compared again. Additionally information about UAP in Berlin was obtained via literature- and internet research. More information's about the selected gardens and their projects were gathered through the attendance of plenary and public meetings. The researcher took also part in the *Working Group Research (AG Forschung)*. In terms of the social

hypothesis of the thesis for Berlin, research had been done earlier so that the researcher was able to use the already existing data. In terms of the ecological part of the thesis, the case studies in Berlin were sufficient in providing all the data needed. Since the focus of this thesis was on ecological rather than socio-economic aspects, a good comparison could be made.

### **3.3. Field work in the UAPs**

In terms of species richness, species composition, biomass and the degree of weed infestation (DWI), data was composed during field works. Data was collected, inventoried and categorized in alien invasive and native.

It should be stated here that the gardeners say spinach for Swiss Chard.

The term biodiversity in general comprehends ecosystem or community diversity, species diversity and genetic diversity. This thesis concentrates on species diversity only.

The specimen which could not be identified during the field work were brought to the *Botanical Institute of Namibia* where they were identified with the help of its employees. In Berlin the species were identified with the help of plant field guides and an expert in ecology.

In Berlin different crop varieties occurred. In some cases it was not possible to exactly identify the specific variety on the grounds of the fact that no specimens could be taken out and given to analysis as it is an anthropogenic system. Nevertheless, it was possible to gain assumptions.

As it turned out, the biomass could not be investigated due to continual harvesting. And as UAP are anthropogenic systems, taking samples is impossible.

During the field work it became apparent that the DWI for the different species could not to be measured. In Namibia the data was conducted according to the amount of crop varieties in each garden. In Berlin they do not plant the species separately. Accordingly a DWI for each crop was not possible. Research focused on the following two main research questions:

- (1) Does UA have the ability to maintain local crop diversity?
- (2) Can UA be the source of alien invasive species?

In consideration of these two main questions, the subitem DWI is synthesized under species composition as well as alien invasive plants.

Especially in Windhoek direct observation was used as a tool of investigation. At the beginning the cultivators were not informed about the research. This was done in purpose. In order to obtain correct results, the cultivators were required to proceed with their usual ways of farming. The risk of a potential change in behaviour when being under observation is one of the weaknesses of this investigation method. There are dangers that the observer influences the observed as well as the other way around (IFAD 2008). In order to prevent manipulation the researcher was introduced as a new staff member of the MAWF. From a monitoring and evaluation point of view, direct observation is necessary to complement collected data. One advantage is that insights can be enlarged. It can build trust and increase the bond between the stakeholders and the researcher (IFAD 2008).

### 3.4. Data analysis

The data collected through the questionnaire was analysed qualitatively. Categories were determined. It is presented in terms of figures and tables. Furthermore, the information was compared with the literature. Answers that did not relate to the questions asked were not taken under consideration. The following could serve as an example in this regard: “Do you have any limitations in terms of water supply?” Answer: “Yes hungry and thirsty”.

For the *species composition* a Hierarchical Cluster Analysis (HCA) was used. The HCA served to measure the degree of similarity between the different gardens within each city and could also be used as a tool to compare the gardens of Windhoek with the ones of Berlin.

The plants were checked if they are alien invasive species with the help of [WIP] *Weed and Invasive plants database* for Windhoek (<http://www.agis.agric.za/wip/>) and *Floraweb* (<http://www.floraweb.de/pflanzenarten/pflanzenarten.html>) for Berlin. Additionally, literature was used.

## 4. Results

To begin with, all identified gardens in Windhoek will be presented, followed by a detailed description of the three case studies conducted in Windhoek. The data on: cultural background, stakeholder, availability of resources, farming methods, management purpose, biodiversity (species richness and species composition), origin of seeds, invasive species and the potential to conserve crop plant diversity is pooled together for Windhoek. The data is based on the questionnaires, interviews, field work

and direct observation. Some data conducted in Windhoek which could not be compared to information about Berlin is not presented. The data in Windhoek is partly based on direct citation of the given answers by the interviewed gardeners, in order to retain this uniqueness they are presented as they were given.

As the questionnaire enabled the gardeners to give more than one answer more than a 100% are possible.

In the last part of this chapter the case studies in Berlin are described in detail based on expert interviews and literature review.

#### 4.1. Preliminary list of current UAP in Windhoek

Nine UAP in Windhoek could be identified, namely:

Table 3: Investigated UA projects in Windhoek (Carolin Tischauf)

|                                                                                     | Name                          | Coordinates          | Location                                             |
|-------------------------------------------------------------------------------------|-------------------------------|----------------------|------------------------------------------------------|
|  | “Chinese garden”              | -22.522572,17.003279 | Goreangab Dam                                        |
|  | NEYO                          | -22.511179,17.051492 | Okuryangava Disability Resource Centre - Okuryangava |
|  | Dr. Sam Nujoma garden of hope | -22.56095,17.014136  | Otjomuise project school - Otjomuise                 |
|  | Garden of Hope                | -22.528786,17.063948 | Windhoek Multipurpose Youth Resources Centre         |
|  | Katutura TBC clinic garden    | -22.533944,17.063932 |                                                      |
|                                                                                     | Namgreen                      |                      |                                                      |
|  | Greenworks                    | -22.346.33,17.53804  |                                                      |
|  | Family Hope                   | -22.508473,17.032326 | Hainyeko Community Centre                            |
|                                                                                     | After-school daycare center   |                      | Totoggevoud                                          |

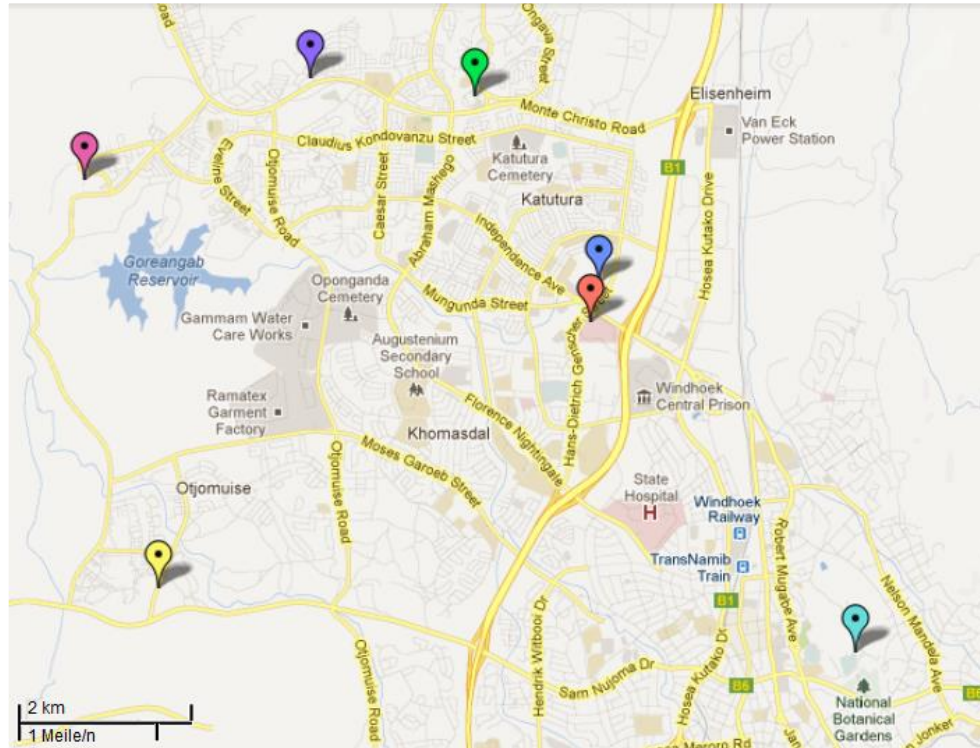


Figure 5: Overview of the UAP in Windhoek, Namibia (Carolin Tischtau)

## 4.2. Case studies in Windhoek

In the following paragraphs the three case studies in Windhoek are described, namely:

- (1) Garden of Hope (GoH)
- (2) NEYO
- (3) Dr. Sam Nujoma Garden of Hope (DSNGoH)

Data which was the same in each garden or not specific related to one garden but for Windhoek in general is conducted after the specific description of the case studies.

### 4.2.1. Garden of Hope

The garden is located in the backyard of the Youth hostel in Katutura (Figure 8). It has existed since 2004. The stakeholders are the Ministry of Youth, National service, Sports

and Culture and the MAWF. Three people are working in the project. They all do UA since they are part of the project. The main language spoken in the garden is English (Appendix 2).



Figure 6: Seedling trays in Katutura youth center (Carolyn Tischtau)

The area of the greenhouse is 10m x 8m. Outside the greenhouse some fruit trees are planted.

The management purpose is to train youth to acquire skills in cash crop production through micro gardening. The project is an initiative to empower young people in the rural areas. It aims at making them acquire basic knowledge and skills through practical experiences and activity based learning. The project wants to contribute to enable them having a rewarding live and benefit their families. This is to be achieved through an innovative training strategy, involving training of trainers, a system of community volunteer leaders to extend the learning, development of prototype training materials, village-level youth organization and sets of income generating/small enterprise development models (MYNSC, 2008). For the gardeners the purpose of the project is to

generate income, food supply and to train and encourage people that they can produce vegetables in the city themselves (Appendix 2).

Two years passed from the developing of the idea to establish the garden till the day the garden opened. In the process financial problems arose. According to the gardeners the following problems occurred: “it was initially especially for the youth, but due to the community demand it was decided to accommodate the community as well” and “it should be extended to other regions as it contribute to food security and improved standard of living for the rural poor” (Appendix 2). The garden does not have hierarchical structures and everyone can participate in the project, especially the youth (Appendix 2).

GoH is in contact with other projects. More precisely, it cooperates with community groups around Katutura and some other regions. This cooperation is mostly involving technical advice and they provide the project with seeds and gardening tools. Furthermore, networking with the *After school project* occur. In fact they used to train the participants of the *After School Project* on how to produce vegetables (Appendix 2). They earn 200 N\$ (around 20 €) per month from the garden. In regard to funding from outside, one of the interviewed persons indicated that the project is not self-sufficient. More precisely according to them they received some material assistance from MAWF. Additionally, they received materials and support from FAO. They did not indicate if there will be any future funding and if they are secure (Appendix 2).

The biggest problem in the garden is a lack of support from the Ministries and NGOs, besides, a lack of manure so the gardeners. They would like to have more support from

the Ministries in terms of materials, seeds, fertilizers, exposures and marketing of products. Additionally they hope for empowerment: “empower us by taking us to train other people at the rural villages” (Appendix 2).

For future projects they recommend: to expand the project to other region as it is contributing to food security and improves the standard of living for the rural people. Furthermore, they added, that at other rural regions young people are willing to do gardening but they do not have support (Appendix 2).

#### **4.2.2. NEYO**

The garden is located within the boundaries of the disability center in Okuryangava (Figure 9). It exists since 2005. The stakeholders are the MAWF and the AIDS care trust. At the moment 33 – 110 people are part of NEYO. The group which was questioned had around 25 gardeners. Three gardeners indicated that they have been doing UA for two years, one for three years, one for four years and one for nine years. Four did not answer the question (Appendix 2). The main languages spoken in the garden are 53% Oshiwambo, 49% English and 7% Oshiherero (Appendix 2).



Figure 7: Melon planting in NEYO (Carolin Tischtau)

In the beginning only a small portion of the area of the disability center was used for agriculture purposes. In July 2012 they started to use every free space within the area of ~ 2 ha. In total two greenhouses (one is 12 m x 30 m and the other is 12 m x 25 m), a fruit tree area (5m x 25 m) and an area for the plots which is approximately 740 m<sup>2</sup>, exist.

The project started in 2005 the purpose was to be able to offer people coming to take their AIDS medication proper food. However, after some time the work in the garden was neglected because no one took care of it.

In 2010 NEYO which is also located at the disability center started using the area. NEYO was formed 2004 as a non-profit organization to fight HIV/AIDS at local, national, international and global levels. The purpose is to prevent HIV/AIDS infection through developing information communication materials and distributing them. In this project the education and training of community members on HIV/AIDS is on focus. The main purpose now is, to give the community knowledge of how to produce food and gain income (Appendix 2). According to the participants it took eight months to two years from the idea to the start of the project (Appendix 2). According to the MAWF it took a couple of month to start with the group from NEYO.

They designed the project in a spirit of self-help: “We just came up with an idea to do something to help ourselves in order to get food and income in order to reduce unemployment in the country.” They started in a team with digging the land. They

received picks, forks and a handful of other tools from the MAWF. In the end they divided the ground in plots, three for each member.

In terms of development of the project, 36% said that financial problems arose and 36% did not answer the question. No problems occurred was indicated by 18% and 9% alleged they had problems with tools (Appendix 2). In the development of the project they would change “the cultivation style and the place of the project”, additional they want to own the plots and “to expand the project to become big bigger even” (Appendix 2).

According to the cultivators the garden does have hierarchical structures and everyone can participate in the garden (Appendix 2). According to the managers from NEYO only people which are part of NEYO can participate.

Two gardeners indicated that they are in contact with other projects, but did not specify with which ones. Five said they are not. Three did not answer the question (Appendix 2).

Most of the tools used in the garden were donated from NGOs or the MAWF.

No pesticides were used in the project so far (Appendix 2).

They do not make any profit up to now. In terms of funding: One indicates that they receive funding from a private source, three stated that no one is supporting them and that they do not get any money. It was stated by 40% that the project is not financing itself. Another 30% said the project is financing itself, and 30% did not answer the question (Appendix 2).

The biggest problems in the garden according to the cultivators are transport (three out of ten) and theft (two out of ten). Furthermore, the digging, the birds and the non-

existent net surrounding the garden (one out of ten). Additionally, financial problems (one out of ten) and the fact that they are not having enough land (one out of ten) are worrying the gardeners in NEYO. Moreover, they added that they need help from the government in terms of jobs. They criticize that they need more transport and that they are not selling as a team. In addition, they indicated that they need financial resources and shops to sell the crops. They also stated that they are great full for the knowledge they acquired via the training by the MAWF (Appendix 2).

For future projects they recommend: You should do it, because you will get an income and become healthier yourself. We must work hard and be happy with our project, but we need to be willing to do everything to be serious. Furthermore, one gardener stated: “I want to tell all Namibian people that let us do something, let us stop stealing others stuff. Let us produce our own food and incomes” (Appendix 2).

#### **4.2.3. Dr. Sam Nujoma Garden of Hope**

The garden is located within the boundaries of the Otjomuise project school in the informal Otjomuise settlement (Figure 10). It was opened in 2008. The stakeholders are: MAWF, Ministry of Regional and Local Government, Housing and Rural Development, Ministry of Education and the Council. Seven people are working there. They are all doing UA since the existence of the project. The main language spoken in the garden is Oshiwambo (Appendix 2).



Figure 8: Dr. Sam Nuyoma Garden of Hope (Carolyn Tischtau)

In total the usable area would be 100m x 100m, it is all surrounded by fences already, but it is not levelled yet. To level it heavy machinery is needed. This could be provided either from the municipality or directly from a private company. However, this has not been realized yet, on the grounds of organizational and financial issues. The area of the greenhouse is 30m x 40m which is the only part currently used.

In the beginning the idea was to train school children in gardening. As a result of construction there was a need to move the plot within the school area in 2010. It took the community around two month to build up this new plot. The objective then changed to the training of adults only. They should acquire knowledge about gardening in order to use it to grow crops in their own backyards. No children were allowed anymore so Mr Kanguvi (2012). The main management purposes according to the gardeners is to get trained how to produce one's own food, supplementary to earn income and to learn how to feed ones family (Appendix 2).

It took two years from the idea to the start of the project. During the development of the project all gardeners indicated that social problems occurred. In detail, some community members stole the net and additionally, burned it. Furthermore, they all want to harvest, but most of them do not want to work in the garden. According to Kanguvi (2012) from the MAWF: “It seems to be better if the plot is just for training and the production just takes place in their own backyards. They only work proper if someone is pushing them. If not, nothing is happening.” In July 2012 they decided to split the plots. Since than seven people have each four plots for themselves (Appendix 2).

The next time the gardener’s would make sure, that the water supply is closer to the garden, that they have enough tools, a stronger net and fence in order to be able to produce more and so make more profit (Appendix 2).

The garden does not have hierarchical structures, everyone is equal. Everyone can participate in the garden (Appendix 2).

One stated that they are in contact with other gardening projects but did not say which ones. The others stated that they are not in contact with any other gardening project (Appendix 2).

The tools they are using were sponsored by the regional council.

Occurring pests in the gardens are: aphids, whitefly and grasshopper. As a result of improper pest management experts from the MAWF applied the Pesticide Metomex and the Fungicide Oscar. “The garden was already to infest with parasites that no organic Pesticides or fungicides were possible anymore” (Sánchez, 2012).

The whole project was financed by the regional council and the Ministry of Education, they provided the land. The MAWF provided the infrastructure, including: cleaning and levelling of the area and putting manure. It took around two weeks. After that the MAWF started training them. They are helping them out and working together with them until to today.

In terms of income per month per gardener (Figure 11) it can be stated that:

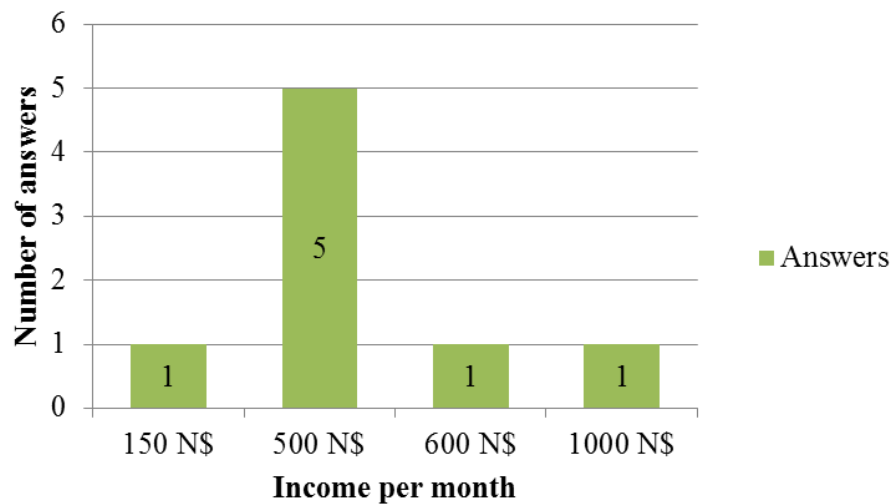


Figure 9: Income per month per gardener in the DSNGoH (Carolin Tischtau)

The gardeners earn different amounts from the garden: one person earns 1000 N\$, one 600 N\$, five earn 500 N\$ and one 150 N\$ per month.

In the following it was initially asked: “What do you do with the funding?” But as it turns out they seemed to understand “what do you do with the money you earn from the garden?” So they are using the money for reparations, buying seeds and take some for themselves (Figure 12). More precisely:

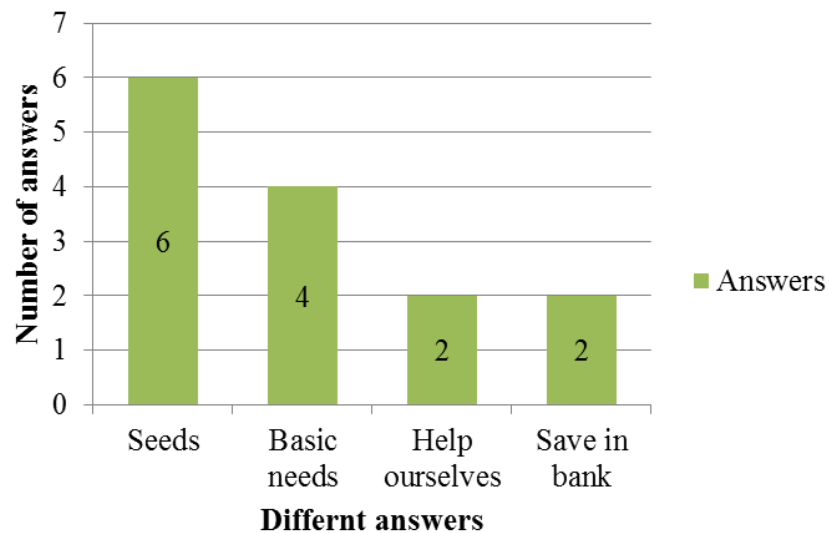


Figure 10: Use of (funding's) money (Carolín Tischtau)

Nearly the half (43%) of the gardeners use the money from the garden to buy seeds, 29% for basic needs, 14% to buy things for themselves and 14% save some money in the bank. Additionally, they are busy to negotiate a contract with the supermarket *fruit&veg* at the moment to have a secure buyer. In July 2011 they opened a bank account to save the income from the selling.

Most of the gardeners (71%) indicated that the garden is not financing itself, 29% said it is. Four indicated that they receive their financing from *other* sources but did not indicate where from. Two indicated that they receive funding from private investors. Two did not answer the question. However, all indicated that their future funding is secured (Appendix 2).

The main concern of the gardeners (five out of seven) is that the water supply is too far from the garden. Furthermore, they would like to get more support from the government, in terms of jobs and money, but also regarding help with community issues. End of July

2012 part of the greenhouse burned down due to a fire at the school grounds. Three out of seven gardeners stated that they would like to network with other gardens to gain more knowledge (Appendix 2).

The recommendation for future projects they have is: “to tell Namibian people and the community that the garden is there for development not to destroy it.” Furthermore, to go and help other people in making their own backyard garden at home (Appendix 2).

#### **4.2.4. Cultural background in Windhoek**

In total 95% of the cultivators in Windhoek are Namibians. One did not answer the question. Out of this 84% come from small villages in Owamboland in the Northern parts of Namibia, belong to the Owambo tribe and speak one of the seven dialects (Kwanyama or Oshikwanyama). The others (16%) are from small villages in the Kavango region of the Northern parts of Namibia, belong to the Kavango tribe and speak one of the five different Kavangolanguage dialects (RuKavango or Rumanyo) (Appendix 2).

#### **4.2.5. Stakeholders in Windhoek**

It should be noted here that a stakeholder in this thesis is every gardener, every institution or ministry involved in the projects.

In general it can be stated that 74% of the people in the projects are female, 26% male (Appendix 2).

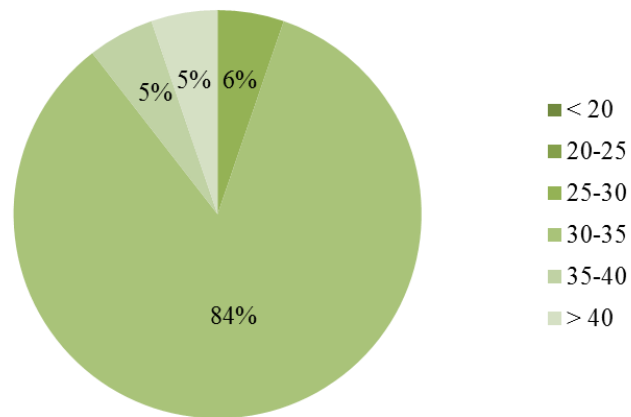


Figure 11: The age of the cultivators in the UAP in Windhoek (Carolyn Tischtau)

Most of the gardeners (84%) are between 30 and 35 years old. One gardener is between 25-30, one between 35 and 40 and also one above 40 years old.

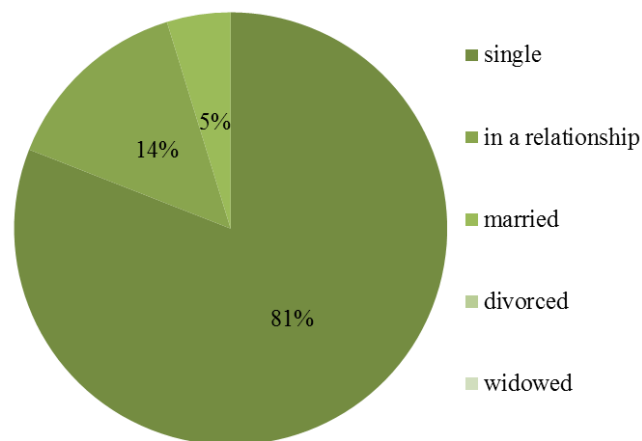


Figure 12: The personal status of the cultivators in Windhoek in % (Carolyn Tischtau)

Most of the gardeners (81%) in Windhoek are single. Some (14%) are in a relationship and 5% are married.

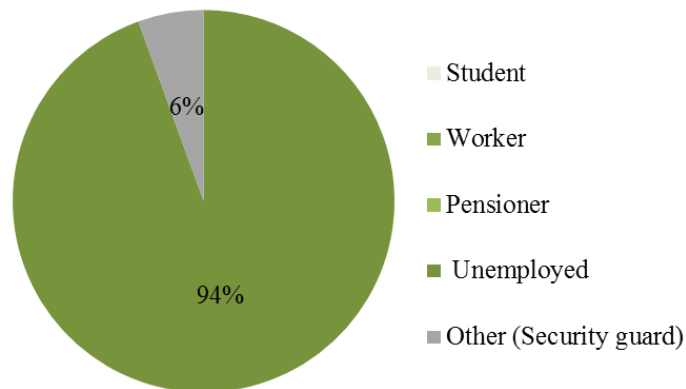


Figure 13: The employment status of the cultivators in the UAP in Windhoek (Carolyn Tischtau)

Nearly all (94%) gardeners in Windhoek are unemployed. One additionally indicated that he/she is a security guard.

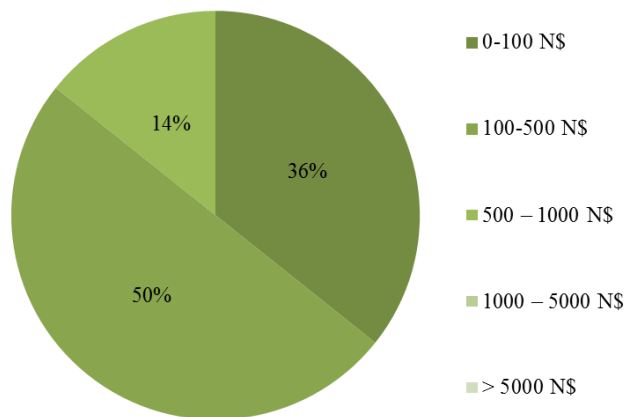


Figure 14: The personal income of the cultivators in the UAP in Windhoek in % (Carolyn Tischtau)

Half of the gardeners in Windhoek (50%) earn 100-500 N\$, 36% earn 0-100 N\$ and 14% earn 500-1000 N\$ a month. Five cultivators did not answer the question.

When asked whether food supply had increased within the households by participating in the UAP 58.89% indicated that their food supply has increased since they are part of the project. That it has not improved indicated 31.58% of the gardeners. The rest (10.53%) did not answer this question (Appendix 2).

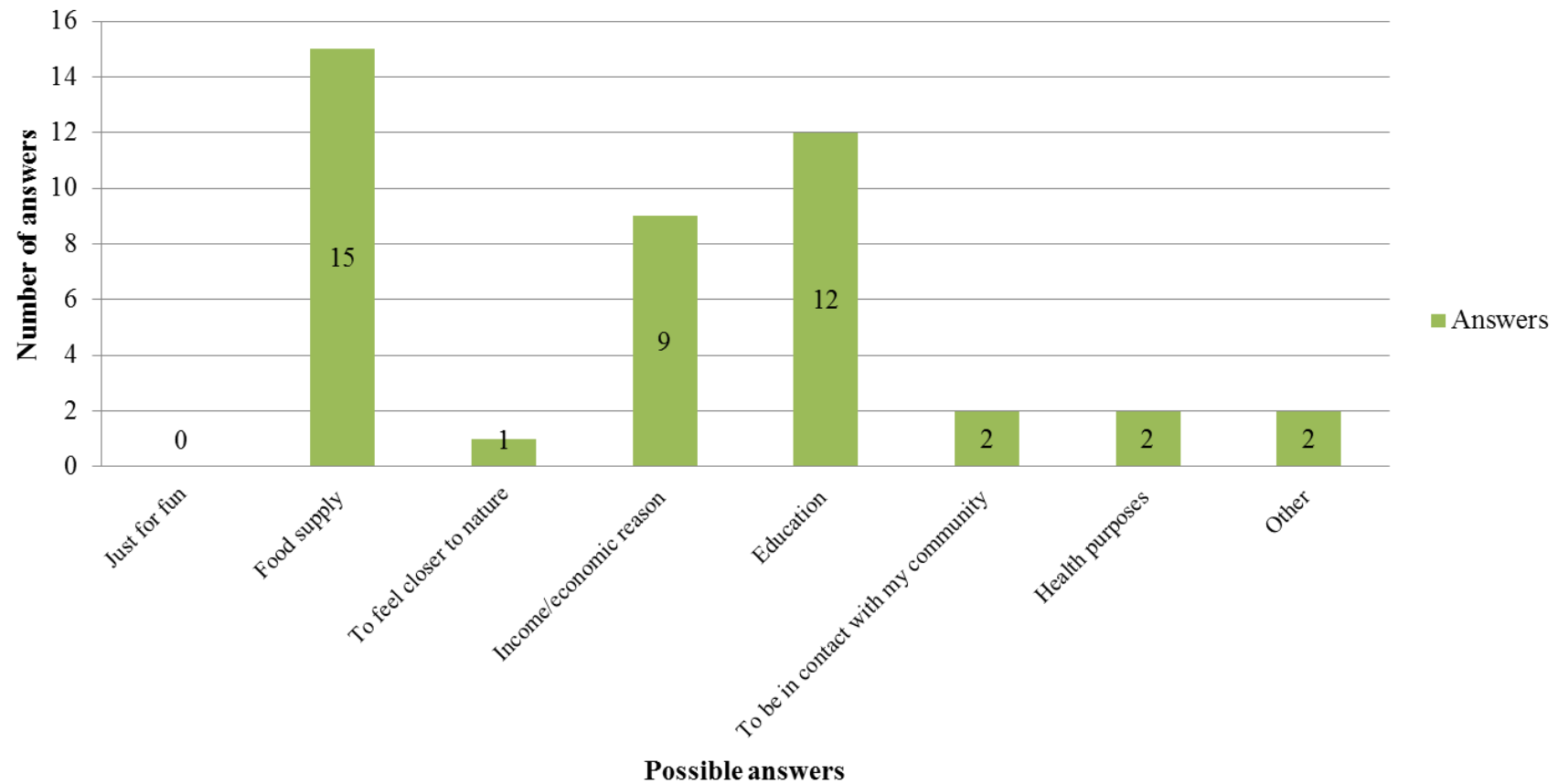


Figure 15: Reasons for cultivators to do UA in Windhoek (Carolin Tischtau)

Most important reasons for conducting UA are food supply (35%), education (28%) and economic/income reasons (21%), the remaining categories vary between 0 and 5%.

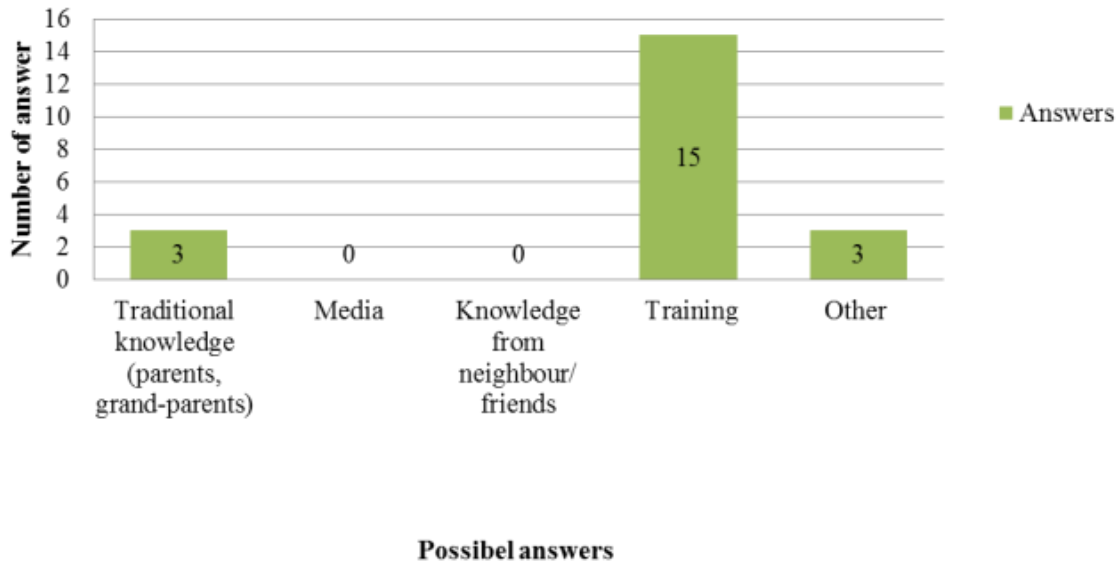


Figure 16: Origin of knowledge (Carolin Tischttau)

Most of the gardeners (68%) learnt how to cultivate through training by the MAWF. Furthermore, 18% indicated that they acquired their knowledge on other ways, namely: from school and due to a friend. Another 14% of the cultivators acquired their understanding about gardening via traditional knowledge from their parents or grand-parents. Three did not answer the question (Appendix 2).

#### 4.2.6. Availability of resources in Windhoek

##### 4.2.6.1 Land

All gardeners who answered the question stated that they obtained the land from the municipalities (Appendix 2). It can be stated, that the investigated projects in Windhoek all have secure land, due to the fact, that they are located on a school/center yard. In all cases the land the projects are using now was a fallow before (Appendix 2). Consequently, most of all the gardeners (78.94%) stated that they are not the owner of the land. Another 10.53% said they are the owners and 10.53% did not answer the question (Appendix 2). The projects selected the land they are using due to different reasons: In GoH the area was chosen, because it is accessible to young people that they provide training to. Furthermore, because it is the only open space close to water. In NEYO the area was

preferred, because water is available, it is safe and the only land they have. In Dr. Sam Nuyoma garden of hope instead the land was picked, because it was well fertilized, close to the community and offers sufficient space (Appendix 2).

In general there is no policy or law in Namibia concerning UA and UAP. But, the agriculture policy and the green screen policy can be applied, according to the conducted interview with Shilunga (2012) from the MAWF. The MAWF is currently busy working on the legalization of UAP and UA in Namibia. „We try to communicate the need of UAP, especially to the city of Windhoek, so that they consider spaces within the city planning already, but so far the communication failed” (Shilunga, 2012).

According to Moongela (2012) from City of Windhoek UA is not part of the urban land use planning in Windhoek. Thus there is no policy. Nevertheless, in general she said if someone would come and ask if he/she could start a garden in the city it would not be a problem, as long as it is not in a high risk zone (between streets etc.). But so far no one came to ask for space.

According to Kanguvie (2012) from the MAWF the biggest problem is that suitable land for UA is insecure. “I have seen many gardens vanishing, due to construction.” Especially in Katutura space is the major concern.

#### **4.2.6.2 Water**

In all investigated projects the water is supplied by the municipalities free of charge according to the MAWF. But, GoH stated that they have limitations in terms of: “the more you use the more you pay.” DSNGoH does not have any limitations. At NEYO 40% indicated they do have problems with water, 20% said that they have no problems with it and 20% did not answer the question (Appendix 2). On average GoH is using 50 l per day, DSNGoH 604 l per day and NEYO 24 l per day (Appendix 2).

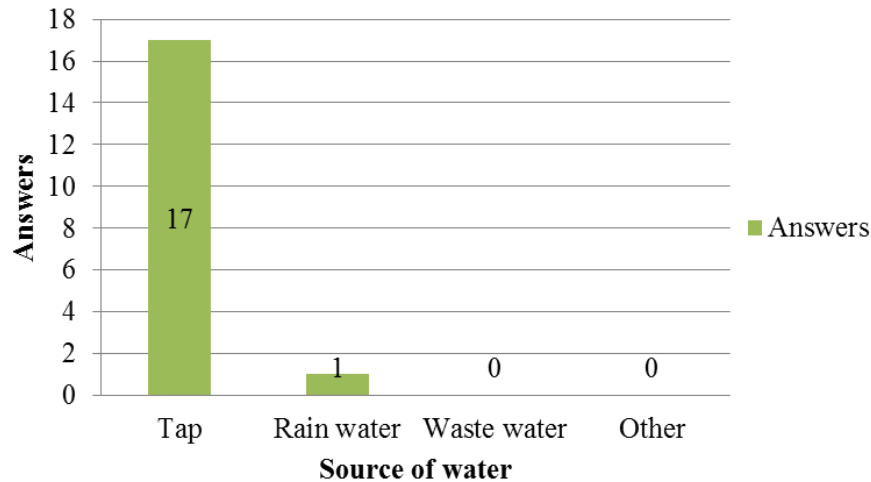


Figure 17: Source of water (Carolin Tischtau)

The majority (94%) of the gardeners in Windhoek indicated that they are using tap water. Only one gardener said that he/she additionally uses rain water. No one is using waste water or any other source of water supply. Two did not answer the question (Appendix 2).

#### 4.2.6.3 Tools

Every gardener who answered the question indicates that the projects have tools (Appendix 2).

Dr. Sam Nuyoma Garden of Hope has the largest variety of tools, followed by NEYO. GoH has the lowest amount of tools. All three gardens have shovels, wheelbarrows, dung forks, seedling trays and drip irrigation (Figure 21).

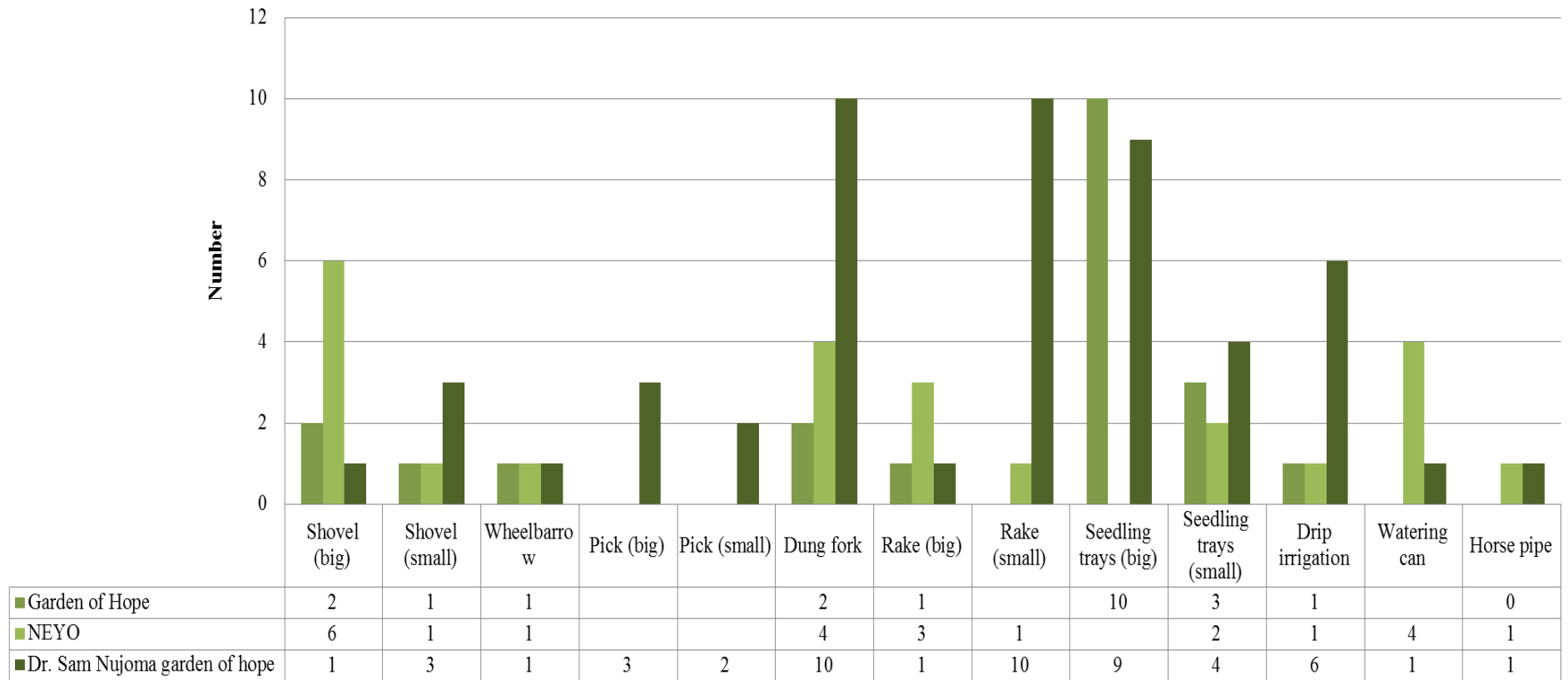


Figure 18: Number of tools in each garden in Windhoek (Carolín Tischtau)

In GoH they either buy their tools at the market (50%) or at the shop (50%). The gardeners from DSNGoH stated that they received all their tools (100%) from the MAWF, additionally also from the UN (14%). In NEYO most of the gardeners (70%) did not indicate where they got their tools from. The rest (20%) indicated their source of tools as MAWF and 10% from the organisation NEYO.

#### 4.2.6.4 Seeds

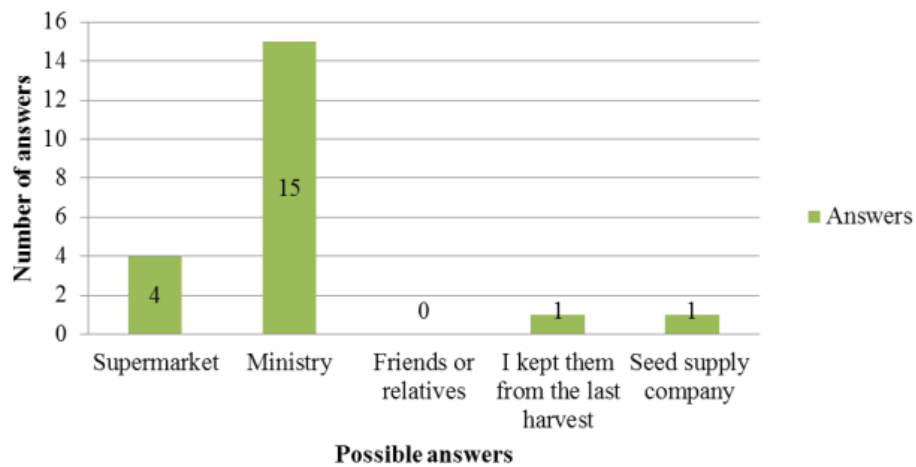


Figure 19: Source of seeds (Carolín Tischtau)

Seeds grown in the gardens in Windhoek are mainly supplied by the MAWF (71%). The gardeners do not need to pay for them. Some also buy them in the supermarket (19%) or directly from the seed supply companies (5%). One gardener kept them from the previous years' harvest (5%). No one gets their seeds from relatives or friends. Three gardeners did not answer the question.

#### 4.2.6.5 Professional advice

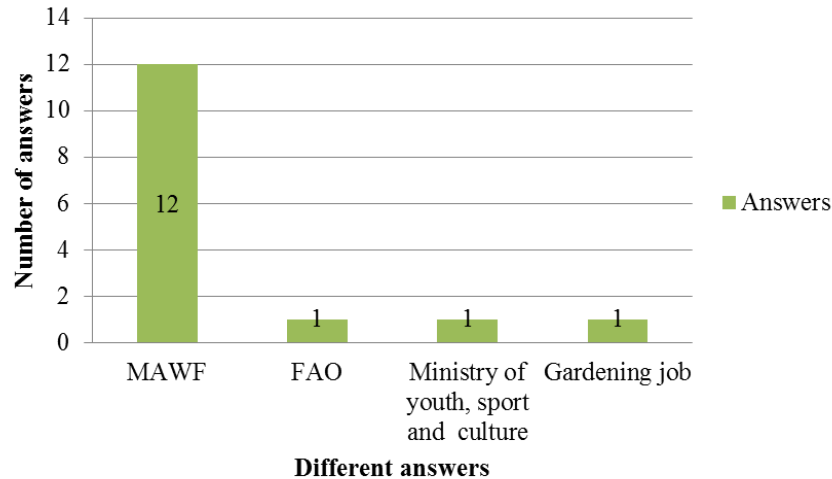


Figure 20: Source of training (Carolín Tischtau)

Most of the gardeners (80%) learnt how to do gardening via training from the MAWF. Additionally, 7% received them from the FAO, 7% from the MYNSC and 6% due to a gardening job. Three cultivators who indicate that they received training did not specify where from.

The MAWF is providing groups which are asking for training. The overall objective of this is to enhance agricultural production at a national level and household level in a sustainable manner. In order to “contribute to food security by improving access to high quality fresh horticulture produce at household level all year round.” as well as to “promote employment and income for the less well-off population in the urban and peri-urban environment” (MAWF, 2010, p.1). The primary project beneficiaries are urban slum dwellers, landless, marginal farmers and disadvantaged group and unemployed or underemployed people. Whereby, the training of trainers and beneficiaries is a major part of the project activities.

In addition, the project objectives are to also secure access to natural resources (land and water) and to protected high quality and safe horticulture produce. Furthermore, it aims to secure the institutional context for a sustainable development of urban and peri-urban areas (MAWF, 2010).

The used technologies amongst others are integrated production and protection management techniques, micro-garden systems, micro irrigation techniques and the cultivation of improved and adapted varieties (MAWF, 2010). The microgarden system, can provide nutritious vegetables for home and commercial use, avoids pest problems, uses little water and does not require a lot of space and is easy to practice.

The projects receive help from the MAWF not only during the installation process, but also in terms of weekly visits in order to maintain the garden and a constant training in proper gardening practices, pests, disease and weed control. As well as help with marketing including transport to the market. Additionally, help with community issues are needed. Supplementary, seed supply and help with planting is part of the work done by the MAWF (Appendix 3).

Knowing this it is not surprising, that 12 out of 16 gardeners who answered the question stated that they received help while starting the project (Appendix 2).

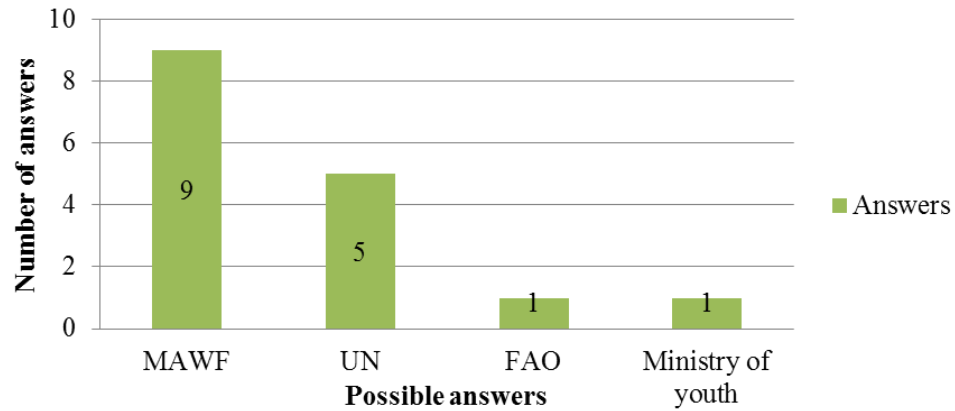


Figure 21: Absolute numbers of answers indicating the institutions providing support during the starting phase of projects (Carolyn Tischtau)

More than half of the cultivators (57%) stated that they received support while starting the project from MAWF, 31% from the UN and 6% from the FAO and 6% from the MYNSC. Three of the gardeners who indicated that they received training did not specify the source of support. It should be stated here, that this support can include resources or financial help. The largest proportion of sources of support was supply of tools (35%), followed by supply of materials (29%), training (18%) and seeds (12%) (Appendix 2). If this is compared to the answers about where the gardeners get their tools or seeds from it can be stated that most support is provided by the MAWF.

#### 4.2.6.6 Pesticides

The majority (68.42 %) of the gardeners in Windhoek indicated that they have problems with pests. Almost one third of the gardeners (26.32%) did not answer the question. Only 5.26% of the gardeners indicated that they do not have any problems with pests (Appendix 2).

According to Mr. Sánchez from the MAWF the main pest in the UAP in Windhoek are: the genus Aphis, Fruit Fly, Thrips and Lepidopteras (Cutworm). In terms of Fungi, the main species are: Rhizotornia, Sclerotium, Alternaria, Cercospora, Collecthotricum and Fusarium (soil). Additional the gardeners also identified: red spider mite (*Tetranychus evansi*) and Spiralling whitefly (*A. dispersus*) In NEYO they mainly have problems with birds (Appendix 2).

The MAWF is controlling this pest and fungi mainly with: Cupriflow, Oscar, Amistar and Iprodione. Most of the gardeners in Windhoek (53%) indicated that they are using pesticides. Alternative 26% of them did not answer the question and 21% said they do not use any sort of pest control (Appendix 2). Four of the cultivators that indicated pesticide use confirmed the use of DDT, two cultivators specified that they are using the pesticide Namadots. One cultivator referred to the general term “chemicals”. The rest (13 gardeners) did not indicate what kind of pesticides they are using (Appendix 2).

The two gardeners from GoH stated they buy their pesticides from the shop or market. All participants from DSNGoH said their source of pesticides is the MAWF. At NEYO one cultivator said its source of pesticides is MAWF. The other nine cultivators did not answer the question.

#### **4.2.6.7 Fertilizer**

Nearly all (84%) cultivators in Windhoek use fertilizer (Appendix 2). To improve the soils physical qualities, the Windhoek growers use mainly cattle manure (14 of the 15 who answered indicated this) (Appendix 2). It is obtained from producers in the nearby

Meatco's Feedlot at Okapuka and organized by the MAWF. At GoH they additionally use organic fertilizer for soil production, chemical for hydroponic and vermicompost. For seedling they use hydroponic. It is either provided by the MAWF or as in the case of GoH bought in the shop (Appendix 2).

#### 4.2.6.8 Finance

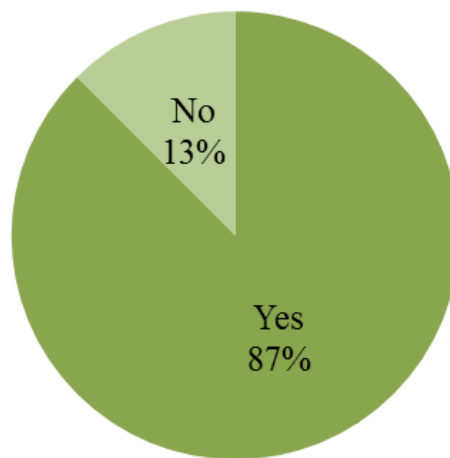


Figure 22: Do you sell your products? (Carolin Tischtau)

Nearly all gardeners (87%) are selling their products.

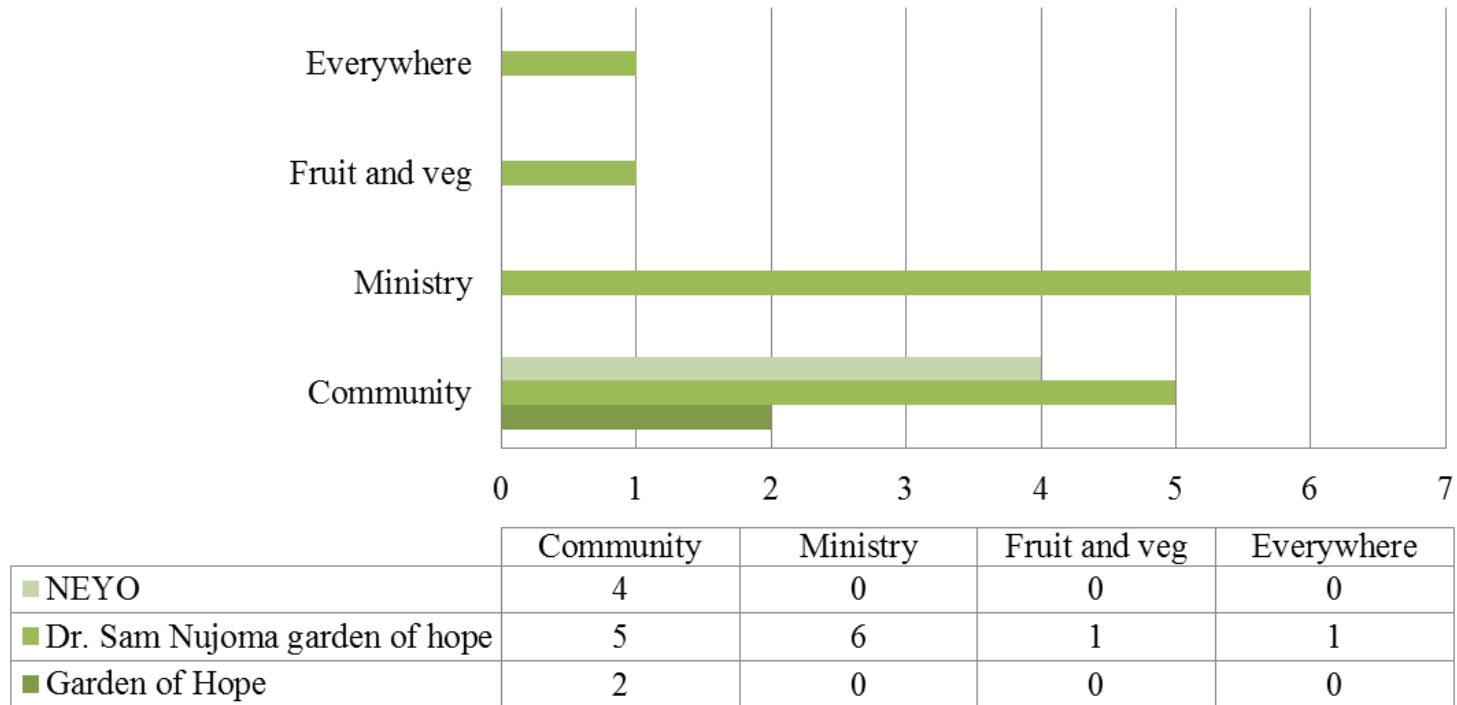


Figure 23: Place of selling (Carolin Tischtau)

Eleven gardeners are selling their products within the community. Six sell it at the Ministries, one at *fruit&veg* and one everywhere.

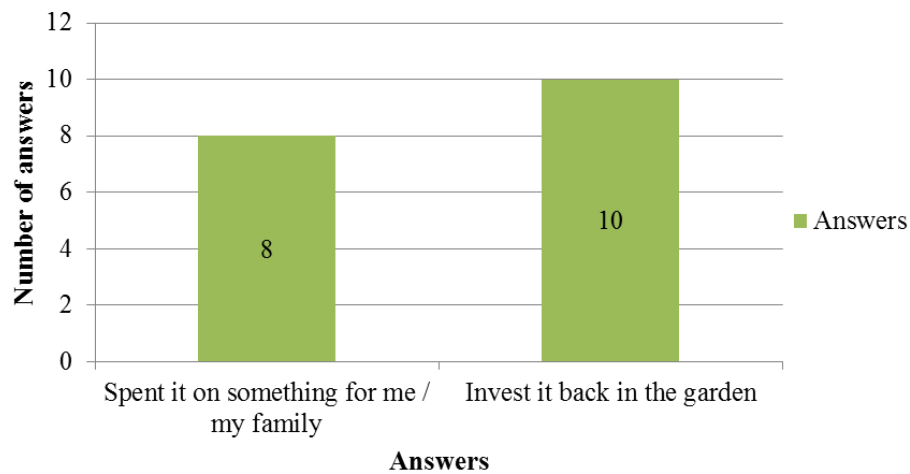


Figure 24: Use of profit (Carolín Tischtau)

More than half of the gardeners (56%) invest their profit back in the garden. The others (44%) spent their profit from the garden in either their family or themselves. Six gardeners did not answer the question.

None of the gardeners process their harvest to some extent. Seven gardeners did not answer the question (Appendix 2).

Taking the 81% of the gardeners who are selling their product under consideration, only 42% of the gardeners indicated that their income has increased since they are part of the garden. Another 32% said that it has not and 26% did not answer the question (Appendix 2).

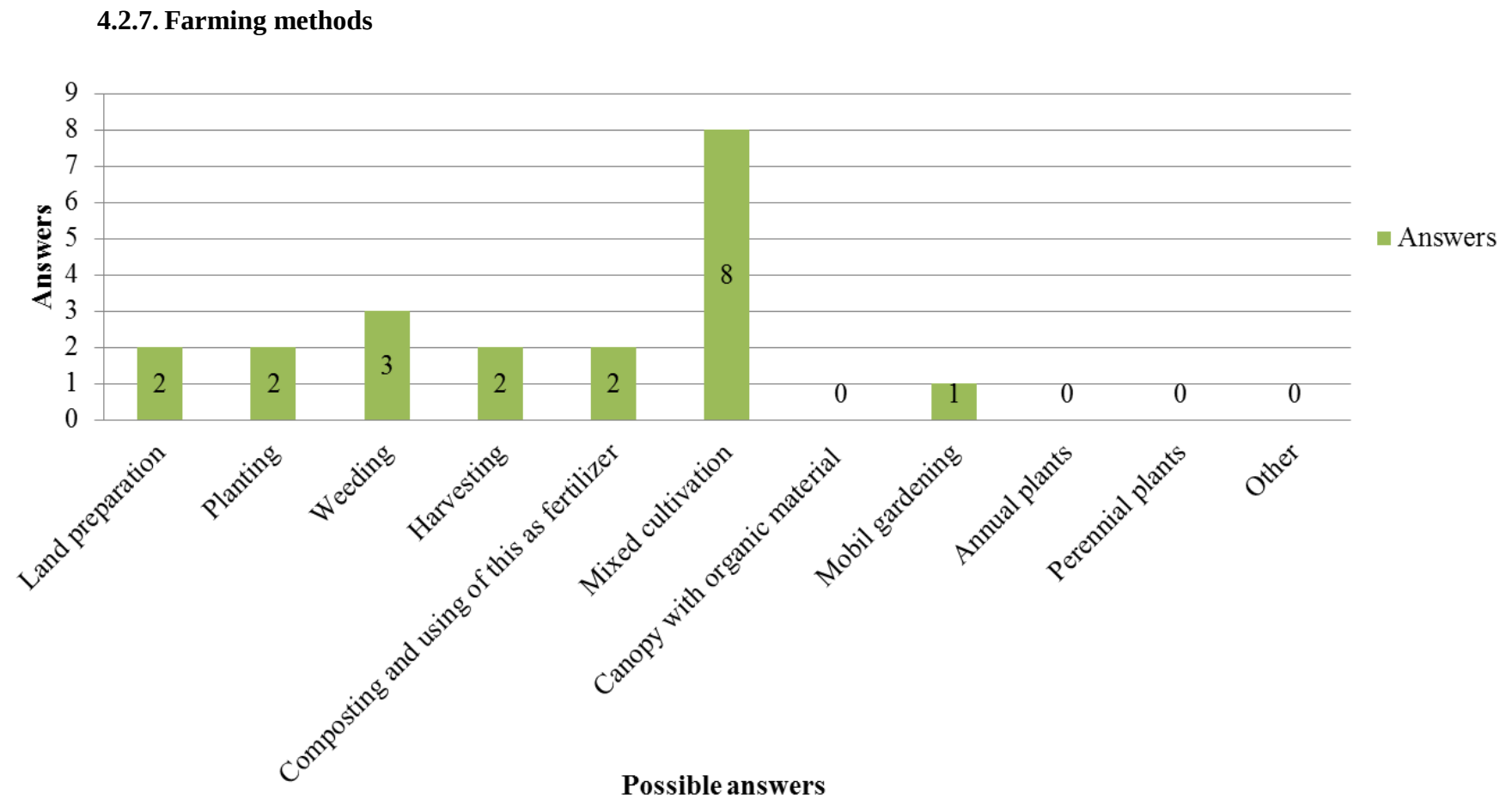


Figure 25: Farming methods (Carolín Tischtau)

Most of the gardeners in Windhoek (40%) do intercropping. Some also specified it: one said he/she is doing intercropping “mostly vegetables with herbs”. Another one stated “onions and spinach”, one “lettuce and spinach” and one “tomatoes and cabbages”. Furthermore, 13% do weeding. Most of them (64%) do weeding when it is necessary (Appendix 2). Land preparation is done by 10% of the farmers. More precisely: ten gardeners de-stone, dig and plant. Two de-stone and plant and none is planting directly. Another 10% do compost and use it as fertilizer. One indicated that he/she is doing mobile gardening.

During the field work it was observed, that all investigated UAP in Windhoek use seedling trails (on self-made tables) with hydroponics, crop rotation, manure and rising beds. Additionally they all have at least one greenhouse. In GoH they have a vermicompost as well. In both NEYO and Dr. Sam Nuyoma Garden of Hope they use a drum-and drip irrigation on small scale and low cost units of 100m<sup>2</sup> with a water reservoir of 1m<sup>3</sup>. The crops are placed in beds 1m wide on average. These beds are separated by small central and secondary alleys 50cm wide (Figure 33). NEYO is additionally also cultivating fruit trees.



Figure 26: Beds with drip-irrigation in NEYO (Carolyn Tischtau)

In total 31 different crop varieties were identified. The most common crops in terms of cultivated land area are swiss chard, tomatoes, onions, lettuce, cabbage, carrots and green pepper. Figure 34 shows the absolute numbers of answers confirming the cultivated crop varieties:

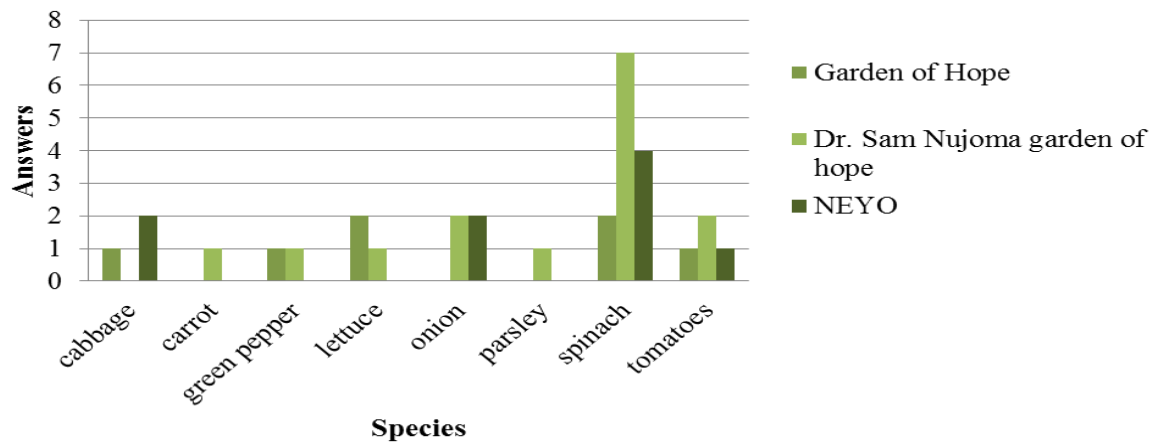


Figure 27: Absolute numbers of answers confirming the cultivation of different crop varieties at the three investigated institutions (Carolyn Tischtau)

According to GoH the best grown species are lettuce and spinach, followed by cabbage, green pepper, and tomatoes. Conferring to DSNGoH the best grown species is spinach, followed by tomatoes and onions. Additionally, carrot, green pepper lettuce and parsley are growing well. In NEYO the species growing best is spinach, followed by cabbage, onion and tomatoes. Five did not answer the question.

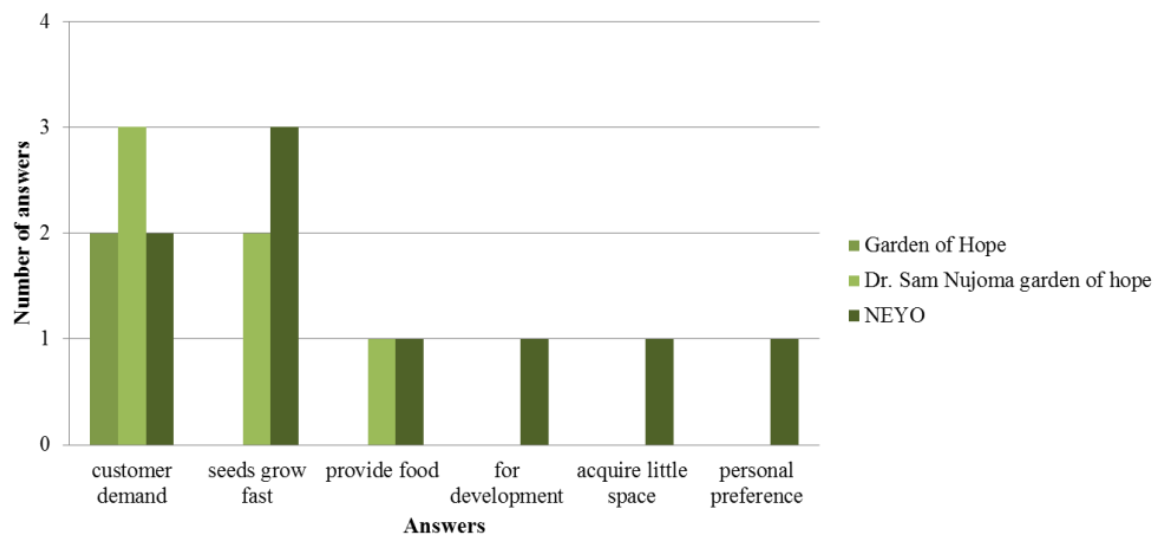


Figure 28: Reasons for plants growing (Carolín Tischtau)

The selection of plant species and varieties at GoH is based on customer demand only (100%). The stakeholder at DSNGoH base their decision on the cultivated plant species and varieties on customer demands (50%), because this used seeds grow fast (33.33%) and to provide food (16.67%). Another situation was found at NEYO, where cultivator's priorities were as follows: fast growing of the specifically used seeds (33.33%), customer demand (22.22%) food production (11.11%), developmental reasons (11.11%), because this species acquire little space (11.11%) or personal preference (11.11%).

#### 4.2.8. Management purposes

The overall management purpose in Windhoek are to reduce poverty and hunger by a daily availability of fresh vegetables for home consumption and the generation of income. Especially important is to increase food security of the most vulnerable members and people living with HIV / AIDS (MAWF, 2010).

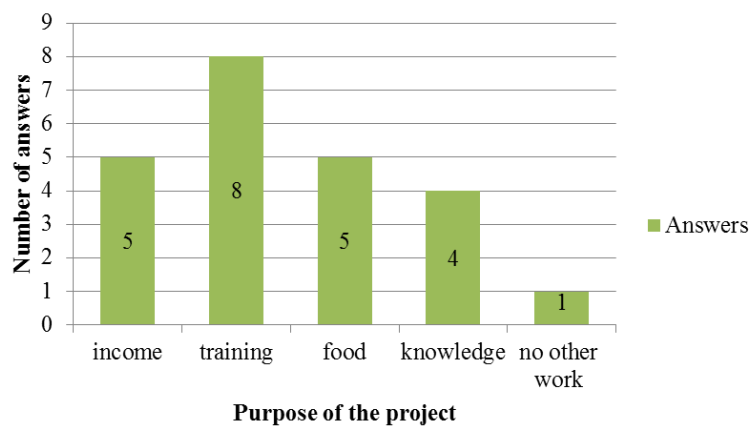


Figure 29: Purpose of the project (Carolin Tischtau)

UAP in Windhoek can be defined as a place for training of groups in horticulture. Additionally, a group of people that come together to produce food collectively for themselves. The plots are separated. The practice is part time and takes place usually around public facilities (e.g. church, school, and clinic). It is part of a survival strategy and includes vegetable production only.

In terms of relation between the gardeners: Nearly all (83%) of the gardeners stated that they are community members or neighbours. Some (11%) said they are friends or relatives and 6% said they are members of a youth organization (Appendix 2).

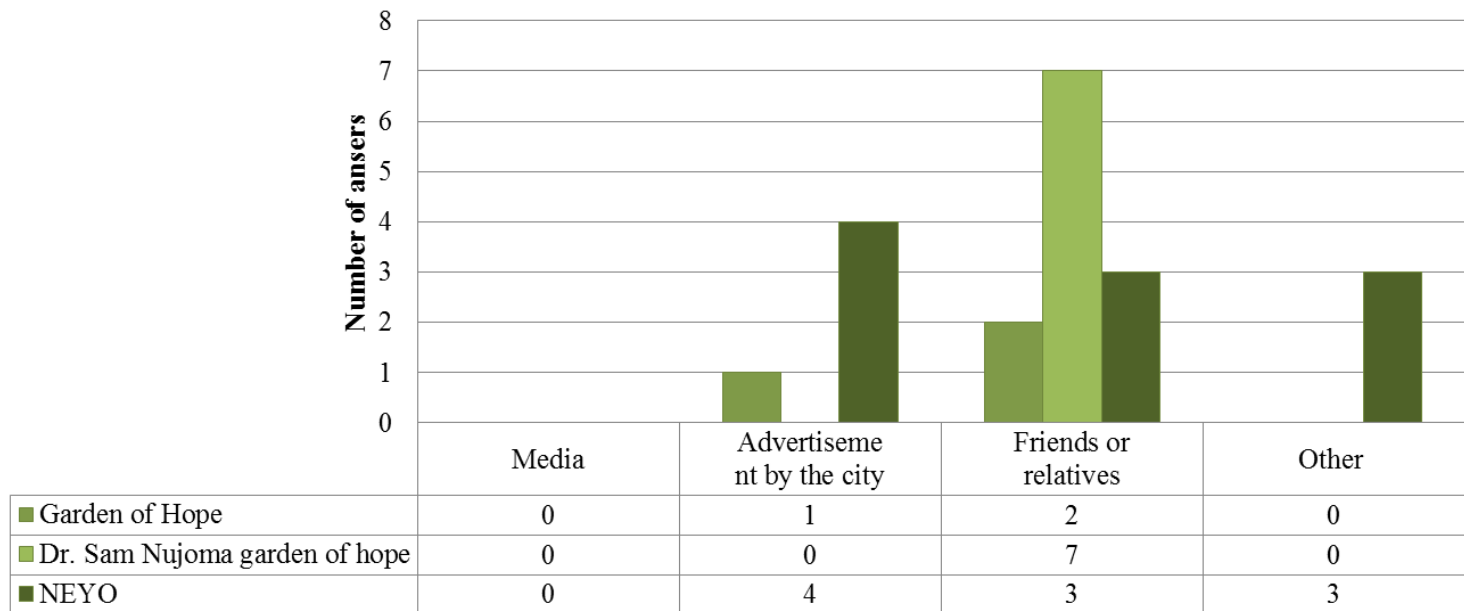


Figure 30: Knowledge about project existence (Carolin Tischtau)

In terms of advertisement of the projects it can be stated that none of the cultivators in Windhoek got to know about the project via the media. Twelve participants got to know about the project through friends or relatives and three by other sources, more precisely: From a youth group, from the organization NEYO/NOYD or throughout youth league messages. Five got to know about the project via advertisement by the city. Two persons did not answer the question (Appendix 2).

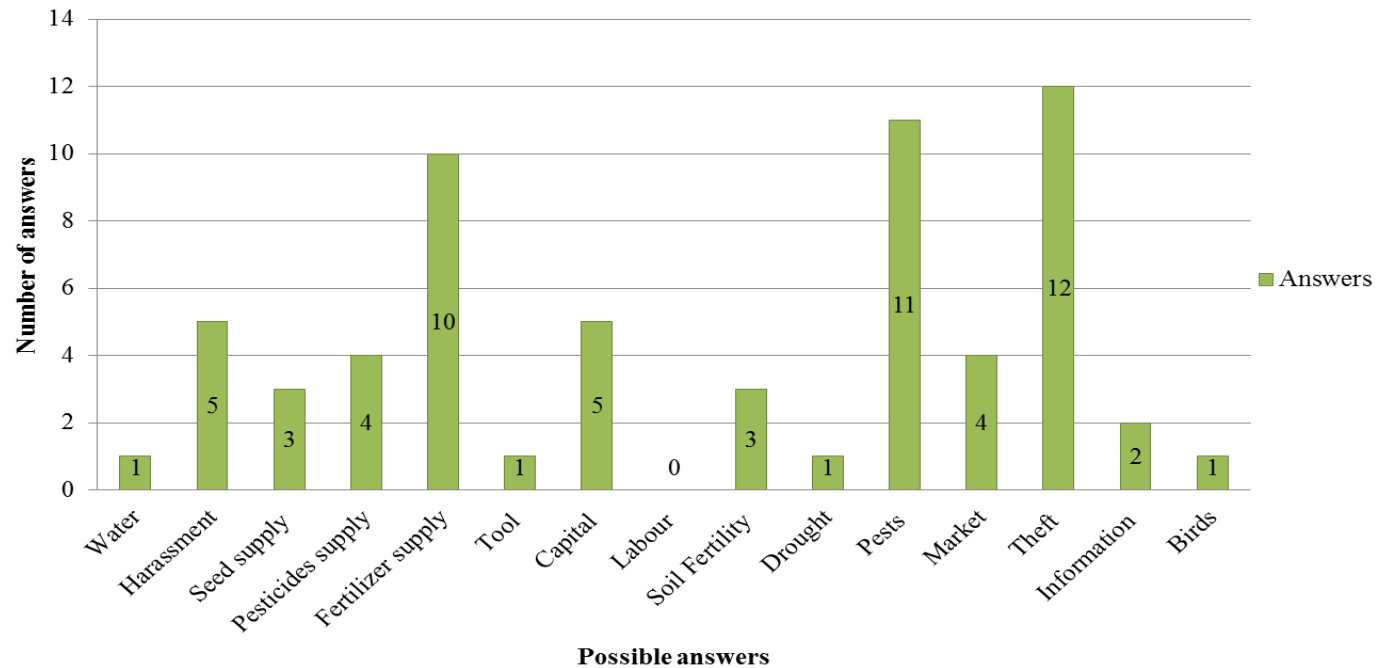


Figure 31: Problems in the garden (Carolín Tischa)

The biggest problem occurring in the gardens in Windhoek is theft (19%). Pest (17%) and fertilizer supply (16%) are also concerning the gardeners to a big extent. Furthermore, harassment (8%) and the availability of capital (8%) are a problem for the gardeners. Some also indicated, pesticide supply (6%) and market (6%) are challenging them. In addition, soil fertility (5%) and seed supply (5%), as well as information (3%) are problematic for certain gardeners. Water and tools supply as well as drought and birds (each 2%) are worrying a few gardeners too.

#### 4.2.9. Biodiversity

The Species richness in Windhoek is between 14 and 18. More specific, GoH has a species richness of 15. In Dr. Sam Nuyoma garden of hope the species richness is 14 and in NEYO 18 (Appendix 4).

In terms of species composition in the investigated projects in Windhoek it can be stated, that:

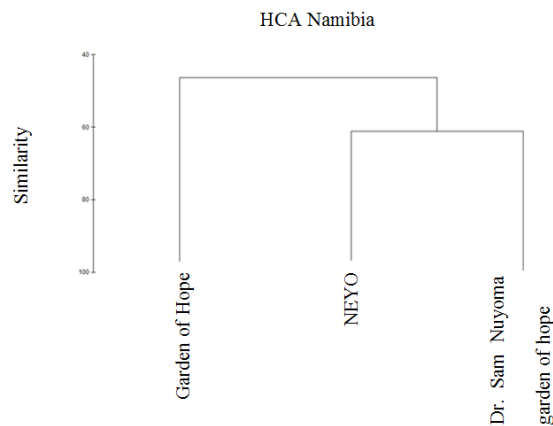


Figure 32: Similarity of the projects in Windhoek (Carolyn Tischtau)

GoH is 45% similar to Neyo and DSNGoH. The two are 63% similar to each other.

#### 4.2.10. Origin of seeds

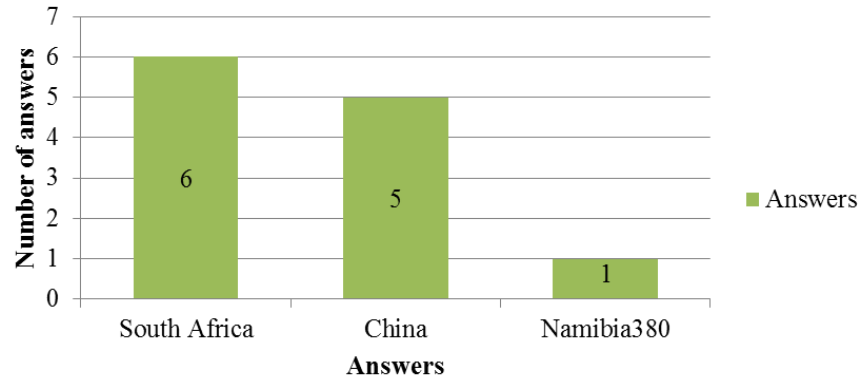


Figure 33: Country of origin of seeds (Carolyn Tischtau)

Half of the gardeners (50%) indicated that their seeds are from South Africa, 42% indicated that they are from China and 8% said they are from Namibia380. Six did not answer the question. It should be kept in mind here that 71% of the gardeners indicated that their source of seeds is the MAWF.

According to the interview made and visits to the shops of the three seed companies in Windhoek - *Agrigronamibia*, *Agra* and *Starke Ayres* - only imported seeds from South Africa are sold in Windhoek. These three specialized seed-supply companies hold the monopoly for the market in Windhoek.

#### 4.2.11. Invasive Species

Five invasive species were identified in the projects (Appendix 4), namely:

1. *Schinus terebinthifolius* – Brazilian pepper tree (Figure 34). “It is categorized with an invasive status in South Africa. More precisely: alien species that may no longer be planted; all reasonable steps should be taken to prevent their spread. It is originally from South America (Brazil). The ecological impact is that it

competes with and has the potential to replace indigenous species. It is poisonous and irritant” (Agriculture Geo-Referenced Information System, 2012)



Figure 34: *Schinus terebinthifolius* – Brazilian pepper tree in NEYO (Carolyn Tischtau)

2. *Argemone ochroleuca* (White-flowered Mexican poppy) is prohibited and must be controlled. It competes with agricultural crops and indigenous species. It has the ability to contaminate crop seed (WIP, 2006).
3. *Leucaena leucocephala* (Leucaena) is a declared weed, it is prohibited and must be controlled it is allowed in defined areas by permit holders. It competes with and is likely to replace indigenous species. Furthermore, the dense stands along watercourses are likely to reduce stream flow. It is originally from Mexico and Central America (WIP, 2006).
4. *Psidium guajava* (Guava) is an invader but plants can be grown under controlled conditions (SANA, 2009).

5. *Oxalis species* (clover) are declared as invaders, the specific variety could not be identified.

#### **4.2.12. Potential to conserve crop plant diversity**

The investigated gardens in Windhoek do not have the conservation of crop plant diversity on focus.

The data acquired through the questionnaire about local species cannot be considered, because the gardeners did not understand the term *local species*. The species they named are evidently no local species. For this part of the study only the data acquired via field work will be taken under consideration.

It was conducted that 11% of the investigated species in Windhoek are native to Namibia. Two species of local fruit trees from Northern parts of Namibia growing in NEYO could be investigated. Namely: *Sclerocarya birrea ssp. caffra* and *Berchemia discolor*. In GoH *Amaranthus* and *Laggera decurrens* were examined (Appendix 4). It could not be explored who brought them there from where.

*Sclerocarya birrea* (Marula) is a widespread species throughout the semi-arid, deciduous savannas of sub-Saharan Africa. It is a medium to large tree, usually nine m tall. Marula fruit has a thick, soft leathery exocarp with tiny, round or oval spots, enclosing a juicy, mucilaginous flesh that adheres tightly to the stone. It has multiple uses for the rural population, containing fruits, nuts, oil, bark, wood and leaves. It has also a spiritual component and it is often kept in homestead. On the basis of the fact, that it is widespread and its high fruit production and use it is often identified as a key species to

support the progress of rural areas (AgroForestryTree Database 2012; Shackleton, Shackleton, Cunningham, Lombard, Sullivan and Netshiluvhi, 2002).

*Berchemia discolor* is a shrub or a tree and about 3-20 m high. The fruits are yellow and up to 20 x 8 mm with 1-2 flat seeds, only the flesh is edible. Additionally, the trees are used for shelter (AgroForestryTree Database, 2012).

*Amaranthus* (Amaranth/Ekwakwa) is an annual herb. It is an easy crop to propagate, as it produces abundant seed.

*Laggera decurrens* (Bitter bush) is widespread in most of Southern Africa and as disturbed areas increase, so does the probability of this bush spreading. They form dense spreads in river beds as well as disturbed ground, whilst occurring on plains. As with other wild flowers of the northern Namib Desert, the bitter bush is used for a variety of medicinal purposes.

#### **4.3. Case studies in Berlin**

In the following paragraphs the three case studies in Berlin are described, namely:

(1) Spreegarten

(2) Rosa Rose

(3) Bunte Beete e.V. - Interkultureller Garten Berlin-Kreuzberg

The data was conducted via interviews, literature- and Internetreview, attending sessions, like *AG Forschung*, regarding the topic. The description of the case studies is nearly following the structure of the hypotheses: Location, size of the garden, stakeholder, cultural background, management purpose, availability of resources (land, water, tools, seeds, professional advice, pesticides, fertilizer, finance), farming methods,

origin of seeds, invasive species, problems. In the end the data about biodiversity (species richness and species composition) and the potential to conserve plant diversity is pooled together.

#### 4.3.1. Spreegarten

The *Spreegarten* (Figure 35) is located at Köpenickerstraße between Bona-Peiser-Weg and Michaelkirchstraße (52.510834; 13.424641). It has existed since 2011. The project size is 500 m<sup>2</sup>.



Figure 35: Spreegarten (Carolin Tischtau)

The cultivators are a homogenous group of around 20 people. Most of them are between 20 and 40 years old and belong to the academic middle class. Two have a Turkish migration background. Other than that they are mainly Germans.

The management purpose is: City beautification and culture on fallow.

The area was a beach bar before. 2011 it was brought off by a cooperative (*Baugenossenschaft*). Their goal was that it remains accessible for the public. They did a call for proposals. One person submitted the idea of starting a garden. This proposal won and he sent E-Mails to his friends, inviting their participation. Through this so-called

snowball principle a group emerged. It took half a year from the idea to the beginning of the project.

They did not receive professional advice from anyone while starting the project. It was decided to do raised bed because it was an industrial area before. Furthermore that enough space between the beds is needed for wheelbarrow. Then everyone started building their own plot. The initiator ordered soil from the urban fringe. No problems occurred in the development of the project.

There are no hierarchical structures in the garden and everyone can participate. The main language is German. They are mainly communicating via E-Mail.

In terms of networking with other gardening groups it can be stated that it does not exist. But some gardeners are part of other projects as well.

Regarding land it can be stated that the cooperative is the owner of the plot. They are not paying rent.

Concerning water, in the beginning they used Spree water which they got with the help of a bucket out of the river. Later they invested in a pump getting the Spree water for them.

In terms of availability of tools everyone is bringing some. They have: three big shovels, one small shovel, one wheelbarrow, one big pick, four watering cans, two rainwater tank, 25 plastic flowerpots and three plastic tubs.

Some gardeners are buying their seeds from the supermarket or keep them from the last harvest.

In terms of pests the garden has mainly problems with aphids. No one is using chemical pesticides. But organic one like pesticide derived from stinging nettle.

In terms of fertilizers some are using self-made pesticide derived from stinging nettle.

They are not selling their products. If something is needed they are putting money together.

In terms of farming methods they have risen beds made of a wooden self-made box, because the area might be contaminated. The garden consists of 14 individual beds.

They are doing mixed cultivation and have compost.

They do not have any requirements regarding the origin of seeds.

No invasive species could be investigated.

In terms of the potentials to conserve crop plant diversity some gardeners have a focus on planting local varieties. More information in chapter 4.3.5. Potential to conserve crop plant diversity.

Two problems are occurring in the garden: Firstly, sometimes some vegetables get stolen. And secondly, a building opposite the garden is supposed to be planned this will seriously affect the attractiveness of the garden and is a reason for some people to stop participating in the project.

All the information was acquired via an interview (Appendix 5), field work and direct observation.

#### 4.3.2. Rosa Rose

The garden project Rosa Rose (Figure 36) is defined as an intercultural- and community garden. They started 2004 but were forced to move from their initial place and started at a new location (Jessnerstr. 3) in 2010. The whole area is around 2000 m<sup>2</sup>.

Rosa Rose

c/o Hehl, Frauke  
 Jessnerstrasse 3 10247  
 Berlin  
 Access via Jessnerstrasse 3  
 und 13  
 10247 Berlin  
 Tel: 0151 - 15352490  
 E-Mail:  
 rosarotrose@web.de



Figure 36: Rosa Rose garden (Carolin Tischtau)

Approximately ten regular and 30 occasional gardeners from seven different countries (England, Italy, Spain, Germany, Poland, the USA and Austria) and of different age groups live more or less close to the above mentioned area are part of the project. The main language is German. More women than men are working in the garden. The workstation *Ideenwerksatt Berlin e.V.* is the agency.

The overall management purpose is: One garden from everyone for everyone.

The project started through the initiative of neighbors as a guerrilla garden. They decided to clean unused land full of waste and rubbish and brought several tons of soil. The first sowing was undertaken 2004/05. They were broached from this initial area

(Kinzigstr. 11+13+15) in 2008 and 2009 due to construction. In 2010 they started again on the allocated land of a Real Estate Fund (*Liegenschaftsfonds*). The development of the project was a process transparent and open for everyone. With different ways of communication, like: mailing list, meetings in the garden, plenum and networking with other gardening projects.

The garden became an important place for the entire neighborhood. They organized cultural events and workshops as well as training courses and classes. They meet for gardening, drinking coffee and tea and to enjoy sunny days together. Many neighbors use this open area for their weddings, birthday celebrations, cinema evenings and readings. They also organize regularly garden parties for the entire neighborhood. To the residents, the garden offers the possibility of actively participating almost without financial expenditures in a joint, intergenerational project, to get to know other people, and to experiment with and develop skills involving handcrafts, gardening or art activities. They are mainly friends and neighbors and people with the same Visions. The activities that take place in the garden always involve: Bringing together children and elderly, immigrants and members of the gay and lesbian community; they strive for equality and empowerment.

Most work in the garden is done together. The garden is self-organised, meaning *Rosa Rose* does not comply with instructions of institutions and everyone who wants to take part can do so and has the same rights as everyone else.

Networking with other UAP exists. Mainly with *Ton, Steine, Gärten, Prinzessinengärten, Laskerwiesen* and *Tempelhoferfeld*. This networking takes place for

example in terms of organizing transport and distribution of peat together. Communication and information exchange takes place via mailing lists. Furthermore the project is also networking on a global scale with for example community gardens in New York, London or Wien.

A contract with the district office is regulating the free use of the area. Gardens like *Laskerwiesen* and *Ton, Steine, Gärten* acquired their land after the same model. A free utilization for five years is guaranteed. In order to sign the contract a club took over the sponsorship.

According to the land-use zone plan the area is classified as a building- or free space area.

On the grounds of a cooperation agreement with the district authority Friedrichshain-Kreuzberg free access to a deep well exist.

The tools are either form members or gifts.

They mainly get their seeds via cooperatives like: *social seeds*. Some gardeners are also buying their seeds from the supermarket, exchange them with families and friends or keep them from the last harvest.

They did not receive professional advice, but worked together with an independent neighbourhood initiative. In terms of work power, access to water and a place where they could log up their tools.

In terms of pest, they have mainly problems with slugs. The interview revealed that they are not using chemical pesticides in the garden but it was also indicated that they cannot speak for everyone.

In terms of fertilizer they are using horse manure, guinea pig manure, stinging nettle swill and compost. Whereas, they produce it themselves, get them as a donation or buy it in a shop.

They do not sell the produce. They do not have running costs. They get the things they need via their different social networks. For example: peat soil or old bricks. Nobody is able to invest thus a great deal of cash and material donations were collected.

In terms of farming methods they are using: Levels around flower beds, mixed cultivation, intercropping, land cover with organic material and compost.

They plant vegetables, fruits, ornamental plants annual as well as perennial varieties. The garden is biological and ecological. Individual and joint used beds exist.

No invasive species could be investigated in the project.

In terms of the potential to conserve crop plant diversity it can be assumed as being relatively high since some people are parts of social seeds. They explicitly have the distribution of local varieties on focus. More information in chapter 4.3.5. Potential to conserve crop plant diversity.

Problems occurring are the eviction from the old location as well as harassment at the new location from the neighbours.

According to Meyer-Renschhause (2011) also it is supposed to be an international garden it is more a homogenous group. People with Turkish background living close by are not really present.

The information is maintained from: Henneberg 2012a; Meyer-Renschhausen, 2011a; Kotte, 2012, rosarose-garten, 2012 and the conducted in-depth interview (Appendix 6).

#### 4.3.3. Bunte Beete e.V.

*Bunte Beete e.V.* is an intercultural Garden as well as a community garden (Figure 37). They started planting 2003. The total area is 1.200 m<sup>2</sup>. The area used for gardening is: 400 m<sup>2</sup>.

Bunte Beete e.V. - Interkultureller Garten  
 Berlin-Kreuzberg  
 c/o Ulrich Ernitz  
 Naunynstraße 65  
 10997 Berlin  
 Ulrich Ernitz, Tel. (030) 6158173  
 Jürgen Jopia-Kuhr, Tel. (030) 2913952  
 E-Mail: [buntebeete@gmail.com](mailto:buntebeete@gmail.com)  
<http://buntebeete.wordpress.com/>



Figure 37: Bunte Beete garden (Carolin Tischtau)

Around 30 people are part of the project. More and more children are becoming part as well. The gardeners have their roots in ten different countries. Mostly they are from the surrounding community. Cooperation partners are the *Senate Department for Education, Youth and Sports*, the *district office Friedrichshain/Kreuzberg*, *Workstation - Ideenwerkstatt Berlin e.V.* and *Stiftung Interkultur* (a foundation which aims to contribute to a new understanding of social integration. It is a nationwide service and coordinating body of more than 100 projects.)

The main purpose is the understanding of people with different ethics, language and cultural heritage.

In September 2003 the *Initiative of intercultural gardens Friedrichshain-Kreuzberg* (*Initiative Interkulturelle Gärten Friedrichshain-Kreuzberg*) in cooperation with

*Workstation – Ideenwerkstatt Berlin e.V* (a platform where projects and individuals can meet, exchange ideas and get advice and support) founded the club: *Bunte Beete e.V.*.

These founding persons were mainly people who live in a bi-national partnership. The encounter, the exchange and understanding of people from different ethnic, linguistic and cultural backgrounds is the most important motivation. Furthermore, they share the enthusiasm for horticultural works.

The search for a property in this densely populated district was advantaged by the fact that at that time, the college of trading in Wrangelstraße opened for the district and was interested in cooperation with them.

Supported through EU funding they started the planting of trees and the creation of the first beds in 2004. A composting facility and a clay oven were added later. Meanwhile, the community garden *Bürgergarten Laskerwiese* at Ostkreuz emerged through the same initiative.

Apart from the equal and intercultural purposes, farming and taking care of the garden things like cultural and art events, theatre, movies or exhibitions are focused on. Additionally, workshop or project weeks as a form of activity-orientated sociocultural and ecological education work. Furthermore, the group takes care of the green areas of the school grounds. Only couple in a bi-lateral relationship can apply to be part of the garden.

As they were one of the first UA projects in Germany they helped to initiate a lot of them and are still in contact with a lot of them.

The official type of use of the land (according to the land-use plan) is buildings- and free space. The area is communal land rented by them, but they are not paying rent.

A private groundwater wells was installed. To cover the costs marginal annual contributions are levied.

In terms of tools they have: two water tons and four watering cans.

They acquire their seeds from various sources. Some bring them from their home countries or from holidays. Other by them at supermarkets; get them from botanical gardens or via contacts to people in Germany.

The club constitution requires ecological farming methods only. No chemical pesticides, herbicides or fertilizer are allowed.

As stated in the club constitution the stock of money of the club can only be used for things set in the club constitution. Members do not get any money.

The garden is following ecological and sustainable aspects. That includes minor soil sealing, the conservation of tree populations and the promotion of biodiversity.

About a third of the approximately 1200 m<sup>2</sup> area is divided into 23 individual plots. The rest of the area is shared and maintained by the community. They are having bees and a vermicompost. They further do intercropping and crop rotation.

No invasive species could be investigated in Bunte Beete.

The gardeners want to contribute to the conservation of plant diversity. In their opinion cultural and ecological diversity belong together. More information in chapter 4.3.5. Potential to conserve crop plant diversity.

Once in a while some vegetables are stolen, but in general they do not have any problems.

The information is maintained from: Henneberg, 2012b; Kotte, 2008, Satzung Interkultureller Garten Kreuzberg Bunte Beete, 2008, Stiftung Interkultur, 2012 and the conducted in-depth interview (Appendix 7).

#### 4.3.4. Biodiversity in Berlin

In Berlin the species richness ranges from 40 to 89 different species. In Spreegarten the species richness is 40, in Rosa Rose 83 and in Bunte Beete it is 89 (Appendix 8).

In terms of species composition in the investigated projects in Berlin it can be stated, that:

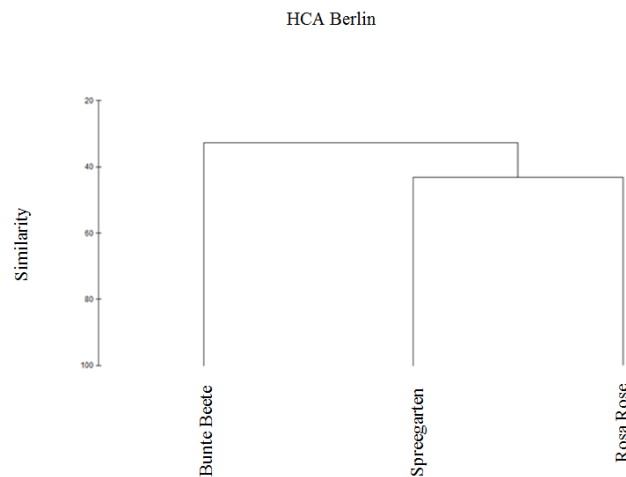


Figure 38: Similarity of the projects in Berlin (Carolin Tischtau)

Rote Beete is 32% similar to both, Spreegarten and Rosa Rose, which are 43% similar.

#### 4.3.5. Potential to conserve crop plant diversity

In terms of the potential to conserve crop plant diversity it can be stated, that in Berlin 32 % of the species in the garden were investigated as native or local ones (Table 4):

Table 4: Native species in the gardens in Berlin (Carolin Tischtau)

| English Name          | Latin Name                          | Spreegarten | Rosa Rose | Rote Beete |
|-----------------------|-------------------------------------|-------------|-----------|------------|
| Alpine currant        | Ribes alpinum                       |             |           | 1          |
| Asters                | Aster alpinus L.                    |             |           | 1          |
| Beam tree             | Sorbus aria                         |             |           | 1          |
| Birdseed              | Plantago major                      |             | 1         |            |
| Boar thistle          | Sonchus arvensis subsp. arvensis L. | 1           |           |            |
| Bol tree              | Bulus                               |             | 1         |            |
| Broad-leaf (plantain) | Plantago major                      | 1           |           |            |
| Brussel sprout        | Brassica oleracea                   |             |           | 1          |
| Bush vetch            | Vicia sepium L.                     |             | 1         |            |
| Butter cup            | Caltha palustris                    |             |           | 1          |
| Cherry                | Prunus padus                        |             | 1         |            |
| Clover                | Trifolium dubium Sibth.             |             | 1         | 1          |
| Common grape vine     | Vitis vinifera subsp. Sylvestris    |             | 1         | 1          |
| Common honeysuckle    | Lonicera periclymenum L.            |             |           | 1          |
| Common ivy            | Hedera helix L.                     |             |           | 1          |
| Cramp bark            | Viburnum opulus                     |             |           | 1          |
| Creeping saltbush     | Atriplex hastata                    | 1           |           |            |
| Dog rose              | Rosa canina                         |             | 1         | 1          |
| Elderberry            | Sambucus                            |             |           | 1          |
| Garlic mustard        | Alliaria petiolata                  |             |           | 1          |
| European goldenrod    | Solidago virgaurea L.               |             | 1         |            |
| Hazel nut bush        | Corylus avellana                    |             |           | 1          |
| Marguerite            | Leucanthemum vulgare                |             | 1         | 1          |
| Raspberry             | Rubus idaeus                        | 1           |           |            |
| Rowan                 | Sorbus aucuparia                    |             | 1         |            |
| Sedum                 | Sedum album L.                      |             |           | 1          |
| Thistle               | Cirsium vulgare                     | 1           |           |            |
| Tufted Sedge          | Carex elata All.                    |             | 1         |            |
| Treacle               | Erysimum cheiranthoides             |             | 1         |            |

|                            |                          |  |   |   |
|----------------------------|--------------------------|--|---|---|
| <b>wallflower</b>          |                          |  |   |   |
| <b>White forget-me-not</b> | Myosotis nemorosa Besser |  | 1 |   |
| <b>White goosefoot</b>     | Chenopodium album L.     |  | 1 |   |
| <b>Yarrow (common)</b>     | Achillea millefolium L.  |  | 1 | 1 |

#### 4.3.6. Summary Results from Windhoek and Berlin

The following subchapter provides a summary of the results in a comparison:

Table 5: Summary of the case studies in Windhoek and Berlin – a comparison (Carolin Tischtau)

| <b>Windhoek</b>                                       | <b>Variables</b>                               | <b>Berlin</b>                                          |
|-------------------------------------------------------|------------------------------------------------|--------------------------------------------------------|
| Homogenous                                            | <b>Cultural background</b>                     | Mixed                                                  |
| More men than woman                                   | <b>Stakeholder - Sex ratio</b>                 | More men than woman                                    |
| Dependency syndrome and the attitude no money no work | <b>Stakeholder - Motivation</b>                | Do it yourself                                         |
| Food security/income                                  |                                                | Political/social/ecological                            |
|                                                       | <b>Availability of resources</b>               |                                                        |
| Yes                                                   | <b>Land - Developed on fallow</b>              | Yes                                                    |
| No                                                    | <b>Land - Law/policy</b>                       | No / Agedna 21 (only for intercultural gardens)        |
| No                                                    | <b>Land - Owner of land</b>                    | No                                                     |
| Yes                                                   | <b>Land - Land secure</b>                      | issue                                                  |
| Fenced off and looked                                 | <b>Land - security</b>                         | Tools are looked but the gardens are open for everyone |
| Secured                                               | <b>Water - Access to water</b>                 | Secured                                                |
| Provided by MAWF or other organisations               | <b>Tools - Organisation</b>                    | Self-organised                                         |
| High and advanced                                     | <b>Tools - Variety</b>                         | Minimal                                                |
| Mainly dependent on MAWF                              | <b>Seeds - seed supply</b>                     | Independent and self-organised                         |
| Constant advice by experts from the MAWF              | <b>Professional advice</b>                     | Learning by doing                                      |
| If necessary                                          | <b>Pesticides - Use of chemical pesticides</b> | No                                                     |
| Yes                                                   | <b>Fertilizer - Use of organic fertilizer</b>  | Yes                                                    |

|                                                  |                                                             |                                                         |
|--------------------------------------------------|-------------------------------------------------------------|---------------------------------------------------------|
| Yes                                              | <b>Finance - Income due to the garden</b>                   | No                                                      |
|                                                  | <b>Farming methods</b>                                      |                                                         |
| Planting directly in the soil; will be increased | <b>Soil fertility</b>                                       | If mobile gardens and/or risen beds it is not improving |
|                                                  | <b>Management purposes</b>                                  |                                                         |
| Via Sms and meeting people in person             | <b>Management purposes - Communication</b>                  | Via the Internet (E-Mail and blogs)                     |
| Guided by the government                         | <b>Management purposes - Organisation</b>                   | Self-organised                                          |
| Only one project                                 | <b>Management purposes - Networking with other projects</b> | Yes                                                     |
|                                                  | <b>Biodiversity</b>                                         |                                                         |
| Mainly crop plants only                          | <b>Plant diversity</b>                                      | Higher variety, also ornamental plants                  |
| 5                                                | <b>Invasive Species</b>                                     | 0                                                       |
| 11%                                              | <b>Percentage of native/local varieties</b>                 | 32%                                                     |

## 5. Discussion

In the following section the outlined results will be discussed and compared. The undertaken research demonstrated how complex the phenomena of UA are and how heavily they are influenced by various social, economic and environmental variables. The results will therefore be discussed by following the structure of the conducted hypothesis. The hypothesis is meant to serve as a guideline here. Since a holistic overview is aspired. For the same reason a clearly stated verification or rejection of any one of UA's phenomena is being avoided. In order to be able to give a holistic overview the focus is less on judging but rather on discussing the phenomena. The discussion is divided into the following subchapters: cultural background, stakeholder, availability of resources, farming methods, management purpose, biodiversity (species richness and

species composition), invasive species and origin of seeds pooled together with the potential to conserve crop plant diversity.

Despite the wide collection of data gathered for this thesis, the study cannot be considered to be representative. The sample size and the data is not enough to be of significance. Assumptions can only be drawn for the six specific projects but not for the whole of Windhoek or Berlin. More research is needed to further explore the topic and therefore placing it in a wider context. Both things lie outside the possibilities of this work. Nevertheless, generalisations can be drawn.

### **5.1. Cultural background**

It has been stated that all cultivators in Windhoek either belong to the Owambo or Kavango tribe (Appendix 3) this can be explained by two factors:

First of all these two groups make up half of Namibias population. Bearing these numbers in mind it is not surprising that the Owambo and Kavango tribes also make up the largest group in the gardens.

Secondly, it must be understood that Namibia is divided into four main regions: the Okavango and Owambo-land in the north, the Kaoko-veldt and Damara-land in the center and Nama-land in the south. Only Okavango and Owambo-land are fertile and the tribes there are exposed to crop agriculture (Knappert, 1981). To avoid confusion with the definition of the Owambo it has to be noted that the name “Owambo” serves as a collective name for people speaking seven different languages. Taking into consideration that Namibia is the driest country south of the Sahara and its crop agriculture is very weak, diets of other ethnic groups like the Herero are traditionally

based on meat, milk and only a few vegetables. This possibly explains why it is mostly the Owambos who are practicing UA in Namibia. Reasons, like accessibility of the projects do not seem to influence the situation. In Katututra all Namibian tribes are represented and could theoretically be part of the projects.

In Berlin the UAPs are shaped by cultural diversity. In *Bunte Beete* 1/3 of the gardeners come from countries other than Germany. In *Rosa Rose*, cultivators come from seven different countries. It can be assumed that these projects constitute an area of social interaction between cultures which can lead to a better mutual understanding. Furthermore, the different cultural backgrounds of the cultivators influences the crop diversity planted as people are most likely to plant species they know from their home country. Thus it can be concluded that a garden's crop diversity is linked to the cultural diversity of its gardeners (see also Chapter 5.8.). This may have negative effects too, as chances of introducing alien invasive species increase.

The questions of what would the data in terms of crop diversity, indicate if the projects would be more culturally/tribally diverse in Windhoek remains. Would it be the same due to the small variety of seeds available in Windhoek or are no more crops possible because the environmental factors are too harsh?

## **5.2. Stakeholder**

The gardens in Berlin and Windhoek are mainly run by woman. In Windhoek 74% are female and 26% are male, this is consistent with the common findings about the sex-ratios in UA in African cities and in general. Mkwambisi (2009) states that female-headed households are more efficient in farming and over-represented as UA farmers.

This notion is supported by, Nasr and Ratta (1999), who found that in Nairobi, Kenya and Kisangani, DRC around two-thirds of urban farmers were women. Nevertheless, it should be noted, that the level of women doing UAP varies significantly by country, city and even within the cities along with the communities (Mougeot & Munro-Faure, 2007). Different theories are presented which elucidate this pattern. One is the increasing focus of governments and aid agencies that since the 1990s have focused on female empowerment. Another might be that men have better chances in the labour market.

In the investigated projects in Berlin the stakeholders are mainly woman as well. Most of them have a minimal income despite their high level of education. Arndt, Haidle and Rosol (2004) came to the same conclusion. They too noticed the high percentage of female cultivators in Berlin. According to them women appear to have a higher interest in gardening. In addition to this most garden projects are child-friendly and focus on providing an integrating space which meets the needs of most parents and single mothers in particular. All the Berlin case studies that were conducted for this thesis confirm this trend.

In general behaviour patterns in the projects in Windhoek can be drawn also based on Featherstone (2005) studies about UA in South Africa. It can be assumed that poor nutrition results in low energy and motivation. Sometimes it also manifests in a lack of self-confidence. In some cases an attitude of ‘no money, no work’ is present. It can be stated that older women tend to have better staying power and motivation than younger ones. Often these are the reasons why UAP fail, along with a lack of democracy and group management skills and dominating leaders. Furthermore, distintegration can occur

due to underdeveloped group cohesion, a lack of group rules and discipline issues. Another big problem relate to the tenure of particular participant and the distribution of costs and benefits. It can be stated that socio-organizational aspects of these projects are the main reason of failure. Consequently groups need to be well trained and guided in this aspects and realize that the success of UAPs lies not merely in technical understanding.

In Windhoek the gardeners motivation to get involved into UA is influenced by hard factors (*income/economic reasons and food supply*) rather than soft factors (*to feel closer to nature or I am doing UA just for fun*). This is not surprising in an environment with 43.6% of unemployment for people under 34 years of age and the fact that 84% of the cultivators in Windhoek are between 30 and 35 years old (Figure 11). In 28% of the cases education plays a role too, mainly because some people are interested in teaching UA to their community. It can be assumed that they mean the education they received via the training from the MAWF. It can be assumed, that they mainly do UA because it is offered by the MAWF for free and they hope to use these skills in order to increase their food supply and income through doing it. This seems most likely considering that most of the gardeners earn either between 0-100 N\$ per month (36%) or 100-500 N\$ (50%). The cultivators in Windhoek are driven by the basic need of earning their living. Getting involved in UA is therefore always linked to the hope of finding a job. It is a survival strategy and a possibility to acquire knowledge that may increase one's chances of gaining employment.

The fact that only 58% of the gardeners indicated that their food supply has increased since joining the projects in Windhoek can be explained by the fact that the other 32% have not been doing gardening for long, and therefore, they did not have the time necessary to produce a harvest. 90% of the experienced gardeners – those being involved for two to nine years (DSNGoH and GoH) indicated that their food supply has increased. The 32% that said that their food supply had not increased due to the project are part of the NEYO project. This can be explained because in the first year they were not allowed to harvest for themselves only for the Aids care trust. Consequently, one can state with relative confidence that when UA is preformed over a long period of time food security in Windhoek increases. Nevertheless, it should be kept in mind as Mougeot, (2006) stated as well, that it is impracticable that cities become self-sufficient in food. Most crops can be grown capably only in the rural areas. But as shown, UA can, and does, make important contributions to food security in cities.

Contrary to this UA in Berlin is shaped by self-motivation and self-innovation in most cases. The stakeholders are mainly academics often with a low income. Even so, it is not a survival strategy in Berlin.

Due to a more stable economic situation a bad harvest is seen more as something to be learned from in Berlin. Whereas the consequences in Namibia a far more serious in terms of food security and income generation. For the gardeners in Windhoek it can be disastrous, as they are dependent on the income generated by their gardens.

UA started in Germany for the same reason as it did in Namibia, namely food security (Müller, 2011). Nevertheless, the initial reasons for doing UA in Germany changed.

Today UA combines various different movements and projects such as greening the city, social life, providing access to fresh fruits and vegetables, or turning the garden into an oasis of knowledge. Garden projects serve as a meeting point for many different people who enjoy the project for various reasons. Some people are enthralled by the (political) autonomy of such self-organized garden projects; others are more concerned about their contribution to crop plant diversity. These gardens are about community and offer a place of awareness-raising and communication (Müller 2011; Rasper, 2011; Rosol, 2006). None of the gardeners relies on the garden as his/her source of food or income.

This shows that UA is a practice transcending social status. UA needs to be seen as a worldwide phenomenon and it cannot be reduced to a survival strategy for the poor only.

To sum up the motivation of the stakeholders it can be stated that UA in Windhoek is about food sovereignty and income. In the case studies in Berlin it is about political, social and ecological reasons (Table 6). It should be stated here that there are examples, like *Prinzessinenengärten* also having an economic focus.

Following Crush, Hovorka and Tevera (2010) and Cruz (2000) urban cultivators in Windhoek and Berlin can be summarized into one of the following groups:

Table 6: Overall groups of UA cultivators in Windhoek and Berlin (Carolin Tischtau)

| Group 1                                                               | Group 2                                                                                                                | Group 3                                                                                        | Group 4                                                      |
|-----------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------|--------------------------------------------------------------|
| -Cultivators under the poverty line<br>-growing for own food supplies | -above poverty line growing for own food supplies and the market<br>-still highly affected by unemployment and illness | -Small-scale entrepreneurs<br>-production for the market<br>-capital and resources are present | -Gardening mainly for social / political / knowledge reasons |
| <b>Windhoek</b>                                                       | <b>Windhoek</b>                                                                                                        |                                                                                                | <b>Berlin</b>                                                |

The traditional understanding of cultivation is 14% smaller than expected in Windhoek, especially when one takes into consideration that all the gardeners in Windhoek are from small villages. This can be explained by the fact that the main crops grown in the villages include field crops, like Pearl millet (Mahangu) maize, sorghum and wheat (MAWF, 2009) rather than spinach and tomatoes which are the main crops in the gardens in Windhoek. Consequently these crops differ in their farming methods and knowledge about cultivating it is non-existent. This explains that 68% of the cultivators in Windhoek have learnt how to cultivate through practical training rather than traditional knowledge (Figure 16). It shows once more the fundamental importance of the MAWF for UA in Namibia. Ogunmokun (2005, p. 87) offers an additional reason to explain lack of traditional knowledge of agricultural in Namibia. He claims that “HIV/AIDS has contributed to a loss of knowledge in crop management, pest control, soil fertility, crop and produce storage, freshwater fisheries, forest products and traditional livestock management. The lack of knowledge is affecting the uptake of improved farming practices.” In contrast to Berlin, where knowledge about UA was passed on from friends and neighbours or gained through the media, therefore Berlin’s gardeners acquired their knowledge about UA quite differently. Gaining knowledge through books, by means of “learning by doing” and by sharing experiences is the common way to learn about UA in Berlin. In Berlin training from a professional source does not exist. However, it is likely that some gardeners have professional knowledge

and skills. Self-organized workshops to share knowledge in a specific field are common practice.

### **5.3. Availability of resources**

#### **5.3.1. Land**

In all cases in Windhoek and Berlin the land the projects are using now was a fallow before (Appendix 3; Werner, 2011). It shows the potential of UA to use unused space and transform it into something productive and also demonstrates its contribution to the beautification of cities and its able ability to create habitats within the city.

All the investigated projects in Windhoek have secure land. But the gardeners are not the owners of the plot. Nonetheless due to the fact that the projects are situated within school yards, disability centres, hospitals or hostel backyards and given by the government, the farmers know that the probability that land will be taken from them are minimal. One said he/she is the owner of the plot. It can be explained by the fact that in NEYO they divided the plots so everyone can plant for themselves but do not own the land. As Mougeot (2006, p. 52) stated: “security of tenure is more important than ownership”. This implies that predictability and stability is central to success. This concept is working quite well in Windhoek. Nevertheless, the projects should keep in mind that they can only exist as long as their “host” secures them the land rights.

In Windhoek the projects exist and are supported by the government but there is no law regarding UA, which leaves some open questions. According to, *Town Planning Ordinance No. 18 of 1954. Government Gazette of the Republic of Namibia*, the non-existing regulations mainly occurs due to the Town Planning Scheme. It does not

recognize UA as a land use zone. Although as stated from the municipalities it would be possible to use land for UA in Windhoek “clear and well-publicized regulations for the use of land have also been shown to make life more predictable for city farmers” (Mougeot, 2006, p. 51 and 52). As Ogunmokun (2005) stated most UA which are taking place in Namibia are done in the backyards very few are carried out in urban open spaces. This is mainly due to lack of policy on UA. But it must be taken into consideration, that Namibia is one of the few countries in the world with a specific section on the environment. *Chapter 11 – Principles of State Policy Article 95 Promotion to the welfare of the people states*: “the state shall actively promote and maintain the welfare of the people by adopting policies which include the maintenance of ecosystems, essential ecological processes and biological diversity...” (Ruppel and Ruppel- Schlichting, 2011, p. 81). Furthermore, the *Namibian Environmental management Act no 7 of 2007* was instituted to:

- (1) Promote community involvement in the management of natural resources, and community sharing in the benefits from those resources.
- (2) Protect Namibia’s cultural and natural heritage, including its biological diversity, for the benefit of current and future generations.

UA can be one tool to enforce these regulations, especially when it comes to the potential conservation of crop plant diversity. But so far UA in Windhoek is largely an informal, if not illegal, survival strategy of the urban poor. This lack of policy and therefore lack of recognition/acceptance, of UA by government and municipal officials constrains the development and intensification of UA in Windhoek.

In Berlin UA is consistently under threat in terms of land rights. The *Rosa Rose* case can serve as a good example here. The gardeners were forced to leave their initial place in 2008 and 2009. Now they have a contract, but it only secures the land for five years. This favours the city on the one hand because they can still sell the land but meanwhile it is not a fallow. The gardeners profit, because this land is often in highly sought after areas and they can rent it for relatively cheap. Also examples like the projects: *Prinzessiningärten* or *Tempelhoferfeld* prove the precarious land use situation in the German capital. Land seems to be the biggest issue for UA in Berlin in general. It is likely that in the future land pressure will decrease, as Berlin's population, like that of all German cities, is expected to shrink (Darms, 2011). But it needs to be considered here that this trend will vary to a greater or lesser extent, in accordance to the attractiveness of the different districts of the city. If it is an attractive living area the pressure on UA is most likely to stay the same or become even greater. It must also be taken into account that although the population of Germany in general will decrease, the trend that people will live more and more in cities will remain stable - particularly in "hip" cities like Berlin. In other cities, especially in the East of Germany, people are most likely to move due to better income opportunities. In these cases UA can be considered as new land use zone.

In general, there is no law regarding UA in Germany. It should be part of the communal constitutions, but this is rare, one example is Agenda 21 in Berlin. On average one quarter of the land of big cities is declared as agricultural used space conferring to Lohreberg (2011). According to Rasper (2012) 10–15% of urban land is declared as

farming areas. However, most of the more than 100 community gardens in Germany are not on secure land (Dams, 2011). Neither chambers of agriculture nor BMELV (Bundesministerium für Ernährung, Landwirtschaft und Verbraucherschutz) have specific sections specialized on UA (Lohreberg, 2011). However, it can be assumed that this will change soon, as the topic is gaining an ever increasing amount of attention in the public domain and some cities are already adopting it. The zoning law in Germany requires public authorities to follow the land use plan. It serves as an overall guide line for land use. Therefore it is essential to secure areas for UA in this zoning plan, which is a legally obligatory plan. Gardens which have become part of a zoning plan are harder to relocate. This means that only where gardens are shown in a zoning plan a certain medium to long range, five to twenty-five years, and guarantee for their use is given. But most of the UAP in Berlin do not have such a permanent status (Groening, 1996). Apart from the intercultural gardens which are falling under the Agenda 21.

### **5.3.2. Water**

Although normally a crucial resource in UA, water is not limited for the UAP in Windhoek. It is provided to the schools or centers where the gardens are placed by the municipalities. However, this can lead in later stage to discussions on the price of the water. Tap water is used by 94% of the gardeners. At GoH people stated that they have limitations in terms of: “the more you use the more you pay.” Furthermore, at NEYO, 20% said that they have problems with water, but it is most likely that this related to technical issues such as a broken pipe. The dominant use of tap water in can be explained by the exceptionally low level of rainfall in Namibia. Nonetheless, in other

parts of the country/projects without such services it should be one of the main constraints. Particularly when one considers that the annual rainfall in Windhoek is around 370 mm, and the potential surface evaporation rate is between 3.000–3.500 mm/year. Furthermore, Windhoek's water supply is based on the use of surface water and groundwater. As “the region is one of the driest in the world, all the potable water resources within a radius of 500 km have now been fully exploited. The rainfall is uncertain and long spells of severe droughts are frequently encountered” (Lahnsteiner and Lempert, 2007; Ward, 2007). Compared to the average household consumption of 175 to 350 liters per day (Ward, 2007) GoHs 50 l and Neyos use 24 l per day per person are low, whereas Dr. Sam Nujoma's garden of hope uses 604 l per day - which seems quite high. It can be inferred here that the gardeners do not really know how much water they use and that the data is so entirely correct.

In Berlin both groundwater and river water is used free of charge. It could not be investigated how much of this is used in UAP. But it can be stated that water is not a crucial resource in Germany, due to high rainfall. Berlin has an annual rainfall of 540 mm/year and a potential surface evaporation rate of 628 mm/year (Lahmer and Pfützner, 2003).

### **5.3.3. Tools**

The availability of tools in general illustrates the differences between the projects in the two countries. In Namibia people use a higher variety and amount of different tools than Berlin. Further, the use of advanced drip-irrigation systems in Namibia can serve as an example here. Its occurrence can be explained by the fact that the MAWF is providing

most of the tools for free and teaching the people how to use them. UA in Namibia is a survival strategy of the poor, guided by the government, and so consequently has a high input in terms of, for example, tools.

In Berlin everything is self-organized with little availability of cash. These factors are influencing the availability of tools. Furthermore the production of food is not the primary focus in these gardens. It is a place of social and natural interaction, rather than a “productive farm”, consequently the availability of tools is not a high priority.

#### **5.3.4. Seeds**

The majority of the gardeners in Windhoek do not decide which seed and from which company they wish to use. Whichever seed the ministry provides they take. This results in bestowing the MAWF with a large degree of power in its ability to influence what is grown and from which company. In-depth discussion about the origin of seeds and potential to conserve crop plant diversity were conducted in chapter 5.8.

Berlins’ gardeners often acquire their seeds from networks like social seeds (more information in chapter 5.8. on the potential to conserve crop plant diversity). They also keep them from the last harvest or exchange them with family, friends and neighbours. Some supplement their supply with seeds bought at the supermarket. The exchange of seeds and keeping them from the last harvest in Windhoek would give the growers independence from the MAWF, seed companies and supermarkets, additionally it would reduce their expenses. Furthermore, the moment they breed their seeds they benefit the plant diversity pool. It is important to train the groups in Windhoek in the creation of seed banks and the sharing of seeds through networks.

In sum, it can be stated that there is no awareness of what is being planted and where it comes from in Windhoek, since the objective is making profit by free seeds. In terms of seed supply, it can be stated that the gardeners in Windhoek are dependent upon the MAWF.

In contrast, in Berlin there is an acute awareness of what is being planted - where it comes from plays a much more fundamental role. Furthermore, independent structures of seed supply, like *social seeds*, occur.

#### 5.3.5. Professional advice

The fact that 80% of the gardeners learnt how to do gardening through training from the MAWF shows once more how important the relationship between the gardens and the MAWF is.

As already stated, the MAWF is highly involved in the initiation, development and maintenance of the UAPs in Windhoek.



Figure 39: Seeding time in NEYO (Carolin Tischauf)

No self-initiated projects could be investigated in Windhoek. This problem is similar to the ones faced in South Africa, where “many of the projects fail to progress or even

continue after support is reduced or withdrawn” (Dawn Kirkland, 2008, p.1). Based on Small (2006) the limiting factors in Windhoek could be identified as:

- Leaving the projects, because there is an easier possibility to make money
- Lack of motivation
- Illness such as TB and AIDS.

Ideally projects that are making enough money are able to buy their own inputs and therefore are more self-reliant and sustainable. This income should not include substantial subsidy. Once a UAP is more sustainable, support can be reduced (Dawn Kirkland, 2008). Nevertheless, in Windhoek this does not seem to work. Even if they have a regular income from the garden (DSNGoH) and opened their own bank account they are still dependant, and seek, support from the MAWF.

It is interesting that the gardeners are already receiving a lot of help from the MAWF, many of them stated that they want more support from the government. Some of them have the attitude to get out as much as they can from the organisation. It seems that they do not really want to become independent from the MAWF, simply because it is easier and cheaper for them.

Nevertheless, development patterns in Windhoek can be investigated (Based on Small, 2005) in the development of the projects. It can be presented as follows:

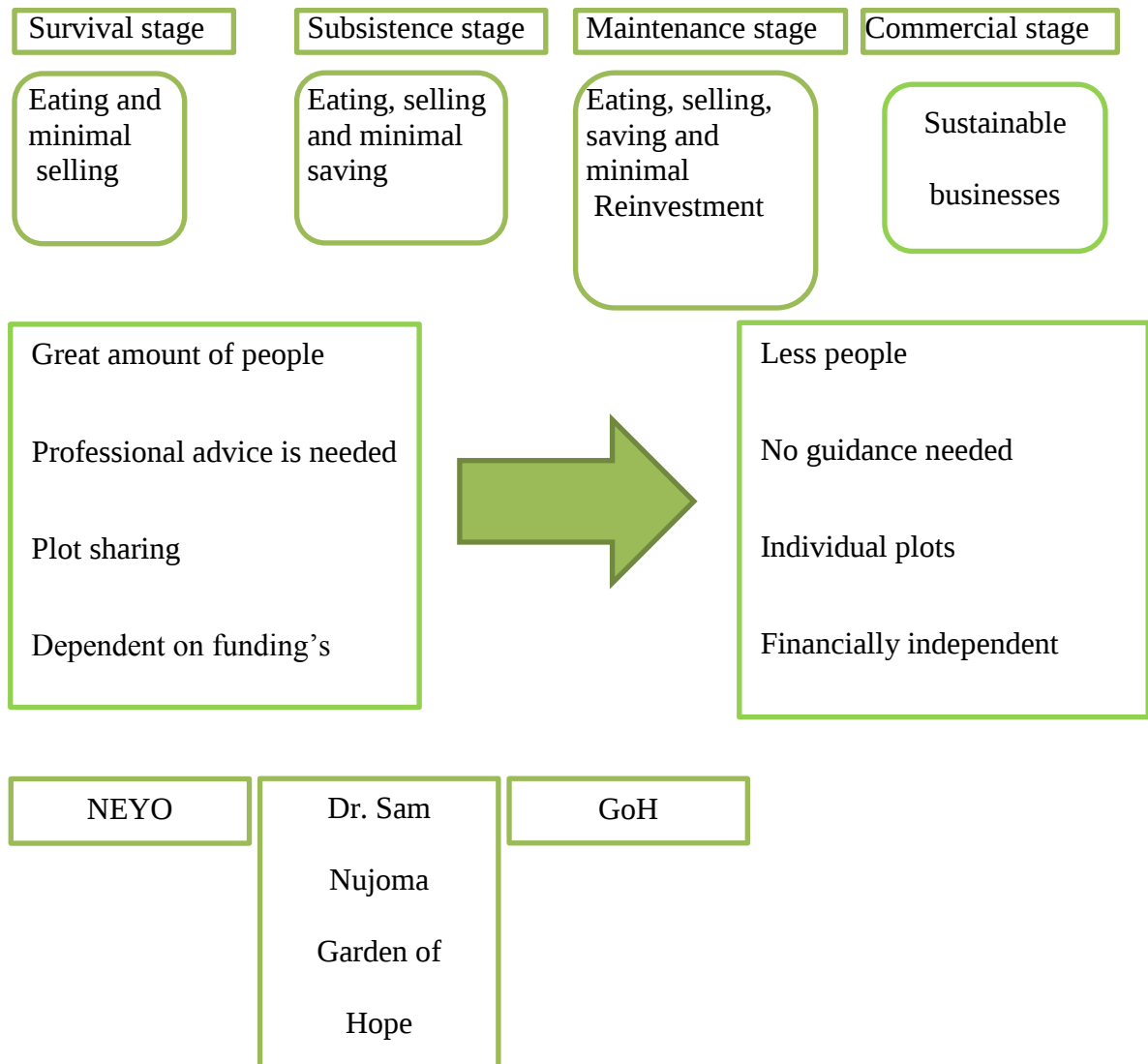


Figure 40: Development patterns in Windhoek (Carolyn Tischtau)

It develops from pure eating purposes, to selling, to saving and to reinvestment, whereas it is possible that some projects are sustainable in one aspect but not in the other.

Contrary to this UA in Berlin is shaped by learning by doing. As well as acquiring knowledge by working together. No professional advice from a government body could be investigated in the case studies in Berlin. Furthermore, stakeholders in Berlin are often well educated. The concept of self-educating is consequently easier for them.

Additionally, the access to information (library, internet or bookshops) is better in Berlin.

This once again demonstrates the differences between the countries and that some parts, like professional advice, cannot be compared. In Berlin UA is a self-motivated and often political stance, taken in order to be closer to nature, or part of a community. In Windhoek it is about income and essential food supply, it is also a strategy of the government to assure this and to help develop it. It appears that UAP in Windhoek cannot function, and is not sustainable, as a purely autonomous community project. Although it is a bottom up participatory planning and learning in action approach, this is mainly due to the fact that the materials and support supplied by the MAWF is all encompassing - which in turn creates a culture of dependency upon the institution.

#### **5.3.6. Pesticides**

Although Kiss and Meerman (1991) stated that the low level of education, lack of regulatory mechanisms and political will, prevailing in sub-Saharan African countries make the risks of inadequate and dangerous pesticides more serious than anywhere else in the world, this claim cannot be levelled, in terms of the investigated projects, against Windhoek UAPs. The pesticides used in the UAP are applied by a pest expert from the MAWF under consideration of human as well as environmental safety (Figure 41) and only after organic pest management did not work out. The MAWF is training people in biological pest control. This includes, for example, that they explain the importance of crop rotation, plugging after harvesting or using natural enemies, like praying mantis

and ladybirds which eat aphids and other small insects. Furthermore, the effect of home-made poisons is explained. It can be used to kill caterpillars or other insects.

Again the gardeners from Dr. Sam Nuyoma's garden of hope and NEYO are dependant upon the MAWF for the supply pesticides. Therefore, a proper application and origin are secured this way. The two gardeners from GoH instead indicated that they buy their pesticides from the shop or market. Here it is unknown if the application as well as the origin are secure.



Figure 41: Application of pesticides in Dr. Sam Nuyoma garden of hope (Carolin Tischtau)

In Berlin, as ecological and sustainable farming methods are often the focus of the projects, no chemical fertilizers are applied. Self-made poison like pesticide derived from stinging nettles is, for example, used. Ecological pest management conserves not only biodiversity, “At the same time a richer diversity of products from diverse production systems can make a significant contribution to improving the nutritional

status and health of both the urban and rural poor around the world” (Galluzzi, et. al., 2011, p.ix).

#### **5.3.7. Fertilizer**

The sandy soil in Windhoek is naturally low in plant-nutritional content and cannot produce crops without the necessary improvement in its physical and chemical composition. Consequently, nearly all cultivators in Windhoek use fertilizers. The gardeners in Windhoek are mainly dependant upon the help of the MAWF for their fertilizer supply. Only in GoH they are doing vermicomposting but the other gardeners rely on the input from outside.

In Berlin the investigated gardens organized fertilizers themselves. All three case studies are doing composting.

It is more sustainable to practice UA as a closed system and thus not reliant on inputs from outside. Fertilizers can and should be produced in the gardens.

#### **5.3.8. Finance**

As stated before UA serves as a survival strategy in Windhoek. 87% of the cultivators are selling their products mostly within the community which saves transport cost. But they are not processing their products so far.

In Dr. Sam Nujoma’s garden of hope participants are earning different amounts in relation to the garden. It can be inferred that this is because they have a dominant leader who is most likely getting more for herself and dictating how much the others are allowed to sell.

In Berlin it is not an income strategy, but for social, ecological and political reasons.

In terms of funding, the projects in Namibia would most likely not exist without the funding by the government. In Berlin, apart from form Bunte Beete (EU funding), no funding occurred.

#### 5.4. Farming methods

First of all it can be stated that in both countries farming methods are diverse.

It seems like the different motivations of the stakeholders are reflected within the farming methods. The main motive in Windhoek for UA is customer demand. Consequently, the crop diversity is smaller and a lot of one crop of its kind is growing in the gardens (mostly Swiss Chard).

As a result of the training and the inputs by the ministry diverse and professional farming methods like, drip-irrigation, exist (Figure 41).



Figure 42: Drip irrigation system in the Otjomuise project school in comparison to Spreegarten project (Carolin Tischtau)

In Windhoek one person indicated that he/she is doing mobile gardening. According to field work data no mobile gardening is present in the gardens in Windhoek. It can be assumed that the person might not know what it meant and ticked it by mistake.

In Berlin the gardens are more for social, political and environmental purposes. Hence, ornamental non-crop plants are part of the gardens too. Consequently, the plant diversity is significantly higher. Of course the different environmental conditions need to be considered as well, but are, as it is an artificial system, not that influential.

In both countries intercropping - planting two or more of plants in the same field – is present. This method enhances soil fertility.

In Berlin the use of raised beds is quite common. It was only investigated in one of the three case studies. Nevertheless, it should be stated that according to Rasper (2012) the advantage is that plants are not in contact with the actual soil and at a comfortable working height. Due to the fact that raised beds are filled with organic material nutrients are produced and the plot heats slightly which causes the plants to grow out faster. In terms of soil fertility, mobile gardens are protecting the plants and the consumer from contaminated soils, but in terms of soil fertility, they are not ecologically sustainable (Meyer-Renschhausen, 2011).

### **5.5. Management purpose**

Due to the fact that the analysed projects in Windhoek are initiated by the MAWF and that their goal is to train people in horticulture, training is consequently the main management purpose. Additionally, due to the bad economic situation the gardeners priorities are income and food supply.

In Berlin as people are not facing hunger and living in shacks, but are compensated by the social systems in the country, the motives are socially, politically and ecologically motivated.

The gardens in Windhoek are community or neighbourhood based. Due to the fact that the gardeners can barely afford transport, they choose a garden which is within walking distance.

In Berlin most people are from the “Kiez” (community or neighbourhood) simply because it is close to their homes or they want to beautify their Kiez.

In terms of communication, the gardeners in Windhoek get to know the projects because the communities they are living in are close and everyone knows what is going on within the location. Therefore, communication can best be described as informal and occurring through networks of friend and kinship. Otherwise they communicate via SMS. Internet is not common in Katutura. In contrast, mailing lists are the common communication type of gardeners in Berlin.

In terms of media involvement it can be stated that UA in general is not a practice people are aware of and interested in Namibia. In contrast, the media is part of the gardens in Berlin. UA becomes an ever increasing topic in the media and its presence upon the internet is increasing. The topic is a mix between local and global these days and so opens a possibility for the actors to go beyond the territorial reality of their projects and become part of the broader picture (Werner, 2011).

In Germany networking between the different projects occur. In Namibia only GoH is networking with another project. Five gardeners in Windhoek explicitly indicated that they would like to be in contact with other projects in order to gain more knowledge. Networking improves the ability to realize common problems and interest, to exchange information and experiences. It is also important because it is easier to enforce their

interest. Furthermore, it is easier to get in contact with other national and international projects and organisations. Especially in terms of seeds, good networking between projects can assure independence from seed companies and has the potential to distribute local varieties.

### **5.6. Biodiversity**

The results of the research have shown that biodiversity in Germany's rural areas is declining. In German cities, however, it is stagnating (Rasper, 2012). According to some experts' estimations, there appears to be more plant diversity in the city of Berlin than in the rest of the outdoors of the whole country. This fact is mainly based on alien species which are planted in the cities (Rasper, 2012; Wania; Kühn; Klotz, 2006).

Nevertheless, the cities' building-densities raise difficulties for the survival of plants and animals. Corridors are therefore an essential element to ensure a sufficient level of biodiversity within urban areas. Habitat corridors provide a shelter for biota and allow them to find food, to breed and to disperse in urban and adjacent areas. Habitat corridors constitute the key to maintaining urban biodiversity at the genetic and species level. Habitat corridors allow the species to disperse and help to prevent their isolation from nearby populations. In addition to that, species are dependent on habitat corridors in order to respond to environmental changes. Environmental changes may urge species to move to different and more favourable locations and habitat corridors allow them to do so (Roetman and Daniels, 2008, p.5). It can be stated that UA is essential for a city's ecosystem by providing diversity, corridors and habitats for species (Dams, 2011). It is a matter of fact that an increase in biodiversity supports the ecosystem's stability.

However, this is more applicable to agro ecosystems and not entirely transferable to urban systems (Spiaggi, 2005, p. 191) mainly because the urban environment is fragmented and a lot of different systems are present. Nevertheless, the number of species (155 different species on 3700 m<sup>2</sup>) investigated in the three projects in Berlin definitely contribute to more diversity within the urban areas. The same applies to Windhoek where there were 37 species on around 1181m<sup>2</sup>.

In contrast to Windhoek's gardens, where UA focuses almost exclusively on crops, there are also ornamental plants in Berlin's gardens.

### **5.7. Invasive Species**

It is assumed that UA contributes to the introduction of alien invasive species. This is particularly true for intercultural gardens as plants are being imported from foreign countries. Whereas in Berlin the gardeners come from different countries, there are solely Namibians working in Namibian gardens. This would suggest that the percentage of alien invasive species is much higher in Germany than it is in Namibia. Nevertheless, the conducted data showed that whereas the amount of invasive species in Windhoek was 5 %, there were no alien invasive species to be identified in Berlin.

In Windhoek *Argemone ochroleuca* is found all over the city. It can be assumed that it invaded the gardens from outside, which is far more likely than seeing the garden as its source.

As for *Schinus terebinthifolius*, *Leucaena leucocephala* and *Psidium guajava* it can be assumed that they were planted on purpose in the garden, presumably without permits and control. It is very likely that its status was not known by the growers.

There is a possibility that, because of the enormous number of different plants, not all plant have been identified correctly. There may be some alien invasive species growing in the UAPs in Berlin that remained unnoticed.

Nevertheless, the data implies that for these six case studies it can be stated that UA is not a source of alien invasive species. To entirely exclude UA as a source of alien invasive species in cities further and expanded research is necessary.

### **5.8. Potential to conserve crop plant diversity**

Although only 50% of the cultivators in Namibia indicated that the seeds they are growing are from South Africa according to field work and interviews the research strongly suggests that South Africa is in fact the only source of seeds used in Windhoek's gardens. This is problematic for different reasons, first of all: It should be noted that there is no seed law in Namibia. No regulations in order to guide the seed sector are present. This includes an absence of a seed certification scheme including validated field and laboratory seed quality standards. Additionally, no official seed testing laboratory exist in Namibia. NASSP (2005, p. 2) states: "The organization and implementation structures dealing with seed issues in MAWF are not appropriate for effective implementation of seed legislation. There is a need to establish a competent authority i.e. Seed Certification Service as enunciated in paragraph 116 of the National Agricultural Policy" Otherwise, seeds are not tested and approved before they get marketed (NASSP, 2005). Obviously there is a need for the enactment of a Seed Act implementing an official Seed Certification Scheme otherwise Namibia will continue with no consumer and environmental protection in regard to purity, germination

capacity, genetic integrity and freedom from diseases and danger a sustainable agriculture in the country. “In order to realise the genetic potential inherent in improved plant varieties for sustainable agriculture, quality control is critical” (NASSP, 2005, p. 14). The non-existent management of seeds already has negative impacts in Namibia. “Some farmers have bought and planted seed varieties that are not adapted to Namibia’s conditions. Furthermore these varieties have not given good yields” (NASSP, 2005, p. 4). Secondly, Namibia is already heavily dependent on South African food imports. Approximately 98% of processed food products sold in supermarkets in Namibia are imported from South Africa (Emongor, 2008). An additional dependency on South African seed imports does not seem advisable. The relations between the country and subsequent imports were 2012 for example disrupted by a truck drivers’ strike in South Africa (Brandt, 2012). Regional instabilities as much as environmental factors can thus compromise Namibian food sovereignty.

On the other hand this non restriction of seeds can contribute positively to the crop diversity in the country. But the data in this research indicates that the percentage of local species is with 11 % relatively small.

In many parts of Namibia indigenous plants are used traditionally as food, such as: ombidi, mpungu or sishungwa (*Cleome gynandra*), ekwakwa or tepe (*Amaranthus thunbergii*) and mutate or mundambi (*Hibiscus sabdariffa*). These GLVs are well adapted and distributed in Namibia which makes them available in most areas and to a large amount. Often they are fast-growing and produce a lot of seeds. However, only *Amaranthus* was found in the garden in Windhoek. It seems like the awareness and the

understanding that these seeds are better adapted and easier to plant does not occur to the gardeners. The knowledge about the distinction between indigenous and imported seeds is not present. It is hardly surprising, but the staff from the MAWF should actively promote and explain the beneficial use of traditional GLV.

To sum up it can be assumed under consideration of the origin of seeds and the nearly non-existing use of local varieties within the projects in Windhoek, that the gardeners do not have a potential to conserve crop plant diversity.

In the EU the Community Plant Variety Office (CPVO) is controlling the species catalog of the EU. It includes 10.000 vegetable varieties. Only these seeds are allowed to be cultivated in the EU. In Germany the *Bundessortenamt* is controlling its implementation. It needs to be considered that 74% of the global seed market is controlled by three multinational companies and that according to estimations of the FAO (2012a) 75% of crop diversity was lost between 1900 and 2000. Furthermore, as much as 22% of the wild varieties of important food crops of peanut, potato and beans will vanish by 2055. It can be assumed that the tight restriction and controlling by institutions like the *Bundessortenamt* is contributing to the loss of crop plant diversity in Germany as the availability of seeds and the allowance to plant different varieties becomes increasingly restricted. It is alarming that, as Rasper (2012); Thomas (2011) stated, plant breeding and the control over the seeds is no longer in the farmer's hands. Many species were cultivated by the farmers themselves until the middle of 20<sup>th</sup> century. Since then more and more professional seed producers took over. This results in a loss of house and farm

varieties but also into a loss of knowledge how to produce seeds independently (Heisteringer, 2011), which has negative impacts on the crop plant diversity.

In contrast to Windhoek, there is a resistance against these regulations in Berlin. Under the name “social seeds” established community gardens in Berlin a platform for exchanging traditional seeds and knowledge in terms of germination and farming methods. Additionally the workshop *Über Lebenskunst* and others are used to acquire specific knowledge about the topic (Über Lebenskunst, 2012).<sup>1</sup> Furthermore, the method of exchanging and keeping seeds from the last harvest is a common in Berlin and hence contributes to the maintenance of crop plant diversity. It needs to be considered that UA has the potential to maintain crop diversity, but not necessarily local diversity. Gardeners often bring species from their home countries and grow them at the new place. In this sense they may maintain local varieties but not in their local environment.

In general, one should not overlook the fact that people are not the only immigrants, but almost all crops and animals are. If one would only eat local crops in Germany, one would have to eat cabbage and turnip most of the year. Crop diversity today has nothing to do with original local species. It is rather a mixture of nature and culture and furthermore the result of thousands of years of breeding. It can be stated that today, at least in industrial states, the source of this diversity are gardens, most likely urban ones,

---

<sup>1</sup> More information can be acquired on: [Magicgardenseeds.de](http://Magicgardenseeds.de); [Bio-saatgut.de](http://Bio-saatgut.de); [Oekoseeds.de](http://Oekoseeds.de); [Dreschflegel-saatgut.de](http://Dreschflegel-saatgut.de); [Tomaten.bplaced.net](http://Tomaten.bplaced.net); [Samenfest.de](http://Samenfest.de); [Vern.de](http://Vern.de); [Shop.arche-noah.at](http://Shop.arche-noah.at); [nutzpflanzenvielfalt.de](http://nutzpflanzenvielfalt.de); [saatgutkampagne.org/](http://saatgutkampagne.org/); [saveourseeds.org](http://saveourseeds.org); [nutzpflanzenvielfalt.de/](http://nutzpflanzenvielfalt.de/)

especially where migrants bring seeds from their home countries. Due to the fact that different varieties are grown in the gardens, people get to know them and the fact that they cannot buy them in the normal supermarket may raise agricultural-political questions and makes people more aware of diversity (Müller, 2011).

To sum up, it can be stated that gardens in Berlin have the potential to conserve local crop diversity. This can be achieved by raising awareness for biodiversity and its challenges. Initiatives like for example *Social Seeds* play also a role and contribute in this regard.

In general it should be kept in mind that projects which are in whatever way controlled by the seed lobby usually do not have any potential to maintain local crop diversity. If projects are in contrast run by traditional farmers the maintenance of local crop diversity is very likely to be one of the priorities.

### **5.9. Problems with the field study**

One of the first challenges was to locate the gardens in Windhoek. Another challenge constituted the language barrier between the researcher and the gardeners. The language barrier was partially overcome by means of body language or with the help of other gardeners or the staff from MAWF who were able to interpret and who provided the researcher with the required translations. It turned out that not all gardeners were able to read and write. The gardeners in Windhoek complained about some questions in the questionnaire being too difficult. Due to the fact that some of the Namibian gardeners only showed up occasionally, not all of the handed out questionnaires were returned. Nevertheless, enough data could be acquired.

In Berlin it was not possible to meet the gardeners in person. The researcher contacted the gardeners by e-mail and asked them to fill out the attached questionnaire. When she did not get an answer, the researcher was forced to change her method in order to obtain the required information. Due to the fact that a lot of research about UA in Berlin had already been done, the required information could still be obtained.

Furthermore, there is a possibility that, because of the enormous number of different species and varieties, not all plant have been identified correctly.

#### **5.10. Statement on the practical applications and implications of the research findings.**

This study has made a number of contributions to the improvement of knowledge in the field of UA. Through the close investigation of case studies, the research has initiated a grounded exploration into various important fields. The conservation of local crop varieties and the impact of alien invasive species were being explored. As this thesis is one of the first ones approaching UA from an ecological point of view it can serve as a pioneer study and may encourage other researches to shift their analysis from a socio-economic approach to questions on biodiversity and ecological concerns.

The thesis is the first one about UAP in Namibia and is hence contributing to close this research gap. It may provide researchers with the kind of basic information that is needed for further research on that topic.

After a meeting with the MAWF in which the potential and the challenges of UA were being discussed, some of the problems the gardeners in Windhoek were facing could be dealt with and networking between the projects increased.

## **6. Recommendations**

In this chapter recommendations for some of the variables researched are presented. It is following the general structure of the thesis by starting with the variable cultural background stakeholder and continue with the variables land, water, seeds, professional advice, biodiversity and the potential to conserve crop plant diversity.

Namibia would be well advised to make education on UA to one of her priorities. UA could prove to be useful for all of the Namibian people. It would be highly recommendable to attract the different tribes' attention for UA and to raise their awareness of UA's many advantages. UA would have the potential to improve their diets, which would be particularly adjuvant for people suffering from HIV/Aids. As the Owambo and Kavango are already involved in UA, one would need to come up with an idea of how do get the other tribes interested and involoved.

There are many different tribes living in Namibia. It has to be pointed out though that the different tribes and migrants not really mingle with each other. Namibia is a country with barriers. These barriers are apparent between different races due to differences in language and level of education. The gardens can serve as a positive space for social interaction and communication.

An increasing number of African cities, like Kampala, Dar as Salaam, Dakar or Addis Ababa and national governments, like Botswana, realize the "importance of urban agriculture and [are] adapting their policies and programmes regarding urban farming. New approaches are currently underway to reinforce the formal establishment of allotment garden schemes and other forms of urban agriculture in cities in Sub Saharan

Africa” (de Zeeuw, 2005, 10). Namibia would also be well advised to improve the awareness and the legal status of UA.

In Namibia as well as in Germany UA should be implemented into the land use plan in order to guarantee UA’s future existence.

There is a research gap concerning the information on soil and water contamination in Windhoek and Berlin. This is particularly alarming because regulations and procedures need to be implemented in order to secure a healthy harvest. According to Baumgartner and Belevi (2004); Buechler, Devi Mekala and Keraita (2006); Kirkland (2008) it needs to be considered, that aside from bacteria, parasites and viruses waste water can contain chemicals like heavy metals, inorganic chemicals, nutrients, organic chemicals, endocrine disrupting chemicals (anthropogenic substances) and pharmaceuticals which hold a serious health risk.

Water-scarcity is one of Namibia’s greatest challenges. The country could potentially profit from the knowledge and techniques of countries facing similar challenges. With regard to the challenge of dealing with water scarcity Namibia would be well advised to take advantage of the knowledge and techniques of the country of Jordan. In Jordan researchers developed a waste water-recycling system, which reuses the waste water from households for the garden. The household pump is being modified and a filter installed. This way the water from the kitchen and bathroom sinks can be used in the gardens. Water savings are estimated to be at least 15% (Bino, Jayousi, Al-Beirut, Jabay, Sawan, Al-Oran, Burnat, Laham, 2003).

The MAWF should focus on the distribution of traditional seeds and encourage the gardeners to store the seeds from their last harvest in order to become more independent. The gardeners should furthermore be informed about the origin of seeds and local varieties. The *Social Seeds* cooperation in Berlin is a showcase for UA. *Social Seeds* should be supported and similar initiatives encouraged. Gardens in Berlin are well advised to focus on local varieties and treat biodiversity as a central issue.

It is important that the cultivators in Windhoek receive a basic training on UA in general. Furthermore, an understanding of the importance of the origin of seeds and biodiversity is essential. Priority should be given to training and education on UA to enable farmers to increase sustainability and relieving them from their dependency on the MAWF.

Cultivators in Windhoek would be well advised to come up with certain projects like for example selling “organic boxes”. The idea behind the concept of the “organic box” is the following:

Cultivators form a union and offer the costumers a box of organically grown fruits and vegetables every week. The box will contain a variety of different fruits and vegetables and its content will change according to season and accessibility. The advantage of this concept is that the farmers work together. Their different products are being collected and the total will be divided into portions to fill up the boxes. These boxes will then be distributed to the buyers who ordered them beforehand. Another great advantage of this concept is that once this system is established it provides cultivators with a reliable source of income and the costumers benefit by getting organic and locally grown food.

As in Berlin Windhoek gardeners should network more in order to exchange knowledge, share problems and so be able to build up more influence in order to improve their situation. As Featherstone (2005, p. 27) stated, whether it is home or community gardeners, nothing works as well as seeing other inspiring examples of productive gardens. By encouraging networks and support groups, standards are set and people are excited to emulate what they have seen.”

As stated and discussed before there are many benefits derived from biodiversity in urban areas. The integration of biodiversity into cities gives the opportunity to take advantage of the services it provides while saving money, improving pleasantness and evolving the conservation of nature in the urban context. Further, residents benefit from the direct interaction with nature and the continuity of natural processes. To achieve this biota must be retained and an environment where biodiversity can flourish must be created. Including space for biodiversity, maximize habitat corridors throughout the urban matrix and include a diverse range of flora with a complex structure. In addition, it is important to manage and limit pest animal species or weedy plant species while encouraging native species.

In order to increase the potential to conserve crop plant diversity cooperation between rural farmers and urban farmers should be implemented in order to exchange local varieties in both countries.

### **6.1. Suggestions for further research**

In general, the focus in UA research should shift more to a combination of inquiring ecological and socio-economical questions. Cities should be considered not only as a

place for social diversity but also as ecosystems: as habitats for species diversity and a place to produce food. This is especially important under consideration of climate change and the dependency on fossil energy. By producing agricultural goods within small scale and local gardens, one avoids costly and fossil intensive transportation. This ultimately enhances the food security of a city.

It can be stated that the mix of different methods led to a holistic picture about the case studies. The approach to do questionnaires on the one hand and verify these assertions with field work combined with interviews is recommendable in order to get a correct picture.

Many ideas of how to integrate more UA in cities occur. From *Farmsscrapers* – skyscrapers with integrated water, air and light system where crops are planted and harvested (Rasper, 2012) – too *Bosco Vertical* (vertical forest) - two skyscrapers where 900 trees are planted on in Mailand (Rasper, 2012). Additionally ACROS in Fukuoka, a skyscraper with terraces on the south side where around 35000 species are planted (Rasper, 2012). This shows the present ideas and creativity when it comes to UA. But these ideas and projects are occurring in HDC only. Less expensive solutions adapted to the given conditions in DC (like a crime rates and poverty which is most likely causing a mismanagement of those projects) need to be created.

## **7. Conclusion**

It was not certain if UAP exist in Windhoek. Due to the study this can be verified.

Corresponding to other literature, Windhoek and Berlin, in both cities more woman than men are part of the projects. In Windhoek, mainly Owambos are working in the gardens,

in Berlin the UAP are characterized by cultural diversity. The projects in Windhoek were initiated and are still co-working with the government. Contrary to this the projects in Berlin are self-initiated. In Windhoek the public is lacking awareness of the existence of UAP. They are mainly communicating via SMS or face to face. While the media is highly involved in the case studies in Berlin their main communication tool is based on public webpages.

The access to resources, especially land and water are highlighted as the most crucial challenges for UA in the literature. It could be investigated that this does not count for Windhoek and Berlin. The study can rather point out stakeholders motivation as the main variable influencing the purpose and biodiversity of the UAP. In Windhoek the motivation to cultivate is shaped by hard factors (income generation and food supply), while UA is undertaken for soft factors (social, ecological and political reasons) in Berlin. Consequently the products are sold in Windhoek but not in Berlin. These differences in the motivation are also reflected in the management purpose of the projects. In Windhoek it is to train people in horticulture in order to improve their food and income situation. In Berlin it is for example about beautifying the city and understanding people with different ethics, language and cultural heritage. This is directly influencing the biodiversity within the gardens. In Windhoek crops are grown because of customer demand, consequently a lot of one of its kind is planted in order to sell it. In Berlin's case studies ornamental plants are part of the gardens as well as crop plants which enriches the biodiversity to great extent. Differences become also obvious in terms of farming methods and availability of tools. They are much more advanced in

Windhoek than in Berlin, which can be explained by the fact that UAP in Windhoek receive professional training and the fact that the gardens are a place for production. While, in Berlin the gardens are a social meeting point and a place for recreation. The origin of seeds is also directly influenced by the motivation and knowledge of the stakeholder: In Windhoek there is no awareness of local species. In Berlin instead the consciousness is present and local varieties are every so often on focus. Consequently there is a potential to conserve local varieties in Windhoek, but no potential in Berlin. No alien invasive species could be identified in Berlin. In Windhoek 5% of the species and varieties in the gardens were declared alien invasive species. Consequently, it can be stated that UAP are not a potential source of alien invasive species.

## **8. References**

- Abgeordnetenhaus von Berlin. Senatsverwaltung für Stadtentwicklung. 2006. Lokale Agenda 2: Berlin zukunftsfähig gestalten. Berlin: Präsidenten des Abgeordnetenhauses von Berlin, Referat Öffentlichkeitsarbeit in Zusammenarbeit mit der Geschäftsstelle des Ausschusses für Stadtentwicklung und Umweltschutz. Available from: [http://www.stadtentwicklung.berlin.de/agenda21/de/service/download/agenda\\_21\\_web\\_2.pdf](http://www.stadtentwicklung.berlin.de/agenda21/de/service/download/agenda_21_web_2.pdf). [Accessed October 2012 05].
- AgroForestryTree Database. 2012. Available from: <http://www.worldagroforestrycentre.org/sea/products/afdbases/af/asp/SpeciesInfo.asp?SpID=326>. [Accessed June 2012 05].
- Aichele, D. 1968. Was blüht denn da? Stuttgart: W.Keller & Co..
- Amt für Statistik Berlin-Brandenburg. German federal Republic. 2011. Statistische Jahrbuch 2011. Berlin. Available from: <http://www.statistik-berlin->

brandenburg.de/PRODUKTE /jahrbuch/jb2011/JB\_2011\_BE.pdf. [Accessed August 2012 16].

Arndt, C., Haidle, E., Rosol, M. 2004. Graswurzeloasen - Innerstädtische Gemeinschaftsgärten in Buenos Aires und Berlin. Oder Community Gardens – Gemeinschaftsgärten – Huertas Comunitarias. Freiraumschaffung durch Nachbarschaftsinitiativen. Buenos Aires und Berlin. Zeitschrift für das Planen und Bauen in der Dritten Welt. 81 (2): 12 – 17.

Baumgartner, B., Belevi, H. 2004. A Systematic Overview of Urban Agriculture in Developing Countries. International Journal of Environmental Technology and Management. 3 (2 / February): 193-211.

Bino, M.J., Jayousi, O., Al-Beiruti, S.N., Jabay, O., Sawan, J., Al-Oran, A., Burnat, J., Laham, O. (IDRC). 2003. Fourth technical progress report: Inter-Islamic Network on Water Resources Development and Management. Amman: IDRC.

Biodiversity in German development cooperation. 2010. Eschborn: BMZ and GTZ.

Bohn, K., Viljoen, A. 2011. Productive Stadtlandschaft: Über ungewöhnliche Verbindungen von Stadt und Ernährung. In: Müller, C. (Ed.). 2011. Urban gardening: Über die Rückkehr der Gärten in die Stadt. München: oekom.

Bopda, A.P., Awono, L. 2010. Institutional Development of Urban Agriculture: An Ongoing History of Yaoundé. In: Prain, G., Karanja, N., Lee-Smith, D. (Eds.). 2010. African Urban Harvest: Agriculture in the Cities of Cameroon, Kenya and Uganda. New York: Springer.

- Bopda, A.P., Brummett, R., Dury, S., Elong, P., Foto-Menbohan, S., Gockowski, J., Kana, C., Kengue, J., Ngonthe, R., Nolte, C., Soua, N., Tanawa, E., Tchouendjeu, Z., Temple, L. 2010. Urban Farming Systems in Yaoundé: Building a Mosaic. In: Prain, G., Karanja, N., Lee-Smith, D. (Eds.). 2010. African Urban Harvest: Agriculture in the Cities of Cameroon, Kenya and Uganda. New York: Springer.
- Bouraoui, M. 2005. Agri-urban Development from a Land-use Planning Perspective: The Saclay Plateau (France) and the Sijoumi Plain (Tunisia). In Mougeot, L.J.A. (Ed.). 2005. Agropolis: The Social, Political and Environmental Dimension of Urban Agriculture. London: Earthscan and IDRC.
- Brandt, E. (New Era Publications). 2012. SA strike exerts pressure on local retailers. New Era [Online] Available from: <http://www.newera.com.na/articles/48156/SA-strike-exerts--pressure--on--local-retailers>. [Accessed 2012 Nov 20].
- Bridge, J., Brown, B., Robichaud, K., Thistle, B. 2006. Enhancing Understanding of Utility Services: Improving communication between the residents of Katutura and the City of Windhoek. Bachelors of Science thesis, Worcester Polytechnic Institute.
- Bruinsma, J. 2009. The resource outlook to 2050: By how much do land, water and crop yields need to increase by 2050? Paper presented at the FAO Expert Meeting on How to Feed the World in 2050, 24–26 June 2009, Rome. Available from: <ftp://ftp.fao.org/docrep/fao/012/ak971e/ak971e00.pdf>. [Accessed December 2011 16].
- Buechler, S., Devi Mekala, G., Keraita, B. 2006. Wastewater Use for Urban and Peri-urban Agriculture. In vanVeenhuizen, R. (Ed.). 2006. Cities Farming for the Future

Urban Agriculture for Green and Productive Cities. Leusden: RUAF Foundation, IDRC and IIRR.

[BBR] Bundesamt für Bauwesen und Raumordnung. 2008. Stadtumbau West: Stadtumbau in 16 Pilotstädten – Bilanz im ExWoSt-Forschungsfeld Stadtumbau West. Bonn: Bundesamt für Bauwesen und Raumordnung (BBR).

Caron, M., Clos Jouve, H. 1969. Heilpflanzen. München: Delphin Verlag.

[CBD] Convention on Biodiversity. 2003. Pilot Assessments: the Ecological and Socio-Economic Impact of Invasive Alien Species on Island Ecosystems. Nairobi: UNEP.

City of Portland. (Portland Peak Oil Task force). 2007. Descending the Oil Peak: Navigating the Transition from Oil and Natural Gas. Portland. Available from: <http://www.portlandoregon.gov/bps/article/145732>. [Accessed October 2012 10].

Community gardens in Berlin [Image]. Available from: <http://maps.google.com/maps/ms?ie=UTF8&hl=en&msa=0&msid=111327962342696701538.000472fcaac6c714b7a9e&t=h&ll=52.51246,13.40126&spn=0.125365,0.205994&z=11&source=embed>.

[Accessed Oktober 2012 08].

Crush, J., Hovorka, A., Tevera, D. 2010. Urban Food Production and Household Food Security in Southern African Cities. Urban Food Security Series No. 4. Kingston and Cape Town: Queen's University and AFSUN.

Cruz, C. 2000. Conceptual Framework of Urban Agriculture. Trialog: Zeitschrift für das Planen und Bauen in der Dritten Welt. 65 (2): 4-8.

Dams, C. 2011. Gärten gehören zur Stadt!: Zur städtebaulichen Relevanz der urbanen Landwirtschaft. In: Müller, C. (Ed.). 2011. Urban gardening: Über die Rückkehr der Gärten in die Stadt. München: oekom.

Davis, K. 2011. The Urbanization of the Human Population. In: LeGates, R.T., Stout, F. 2011. The city reader. New York: Routledge.

Dawn Kirkland, E. 2008. Harvest of Hope A Case Study: the Sustainable Development of Urban Agriculture Projects in Cape Town, South Africa. Mphil thesis. Dissertation, University of Cape Town.

de Zeeuw, H. 2005. Urban Micro-Farming and HIV-AIDS, a need for systematisation of experiences and scaling up. In Gardens of hope: Urban micro-farming as a complementary strategy for mitigation of the HIV-AIDS pandemic. Proceedings of the study visit to Johannesburg and Cape Town, 17-25 August 2005, South Africa.

Deelstra, T., Girardet, H. Urban agriculture and sustainable cities: Thematic Paper 2 Urban Agriculture and Sustainable Cities. Leusden: Resource Center on Urban Agriculture and Forestry.

Denninger, M., Bertil E., Lee-Smith, D. 1998. Urban Food Production: A Survival Strategy of Urban Households. Paper presented at a Workshop on East and Southern Africa, 03.-05.05, Nairobi.

Department of the Town Engineer. 1992. Report on the Upgrading and Extensions of Goreangab Reclamation Works. Windhoek: Namibia.

- Dima, S.J., Ogunmokun A.A., Nantanga, T. 2002. The status of urban and peri-urban agriculture, Windhoek and Oshakati, Namibia. (Integrated Support to Sustainable Development and Food Security Programme). Windhoek: FAO.
- Drakakis-Smith, D., Bowyer-Bower, T., Tevera, D. 1995. Urban Poverty and Urban Agriculture: An Overview of the Linkages in Harare. Liverpool: HABITAT INTL.
- Egal, F. Valstar, A., Meershoek, S. 2001. Urban Agriculture, Household Food Security and Nutrition in Southern Africa Sub-Regional Expert Consultation on the Use of Low Cost and Simple Technologies for Crop. Stellenbosch: FAO.
- Ellis, F., Sumberg, J. 1998. Food production, urban areas and policy responses. *World Development*, 26(2): 213-225.
- Emongor, R. 2008. Namibia: Trends in growth of modern retail and wholesale chains and related agribusiness. Pretoria: University of Pretoria. Available from: [http://web.up.ac.za/sitefiles/file/48/2052/8\\_%20Namibia\\_Trends%20in%20Agri%20Retail%20&%20Wholesale%20Chains.pdf](http://web.up.ac.za/sitefiles/file/48/2052/8_%20Namibia_Trends%20in%20Agri%20Retail%20&%20Wholesale%20Chains.pdf). [Accessed November 2011 07].
- Engelhard, R. (Ed.). 2006. ICT Update issue 33: Urban Agriculture. Wageningen: CTA Technical Centre for Agricultural and Rural Cooperation (ACP-EU). Available from: <http://ictupdate.cta.int>. [Accessed August 2011 16].
- [FAO] Food and Agriculture Organization of the United Nations. 2010. Fighting Poverty and Hunger. Economic and Social Perspectives (Policy Brief No. 10). Rome: FAO. Available from: <http://www.fao.org/docrep/012/al377e/al377e00.pdf>. [Accessed June 2011 07].

[FAO] Food and Agriculture Organization of the United Nations. 2010a. The Second Report on the State of the World's Plant Genetic Resources for Food and Agriculture. Rome: FAO. Available from: [http://typo3.fao.org/fileadmin/templates/agphome/documents/PGR/SoW2/Second\\_Report\\_SOWPGR-2.pdf](http://typo3.fao.org/fileadmin/templates/agphome/documents/PGR/SoW2/Second_Report_SOWPGR-2.pdf). [Accessed Oktober 2012 18].

[FAO] Food and Agriculture Organization of the United Nations. 2011. The Place of urban and peri-urban Agriculture (UPA) in national food security programmes. Rome: FAO. Available from: [http://www.aup.edu.pk/downloads/fao/i2177\\_urban-and-peri-urban-agriculture.pdf](http://www.aup.edu.pk/downloads/fao/i2177_urban-and-peri-urban-agriculture.pdf). [Accessed June 2012 07].

[FAO] Food and Agriculture Organization of the United Nations. 2012. Growing greener cities in Africa. First status report on urban and peri-urban horticulture in Africa. Rome: FAO. Available from: <http://www.fao.org/docrep/016/i3002e/i3002e.pdf> . [Accessed June 2012 07].

Faruqui, N., Niang, S., Redwood, M. 2004. Untreated wastewater use in market gardens: A case study of Dakar, Senegal'. In Scott, C., Faruqui, N., Raschid-Sally, L. (Eds). 2004. Wastewater Use in Irrigated Agriculture: Confronting the Livelihood and Environmental Realities. London: CABI Publishing.

Featherstone, P. 2005. Soil for life. In Gardens of hope: Urban micro-farming as a complementary strategy for mitigation of the HIV-AIDS pandemic. Proceedings of the study visit to Johannesburg and Cape Town, 17-25 August 2005, South Africa.

Floraweb. Available from: <http://www.floraweb.de/pflanzenarten/pflanzenarten.html>. [Accessed October 2012 28].

- Frayne B. 2005. Survival of the poorest: Migration and food security in Namibia. In Mougeot, L.J.A. (Ed.). 2005. *Agropolis: The Social, Political And Environmental Dimension of Urban Agriculture*. London: Earthscan and IDRC.
- Foeken, D. 2006. *To Subsidies My Income: Urban Farming in an East African Town*. Leiden: Brill.
- Gabel, S. 2005. Exploring the gender dimension of urban open-space cultivation in Harare, Zimbabwe. In Mougeot, L.J.A. (Ed.). 2005. *Agropolis: The Social, Political And Environmental Dimension of Urban Agriculture*. London: Earthscan and IDRC.
- Galluzzi, G., van Duijvendijk, C., Collette, L., Azzu, N., Hodgkin, T. 2011. *Biodiversity for Food and Agriculture Contributing to food security and sustainability in a changing world*. Rome: FAO.
- Gillespie, S., Kadiyala, S. 2005. *HIV/AIDS and Food and Nutrition Security: From Evidence to Action*. Washington, D.C.: International Food policy Research Institute.
- Groening, G. 1996. *Politics of Community Gardening in Germany*. Paper presented at the Annual Conference of The American Community Gardening Association (ACGA) "Branching Out: Linking Communities Through Gardening", 26 - 29 September, Montréal.
- Grau, J., Jung, R., Munker, B. 1983. *Wildgemüse, Heilkräuter*. München: Mosaik Verlag GmbH.
- Guarte, J.M., Barrios, E. B. 2006. Estimation under Purposive Sampling. *Communications in Statistics - Simulation and Computation* 35. (2): 257-530.

Haidle, I., Arndt, C. 2004. Urbane Gärten Buenos Aires. Berlin: Universitätsverlag der TU Berlin.

Harvey, W.S. 2011. Strategies for Conducting Elite Interviews. *Qualitative Research* 11. (4): 431-441.

Heistingering, A. 2011. Leben von Gärten. Warum urbane Gärten wichtig sind für Ernährungssouveränität, Eigenmacht und Sortenvielfalt. In: Müller, C. (Ed.). 2011. Urban gardening: Über die Rückkehr der Gärten in die Stadt. München: oekom.

Held, M. 2011. Peak Oil und die Krise der Böden - urbane Nutzgärten und ihr Beitrag zu einer postfossilen Gesellschaft. In: Müller, C. (Ed.). 2011. Urban gardening: Über die Rückkehr der Gärten in die Stadt. München: oekom.

Henneberg, C. 2012a. [Online]. Berlin: stadttacker.de. Available from: <http://stadttacker-wissen.ext.zalf.de/Lists/Projekte/DispFormNew.aspx?ID=7&Source=http%3A%2F%2Fstadttacker-wissen.ext.zalf.de%2FLists%2FProjekte%2FPraxisprojekte.aspx%3FfilterField1%3DBundesland%26FilterValue1%3DBerlin&ContentTypeId=0x01009B1DA313FC5863489D81C5632375B24900EF01BE6446BCCF43BDA988F3AC2AF79E>. [Accessed 2012 Oktober 22].

Henneberg, C. 2012b. Rote Beete [Online]. Berlin: stadttacker.de. Available from: <http://stadttacker-wissen.ext.zalf.de/Lists/Projekte/DispFormNew.aspx?ID=13&Source=http%3A%2F%2Fstadttacker-wissen.ext.zalf.de%2FLists%2FProjekte%2FPraxisprojekte.aspx%3FfilterField1%3DBundesland%26FilterValue1%3DBerlin&ContentTypeId=0x0>

1009B1DA313FC5863489D81C5632375B24900EF01BE6446BCCF43BDA988F3AC2AF79E. [Accessed 2012 Oktober 22].

Hofstee, E. 2006. Constructing a Good Dissertation: A Practical Guide to Finishing a Masters, MBA or PHD on Schedule. Sandton: EPE.

Hovorka, A.J. 2005. Gender, commercial urban agriculture and urban food supply in greater Gaborone, Botswana. In Mougeot, L.J.A. (Ed.). 2005. Agropolis: The Social, Political And Environmental Dimension of Urban Agriculture. London: Earthscan and IDRC.

Howard, P. 2009. Visualizing Consolidation in the Global Seed Industry: 1996–2008. Sustainability 1: 1266-1287.

[IFAD] International Fund for Agricultural Development. 2008. Methods for Monitoring and Evaluation: A guide for Project Monitoring and Evaluation: IFAD. Available from: [http://www/ifad.org/evaluation/guide/annex\\_D-3DEF.pdf](http://www/ifad.org/evaluation/guide/annex_D-3DEF.pdf). [Accessed 2008 July 04].

[IAASTD] International assessment of agricultural knowledge, science and technology for development. 2009. Agriculture at a crossroads: International Assessment of Agricultural Knowledge, Science and Technology for Development (A Synthesis of the Global and Sub-Global IAASTD Reports). Washington DC: IAASTD.

Jensen, L. (Eds). 2011. The Millennium Development Goals Report 2011. New York: UN.

Kang'ethe, E. K., Njehu, A., Karanja, N., Njenga, M., Gathuru, K., Karanja, A. 2010. Benefits and Selected Health Risks of Urban Dairy Production in Nakuru, Kenya. In:

- Prain, G., Karanja, N., Lee-Smith, D. (Eds.). 2010. African Urban Harvest: Agriculture in the Cities of Cameroon, Kenya and Uganda. New York: Springer.
- Katjepunda, S. K., Kamupingene, G. T. 2007. Assessment of agricultural information needs in African, Caribbean & Pacific (ACP) states Southern Africa: Country Study: Namibia (ACP-EU). Wageningen: Technical Centre for Agricultural and Rural Cooperation (CTA).
- Kiss, A., Meerman, F. 1991. Integrated Pest Management and African Agriculture. Washington, DC: World Bank.
- Kotte, J. (Ed.). 2012. Berlin Gärtner: Kübel, Beet und Samenbombe. Berlin: terra press GmbH.
- Kropp, C. 2011. Gärtner(n) ohne Grenzen: Eine neue Politik des „sowohl als auch“ urbaner Gärten? In: Müller, C. (Ed.). 2011. Urban gardening: Über die Rückkehr der Gärten in die Stadt. München: oekom.
- Lahmer, W., Pfützner, B. 2003. Orts- und zeitdiskrete Ermittlung der Sickerwassermenge im Land Brandenburg auf der Basis flächendeckender Wasserhaushaltsberechnungen. Potsdam: Potsdam-Institut für Klimafolgenforschung.
- Lahnsteiner, J., Lempert, G. 2007. Water management in Windhoek, Namibia . Water Science & Technology 55. (1–2): 441–448.
- Lau, B., Reiner, P. 1993. 100 years of Agriculture in Namibia: a historical overview of visions and experiments. Windhoek: National Archives of Namibia.
- Linton, R. 1945. The Cultural Background of Personality. New York: Appleton-Century.

- Lohreberg, F. 2011. Agrarfluren und Stadtentwicklung. In: Müller, C. (Ed.). 2011. Urban gardening: Über die Rückkehr der Gärten in die Stadt. München: oekom.
- Map of Germany [Image]. Available from: [http://www.aifsabroad.com/images/maps/germany/map\\_germany.jpg](http://www.aifsabroad.com/images/maps/germany/map_germany.jpg). [Accessed Oktober 2012 08].
- Map of Namibia - Windhoek [Image] (2003). Available from: [http://www.unicef.org/infobycountry/images/ibc\\_map\\_namibia\\_en.gif](http://www.unicef.org/infobycountry/images/ibc_map_namibia_en.gif). [Accessed Oktober 2012 08].
- Map of Africa - Namibia [Image] (2012). Available from: <http://maps.pickatrail.com/africa/map/namibia.gif>. [Accessed Oktober 2012 28].
- [MAWF] Ministry of Agriculture, Water and Forestry. Directorate of planning. Republic of Namibia. 2009. Agricultural statistic bulletin (2000-2007). Windhoek. Maxwell African Urban Quarterly 11. (2/3): 137—152.
- McKinney, M.L. 2002. Urbanization, Biodiversity, and Conservation. *BioScience* 52. (10):883-890. Available from: [http://dx.doi.org/10.1641/0006-3568\(2002\)052\[0883:UBAC\]2.0.CO;2](http://dx.doi.org/10.1641/0006-3568(2002)052[0883:UBAC]2.0.CO;2). [Accessed June 2012 16].
- [MET] Ministry of Environment and Tourism. Republic of Namibia. 2007: Guide to the Environmental Management Act. Windhoek.
- Meyer-Renschhausen, E. 2011. Von Pflanzenkolonien zum nomadisierenden Junggemüse. Zur Geschichte des Community Gardening in Berlin. In: Müller, C. (Ed.). 2011. Urban gardening: Über die Rückkehr der Gärten in die Stadt. München: oekom.
- Meyer-Renschhausen, E. 2011a. Gemeinschaftlich betriebene Gemüsegärten in Berlin: Eine Studie. Available from: <http://issuu.com/anstiftungundertomis/>

docs/studie\_urbanagriculture \_in\_berlin\_e\_meyer-reuschha. [Accessed Oktober 2012 16].

Mkwambisi, D.D. 2009. Urban Agriculture and Food Security in Lilongwe and Blantyre, Malawi. In Redwood, M. (Ed.). 2009. Agriculture in Urban Planning: Generating Livelihoods and Food Security. London: Earthscan. Ottawa: IDRC.

Mougeot, L.J.A. 1999. Introduction: An improving domestic and international environment for African urban agriculture. *African Urban Quarterly*. 11(2/3): 137—152.

Mougeot, L.J.A. (Ed.). 2005. *Agropolis: The Social, Political and Environmental Dimension of Urban Agriculture*. London: Earthscan and IDRC.

Mougeot, L.J.A. (Ed.). 2005. Neglected Issues on Form and Substance of Research on Urban Agriculture. In Mougeot, L.J.A. (Ed.). 2005. *Agropolis: The Social, Political and Environmental Dimension of Urban Agriculture*. London: Earthscan and IDRC.

Mougeot, L.J.A. 2006. *Growing better cities: urban agriculture for sustainable development*. Ottawa: IDRC.

Mougeot, L.J.A., Munro-Faure, P. 2007. *The urban producer's resource book: A practical guide for working with Low Income Urban and Peri-Urban Producers Organizations*. Rome: FAO.

Mougeot, L.J.A., Gasengayire, F., Lee-Smith, D., Prain, G., de Zeeuw, H. 2010. IDRC and Its Partners in Sub-Saharan Africa 2000–2008. In Prain, G., Karanja, N., Lee-Smith, D. (Eds.). 2010. *African Urban Harvest: Agriculture in the Cities of Cameroon, Kenya and Uganda*. New York: Springer.

Müller, C. 2011. Urban Gardening: Grüne Signaturen neuer urbaner Zivilisation. In: Müller, C. (Ed.). 2011. Urban gardening: Über die Rückkehr der Gärten in die Stadt. München: oekom.

Mushamba, S., Mubvami, T., Marongwe, N., Chatiza, K., (Eds.). 2003. Report on the Ministers conference on urban and periurban agriculture in Eastern and Southern Africa. Ministers conference on urban and peri-urban agriculture in Eastern and Southern Africa; 28 to 29 August 2003. Harare.

Nasinyama, G.W., Cole, D.C., Lee-Smith, D. 2010. Health Impact Assessment of Urban Agriculture in Kampala. In: Prain, G., Karanja, N., Lee-Smith, D. (Eds.). 2010. African Urban Harvest: Agriculture in the Cities of Cameroon, Kenya and Uganda. New York: Springer.

Nasr, A. and Ratta, J. 1999. Urban agriculture and the African urban food supply system. *African Urban Quarterly*. 11(2/3): 137—152.

[NASSP] National Agricultural Support Services Programme. Ministry of Agriculture, Water and Forestry. Republic of Namibia. 2005. Namibia: Draft Seed Policy. Windhoek: Ministry of Agriculture, Water and Forestry.

[NPC] National Planning Commission. Republic of Namibia. 2012a. Namibia 2011 population and housing census preliminary results. Windhoek.

[NPC] National Planning Commission. Republic of Namibia. 2012b. Namibia's Fourth National Development Plan. Windhoek.

[NLFS] Namibia Labour force survey. Ministry of Labour and social welfare. Republic of Namibia. 2008. Windhoek: Ministry of Labour and social welfare.

Newsham, A., Thomas, D. 2008. Agricultural adaptation, local knowledge and livelihoods diversification in North-Central Namibia. Norwich: Tyndall Centre for Climate Change Research.

Schwarz, G. 1988. Allgemeine Siedlungsgeographie: Die Städte. Berlin: Walter de Gruyter & Co.

Ogunmokun, A. 2005. Studies and pilot projects on urban agriculture by UNAM. In Gardens of hope: Urban micro-farming as a complementary strategy for mitigation of the HIV-AIDS pandemic. Proceedings of the study visit to Johannesburg and Cape Town, 17-25 August 2005, South Africa.

Perez-Vazquez, A., Anderson, S., Rogers, A.W. 2005. Assessing benefits from Allotments as a component of Urban Agriculture in England. In: Mougeot, L.J.A. (Ed.). 2005. Agropolis: The Social, Political and Environmental Dimension of Urban Agriculture. London: Earthscan and IDRC.

Prain, G., Karanja, N., Lee-Smith, D. (Eds.). 2010. African Urban Harvest: Agriculture in the Cities of Cameroon, Kenya and Uganda. New York: Springer.

Prain, G. 2010. The Institutional and Regional Context. In: Prain, G., Karanja, N., Lee-Smith, D. (Eds.). 2010. African Urban Harvest: Agriculture in the Cities of Cameroon, Kenya and Uganda. New York: Springer.

Prain, G., Lee-Smith, D. 2010. Urban Agriculture in Africa: What Has Been Learned?. In: Prain, G., Karanja, N., Lee-Smith, D. (Eds.). 2010. African Urban Harvest: Agriculture in the Cities of Cameroon, Kenya and Uganda. New York: Springer.

Premat, A. 2005. Moving between the Plan and the Ground: Shifting Perspectives on Urban Agriculture in Havana, Cuba. In: Mougeot, L.J.A. (Ed.). 2005. Agropolis: The Social, Political and Environmental Dimension of Urban Agriculture. London: Earthscan and IDRC.

Redwood, M. (Ed.). 2009. Agriculture in Urban Planning: Generating Livelihoods and Food Security. London: Earthscan. Ottawa: IDRC.

Roetman, P.E.J., Daniels, C.B. 2008. Biodiversity in urban developments: Your Development online resources. Canberra: CSIRO Sustainable Ecosystems.

rosarose-garten. 2012. Available from: <http://www.rosarose-garten.net/de/start>. [Accessed September 2012 05].

Rosol, M. 2006. Gemeinschaftsgärten in Berlin - Eine qualitative Untersuchung zu Potenzialen und Risiken bürgerschaftlichen Engagements im Grünflächenbereich vor dem Hintergrund des Wandels von Staat und Planung. PhD Thesis. Humboldt-Universität zu Berlin. Available from: <http://edoc.hu-berlin.de/dissertationen/rosol-marit-2006-02-14/PDF/rosol.pdf>. [Accessed August 2012 01].

Rudloff, J. 2011. Gärtnernd die Städte verwandeln: Urbane Landwirtschaft ist in Berlin bereits eine bunte Bewegung. Oya [Online] 6: Available from: [http://www.oya-online.de/article/read/278-Gaertnernd\\_die\\_Staedte\\_verwandeln.html](http://www.oya-online.de/article/read/278-Gaertnernd_die_Staedte_verwandeln.html). [Accessed August 2012 16].

Ruppel, O.C., Ruppel-Schlichting, K. (Eds.). 2011. Environmental law and policy in Namibia. Windhoek: Hans Seidel Stiftung.

[SANA] The South African Nursery Association. 2009. Invasive Alien Plants - CARA List. The 2nd draft of the Alien and Invasive Species Regulations of the National Environmental Management: Biodiversity Act, 2004. Available from: [http://www.sana.co.za/NEMBA\\_Proposed\\_IAP\\_List\\_May\\_2009.pdf](http://www.sana.co.za/NEMBA_Proposed_IAP_List_May_2009.pdf). [Accessed July 2012 15].

Satzung Interkultureller Garten Kreuzberg „Bunte Beete“. 2008. Available from: [http://buntebeete.files.wordpress.com/2010/09/bunte\\_beete\\_vereinssatzung.pdf](http://buntebeete.files.wordpress.com/2010/09/bunte_beete_vereinssatzung.pdf).

[Accessed July 2012 08].

Shrine, C., Williams, N., Gundling, L. 2000. A Guide to Designing Legal and Institutional Frameworks on Alien Invasive Species. Gland: IUCN, the World Conservation Union.

Shackleton, S., Shackleton, C., Cunningham, T., Lombard, C., Sullivan, C. & Netshiluvhi, T. 2002. Knowledge on *Sclerocarya birrea* subsp. *caffra* with emphasis on its importance as a non-timber forest product in South and southern Africa: a summary. Part 1: Taxonomy, ecology and role in rural livelihoods. *Southern African Forestry Journal*. 194: 27-41.

Small, R.. 2005. Can Community Based Organic Micro Farming Create Food Security? South Africa: Trialogue Publication.

Small, R.. 2006a. The Siyazama Community Allotment Garden Association, Cape Town South Africa: A Case Study. In Van Veenhuizen, R. (Ed) 2006. Cities Farming for the Future. Urban Agriculture for Green Productive Cities. Philippines: International Institute of Rural Reconstruction (IIRR), RUAF and IDRC.

Smit, J. 1996. Urban agriculture, progress and prospect: 1975-2005. Report for Cities Feeding People Series. Ottawa: IDRC.

Smit, J., Ratta, A., Nasr, J. 1996. Urban Agriculture: Food, Jobs and Sustainable Cities. New York: UNDP.

Smit, J. U. 2000. Agriculture and biodiversity. Urban Agriculture Magazine, 1 (1), 11–12.

Spiaggi, E. 2005. Urban Agriculture and Local Sustainable Development in Rosario, Argentina: Integration of Economic Social, Technical and Environmental Variables. In: Mougeot, L.J.A. (Ed.). 2005. Agropolis: The Social, Political and Environmental Dimension of Urban Agriculture. London: Earthscan and IDRC.

Statistisches Bundesamt. 2012. Available from: <https://www.destatis.de/DE/ZahlenFakten/GesellschaftStaat/Bevoelkerung/MigrationIntegration/EingebuergerterPersonen/EingebuergerterPersoen.html>. [Accessed Oktober 2012 05].

Tallaki, K. 2005. The pest-control system in the Market Gardens of Lome, Togo. In: Mougeot, L.J.A. (Ed.). 2005. Agropolis: The Social, Political and Environmental Dimension of Urban Agriculture. London: Earthscan and IDRC.

Thomas, F. 2011. Urbane Gärten und bäuerliche Landwirtschaft: welche Städter braucht das Land? In: Müller, C. (Ed.). 2011. Urban gardening: Über die Rückkehr der Gärten in die Stadt. München: oekom.

Tixier, P., Bon de, H. 2006. Urban Horticulture. In Van Veenhuizen, R. (Ed) 2006. Cities Farming for the Future. Urban Agriculture for green Productive Cities. Philippines: International Institute of Rural Reconstruction (IIRR), RUAF and IDRC.

Tevera, D. 1999. Urban Agriculture in Africa: A Comparative Analysis of Findings from Zimbabwe, Kenya and Zambia. *African Urban Quarterly*. 11(2/3): 181-7.

Town Planning Ordinance No. 18 of 1954. Government Gazette of the Republic of Namibia.

Über Lebenskunst. 2012. Available from:[http://www.ueber-lebenskunst.org/contents/project\\_view/nodeId:54](http://www.ueber-lebenskunst.org/contents/project_view/nodeId:54). [Accessed August 2012 02].

[UN] United Nations. 1987. Report of the World Commission on Environment and Development: Our Common Future. UN Available from: [http://conspect.nl/pdf/Our\\_Common\\_Future-Brundtland\\_Report\\_1987.pdf](http://conspect.nl/pdf/Our_Common_Future-Brundtland_Report_1987.pdf). [Accessed June 2012 02].

[UN] United Nations. 2005. Urban Environmental Governance. For Sustainable Development in Asia and the Pacific: A Regional Overview. New York : UN.

[UN] United Nations. 2012. World Urbanization Prospects The 2011 Revision : Highlights. Department of Economic and Social Affairs Population Division. New York : UN.

[UN-Habitat] United Nations Human Settlements Programme. 2008. Country programme document 2008-2009 Namibia. Kenya: UN-HABITAT.

[UN-Habitat] United Nations Human Settlements Programme. 2008. State of the World's Cities 2010/2011: Bridging the Urban Divide. London: Earthscan.

[UN-Habitat] United Nations Human Settlements Programme. 2011. Cities and climate change: Global report on human settlements 2011. London: Earthscan.

[UN-Habitat] United Nations Human Settlements Programme. Namibia. Available from: <http://ww2.unhabitat.org/habrdd/conditions/safrica/namibia.htm>. [Accessed May 2012 14].

Urban II. 2008. Barrieren überwinden Bilanz des Urban II-Programms. Berlin: Senatsverwaltung für Stadtentwicklung, Referat IV B Soziale Stadt. Available from: [http://www.stadtentwicklung.berlin.de/wohnen/urban/download/abschlussbroschuere\\_URBANII\\_deutsch.pdf](http://www.stadtentwicklung.berlin.de/wohnen/urban/download/abschlussbroschuere_URBANII_deutsch.pdf). [Accessed October 2012 08].

vanVeenhuizen, R. (Ed.). 2006. Cities Farming for the Future Urban Agriculture for Green and Productive Cities. Leusden: RUAF Foundation, IDRC and IIRR.

Wackernagel, M. and Rees, W. 1996. Our Ecological Footprint: Reducing Human Impact on the Earth. Gabriola Island: New Society.

Wania, A., Kühn, I., Klotz, S. 2006. Plant richness patterns in agricultural and urban landscapes in Central Germany—spatial gradients of species richness. *Landscape and Urban Planning* 75: 97–110.

Ward, V. 2007. Rainwater Harvesting in Informal Settlements of Windhoek, Namibia. Bachelors of Science thesis, Worcester Polytechnic Institute.

Werner, K. 2011. Eigensinnige Beheimatung. Gemeinschaftsgärten als Orte des Widerstands gegen neoliberale Ordnungen. In: Müller, C. (Ed.). 2011. Urban gardening: Über die Rückkehr der Gärten in die Stadt. München: oekom.

[WIP] Weed and Invasive plants. 2006. Available from: <http://www.agis.agric.za/wip/>. [Accessed October 2012 28].

## 9. Appendix

### Appendix 1 – Questionnaire Windhoek

Multiple and no answers are possible

Name of the project .....

Date .....

#### I. Personal questions

1. Nationality: .....
2. Place of birth: .....
3. Which tribe do you belong to? .....
4. Which language is your mother language? .....
5. Age: ..... years
6. Gender:
 

|                               |                                 |
|-------------------------------|---------------------------------|
| <input type="checkbox"/> Male | <input type="checkbox"/> Female |
|-------------------------------|---------------------------------|
7. Are you?
 

|                                  |                                            |
|----------------------------------|--------------------------------------------|
| <input type="checkbox"/> Single  | <input type="checkbox"/> In a relationship |
| <input type="checkbox"/> Married | <input type="checkbox"/> Divorced          |
| <input type="checkbox"/> Widowed | <input type="checkbox"/>                   |
8. What is your employment status?
 

|                                      |                                     |
|--------------------------------------|-------------------------------------|
| <input type="checkbox"/> Student     | <input type="checkbox"/> Worker     |
| <input type="checkbox"/> Pensioner   | <input type="checkbox"/> Unemployed |
| <input type="checkbox"/> Other ..... |                                     |
9. How much do you earn per month?
 

|                                    |                                          |                                      |                                         |
|------------------------------------|------------------------------------------|--------------------------------------|-----------------------------------------|
| <input type="checkbox"/> 0-100 N\$ | <input type="checkbox"/> 1000 – 5000 N\$ | <input type="checkbox"/> 100-500 N\$ | <input type="checkbox"/> 500 – 1000 N\$ |
|                                    |                                          |                                      | <input type="checkbox"/> > 5000 N\$     |
10. How many people live in your home? .....

#### II. Personal motivation

11. How long have you been part of this project? ..... years
12. How long have you been practicing gardening? ..... years
13. Why are you doing urban gardening?
 

|                                                   |                                                             |
|---------------------------------------------------|-------------------------------------------------------------|
| <input type="checkbox"/> Just for fun             | <input type="checkbox"/> Food supply                        |
| <input type="checkbox"/> To feel closer to nature | <input type="checkbox"/> Income/economic reason             |
| <input type="checkbox"/> Education                | <input type="checkbox"/> To be in contact with my community |
| <input type="checkbox"/> Health                   | <input type="checkbox"/> Other                              |
| purposes .....                                    |                                                             |
14. Where did you get your knowledge about gardening from?
 

|                                                                         |                                   |                                    |
|-------------------------------------------------------------------------|-----------------------------------|------------------------------------|
| <input type="checkbox"/> Traditional knowledge (parents, grand-parents) | <input type="checkbox"/> Media    | <input type="checkbox"/> Knowledge |
| from neighbour/ friends                                                 | <input type="checkbox"/> Training | <input type="checkbox"/> Other     |
| .....                                                                   |                                   |                                    |
- a) If training, from whom? .....

#### III. Social Aspects about the project – management

15. How did you get to know about this project?
 

|                                               |                                                    |
|-----------------------------------------------|----------------------------------------------------|
| <input type="checkbox"/> Media                | <input type="checkbox"/> Advertisement by the city |
| <input type="checkbox"/> Friends or relatives |                                                    |
| <input type="checkbox"/> Other .....          |                                                    |
16. What is the purpose of the project? .....
17. How long has this project existed? ..... years
18. Why this area? .....
19. How was the area used before? .....
20. How many people work in the project? .....
21. Do you receive any help while starting it? .....

- ☐ Yes ☐ No
- a) If yes, from whom? .....
- b) In what way? .....
- 22. How are the people in the project related to each other?**
- ☐ Friends/relatives ☐ Community members/ Neighbors
- ☐ Other .....
- 23. How is the garden organized?**
- ☐ Manager ☐ Everyone is equal
- ☐ Other .....
- 24. Who can participate in your project?**
- ☐ Everyone ☐
- Only .....
- 25. What is the main language spoken in the garden?** .....
- 26. Do you sell your products?**
- ☐ Yes ☐ No
- a) If yes, where? .....
- b) How much of your total income per month do you earn from the garden? .....
- 27. What do you do with the proceeds?**
- ☐ Spent it on something for me / my family ☐ Invest it back in the garden
- ☐ Other .....
- 28. Do you process your products to some extent?**
- ☐ Yes ☐ No
- a) If yes, which one? .....
- b) And how? .....
- 29. Has your food supply increase since you are part of the project? (Due to the project)**
- ☐ Yes ☐ No
- 30. Has your income increased since you are part of the project? (Due to the project)**
- ☐ Yes ☐ No
- 31. How did you design the project?**
- .....
- .....
- .....
- 32. How long did it take to get the project started from the idea to the start?** ..... years
- 33. Did any problems occur during the development of the project?**
- ☐ No ☐ Social ☐ Legal
- ☐ Financial
- ☐ Other .....
- 34. Would you change something in the development of the project?**
- .....
- a) What? .....
- 35. Do you have any recommendations for future projects?**
- .....
- .....
- 36. Are you in contact with other gardening projects?**
- ☐ Yes ☐ No
- a) If yes, which ones? .....
- b) And in what way? .....

#### IV. Financial information

- 37. How did you gain access to and use of urban land?**
- ☐ Municipalities ☐ Headman ☐
- Community ☐ NGO
- ☐ Other .....

38. Are you the owner of the plot?

☐ Yes ☐ No

a) If not, who is it? .....

b) And are you paying rent or fees for using the plot?

☐ Yes ☐ No

39. Is the project financing itself?

☐ Yes ☐ No

a) If not, where does the financing come from?

☐ City ☐ Private ☐

NGO ☐ Ministry

☐ Other .....

40. How did you use this fundings?

.....

41. Is your future fundings secured?

.....

## V. Information about the project

### a) Crop diversity and farming methods

42. Which crops are you growing?

.....  
.....

a) and why? .....

43. Which crop varieties is growing best?

.....

44. Do you grow local crops?

☐ Yes ☐ No

a) If yes, which ones? .....

b) Why? .....

45. What kind of farming methods are you using?

☐ Land preparation ☐ Planting ☐

Weeding ☐ Harvesting ☐

Composting and using of this as fertilizer ☐ Mixed cultivation ☐

Canopy with organic material ☐ Mobil gardening ☐ Annual

plants ☐ Perennial plants

☐ Others .....

46. What kind of land preparation are you doing?

☐ Plant directly ☐ Dig and plant ☐

De-stone and plant ☐ De-stone, dig and plant

47. How often do you do weeding?

☐ Not at all ☐ Once / week ☐

Once / 2 weeks ☐ When necessary

48. When do you plant?

☐ Summer only ☐ Winter only ☐

Both

49. Do you do intercropping (mixing different crops)?

☐ Yes ☐ No

a) If yes, with which plants? .....

50. Are you using fertilizers?

☐ Yes ☐ No

a) If yes, which ones? .....

b) Where do you get them from? .....

51. Do you have problems with pests?

☐ Yes ☐ No

a) If yes, with which one? .....

52. Are you using pesticides?

☐ Yes

☐ No

a) If yes, which ones? .....

b) And, where do you get it from? .....

53. Where do you mainly get your seeds from?

☐ Supermarket

☐ Ministry

☐

Friends or relatives

☐ I kept them from the last harvest

☐ Other .....

54. Which country is the main source in terms of seed supply?

.....

55. How much water do you use per day?

..... liter

a) Where do you get the water from?

☐ Tap

☐ Rain water

☐

Waste water

☐

Other

.....

b) Do you have limitations?

☐ Yes

☐ No

c) If yes, to which extend? .....

56. How do you water your plants?

☐ Not at all

☐ Bucket

☐

Sprinkler

☐ Watering can

☐

Drip irrigation

57. Do you have tools (shovel...)?

☐ Yes

☐ No

a) If yes, where did you get them from? .....

58. Do you have problems with:

☐ Water

☐ Harassment

☐ Seed supply

☐ Pesticides supply

☐ Fertilizer supply

☐ Tool

☐ Capital

☐ Labour

☐ Soil Fertility

☐ Drought

☐ Pests

☐ Market

☐ Theft

☐ Information

☐ Other .....

59. What do you think is the biggest problem in the garden?

.....

60. Do you have anything else you would like to add?

.....

.....

.....

.....

.....

## Appendix 2 – Revised Questionnaires Windhoek

Note:

1 = No/no answer and 2 = Yes

|        | PQ 1     | PQ 2                         | PQ 3      | PQ 4              | PQ 5 | PQ 6 a | PQ 6 b | PQ 7 a | PQ 7 b | PQ 7 c | PQ 7 d | PQ 7 e |
|--------|----------|------------------------------|-----------|-------------------|------|--------|--------|--------|--------|--------|--------|--------|
| GoH    | Namibian | small village in Ovambo-land | Oshiwambo | Oshiwambo         | 30   | 2      | 1      | 2      | 1      | 1      | 1      | 1      |
| GoH    | Namibian | small village in Ovambo-land | Oshiwambo | Oshiwambo         | 30   | 1      | 2      | 2      | 1      | 1      | 1      | 1      |
| DSNGoH | Namibian | small village in Ovambo-land | Oshiwambo | Oshiwambo         | 46   | 2      | 1      | 2      | 1      | 1      | 1      | 1      |
| DSNGoH | Namibian | small village in Ovambo-land | Oshiwambo | Oshiwambo         | 32   | 1      | 2      | 2      | 1      | 1      | 1      | 1      |
| DSNGoH | Namibian | small village in Ovambo-land | Oshiwambo | Oshiwambo         | 33   | 1      | 2      | 2      | 1      | 1      | 1      | 1      |
| DSNGoH | Namibian | small village in Ovambo-land | Oshiwambo | Oshiwambo         | 34   | 1      | 2      | 2      | 1      | 1      | 1      | 1      |
| DSNGoH | Namibian | small village in Ovambo-land | Oshiwambo | Oshiwambo         | 32   | 1      | 2      | 2      | 1      | 1      | 1      | 1      |
| DSNGoH | Namibian | small village in Ovambo-land | Oshiwambo | Oshiwambo         | 39   | 1      | 2      | 2      | 1      | 1      | 1      | 1      |
| DSNGoH | Namibian | small village in Ovambo-land | Oshiwambo | Oshiwambo         | 32   | 1      | 2      | 2      | 1      | 1      | 1      | 1      |
| NEYO   | Namibian | small village in Ovambo-land | Oshiwambo | Oshiwambo         | 30   | 1      | 2      | 1      | 2      | 1      | 1      | 1      |
| NEYO   | Namibian | small village in Ovambo-land | Oshiwambo | Oshiwambo         | 30   | 1      | 2      | 1      | 1      | 2      | 1      | 1      |
| NEYO   | Namibian | small village in Ovambo-land | Oshiwambo | Oshiwambo         | 29   | 1      | 2      | 2      | 1      | 1      | 1      | 1      |
| NEYO   | Namibian | small village in Kavangoland | Kavango   | Kavango languages | 33   | 1      | 2      | 2      | 1      | 1      | 1      | 1      |
| NEYO   | Namibian | small village in Ovambo-land | Oshiwambo | Oshiwambo         | 30   | 1      | 2      | 2      | 1      | 1      | 1      | 1      |
| NEYO   | Namibian | small village in Kavangoland | Kavango   | Kavango languages | 33   | 1      | 2      | 2      | 1      | 1      | 1      | 1      |
| NEYO   | Namibian | small village in Kavangoland | Kavango   | Kavango languages | 30   | 1      | 2      | 2      | 1      | 1      | 1      | 1      |
| NEYO   | Namibian | small village in Ovambo-land | Oshiwambo | Oshiwambo         | 31   | 2      | 1      | 2      | 2      | 1      | 1      | 1      |
| NEYO   | Namibian | small village in Ovambo-land | Oshiwambo | Oshiwambo         | 31   | 2      | 1      | 2      | 1      | 1      | 1      | 1      |
| NEYO   | 1        | small village in Ovambo-land | Oshiwambo | Oshiwambo         | 35   | 2      | 1      | 2      | 2      | 1      | 1      | 1      |

|        | PQ 8 a | PQ 8 b | PQ 8 c | PQ 8 d | PQ 8 e         | PQ 9 a | PQ 9 b | PQ 9 c | PQ 9 d | PQ 9 e | PQ 10     | PM 11     | PM 12     | PM 13 a | PM 13 b | PM 13 c | PM 13 d | PM 13 e | PM 13 f | PM 13 g | PM 13 h |
|--------|--------|--------|--------|--------|----------------|--------|--------|--------|--------|--------|-----------|-----------|-----------|---------|---------|---------|---------|---------|---------|---------|---------|
| GoH    | 1      | 1      | 1      | 2      | 1              | 1      | 1      | 2      | 1      | 1      | 2         | 8         | 9         | 1       | 2       | 1       | 2       | 1       | 1       | 1       | 1       |
| GoH    | 1      | 1      | 1      | 1      | 1              | 1      | 1      | 1      | 1      | 1      | no answer | 8         | 8         | 1       | 2       | 1       | 2       | 1       | 1       | 1       | 1       |
| DSNGoH | 1      | 1      | 1      | 2      | 1              | 1      | 2      | 1      | 1      | 1      | 7         | 2         | 2         | 1       | 2       | 1       | 1       | 2       | 1       | 1       | 1       |
| DSNGoH | 1      | 1      | 1      | 2      | 1              | 1      | 2      | 1      | 1      | 1      | 3         | 2         | 2         | 1       | 2       | 1       | 1       | 2       | 1       | 1       | 1       |
| DSNGoH | 1      | 1      | 1      | 2      | 1              | 1      | 2      | 1      | 1      | 1      | 5         | 2         | 2         | 1       | 2       | 1       | 1       | 2       | 1       | 1       | 1       |
| DSNGoH | 1      | 1      | 1      | 2      | 1              | 1      | 2      | 1      | 1      | 1      | 3         | 2         | 2         | 1       | 1       | 1       | 1       | 2       | 2       | 1       | 1       |
| DSNGoH | 1      | 1      | 1      | 2      | 1              | 1      | 2      | 1      | 1      | 1      | 3         | 2         | 2         | 1       | 2       | 1       | 1       | 2       | 1       | 1       | 1       |
| DSNGoH | 1      | 1      | 1      | 2      | 1              | 1      | 2      | 1      | 1      | 1      | 7         | 2         | 2         | 1       | 1       | 1       | 1       | 2       | 1       | 1       | 1       |
| DSNGoH | 1      | 1      | 1      | 2      | 1              | 1      | 2      | 1      | 1      | 1      | 4         | 2         | 2         | 1       | 2       | 1       | 1       | 2       | 1       | 1       | 1       |
| NEYO   | 1      | 1      | 1      | 2      | 1              | 2      | 1      | 1      | 1      | 1      | 4         | no answer | no answer | 1       | 1       | 1       | 2       | 1       | 1       | 1       | 1       |
| NEYO   | 1      | 1      | 1      | 2      | 1              | 2      | 1      | 1      | 1      | 1      | 3         | 2         | 2         | 1       | 2       | 1       | 2       | 2       | 1       | 1       | 1       |
| NEYO   | 1      | 1      | 1      | 2      | 1              | 2      | 1      | 1      | 1      | 1      | 5         | no answer | no answer | 1       | 2       | 1       | 1       | 1       | 1       | 1       | 1       |
| NEYO   | 1      | 1      | 1      | 2      | 1              | 1      | 1      | 1      | 1      | 1      | 5         | 3         | 3         | 1       | 2       | 1       | 2       | 1       | 1       | 1       | 1       |
| NEYO   | 1      | 1      | 1      | 2      | 1              | 1      | 1      | 1      | 1      | 1      | 3         | no answer | no answer | 1       | 2       | 2       | 2       | 2       | 2       | 2       | 1       |
| NEYO   | 1      | 1      | 1      | 2      | 1              | 1      | 1      | 1      | 1      | 1      | 5         | 3         | 2         | 1       | 1       | 1       | 2       | 2       | 1       | 1       | 1       |
| NEYO   | 1      | 1      | 1      | 2      | 1              | 2      | 1      | 1      | 1      | 1      | 5         | 2         | 2         | 1       | 2       | 1       | 2       | 2       | 1       | 2       | 1       |
| NEYO   | 1      | 1      | 1      | 2      | 1              | 2      | 1      | 1      | 1      | 1      | 6         | 3         | 4         | 1       | 2       | 1       | 1       | 2       | 1       | 1       | 1       |
| NEYO   | 1      | 1      | 1      | 1      | Security guard | 1      | 1      | 2      | 1      | 1      | 6         | 2         | 9         | 1       | 2       | 1       | 1       | 1       | 1       | 1       | 1       |
| NEYO   | 1      | 1      | 1      | 2      | 1              | 1      | 1      | 1      | 1      | 1      | 5         | no answer | no answer | 1       | 2       | 1       | 2       | 1       | 1       | 1       | 1       |

to gain professional skills to be best gardener  
and for food supply for the whole Namibian

|        | PM 14 a | PM 14 b | PM 14 c | PM 14 d | PM 14 e                                             | PM 14.1.                                        | PM 15 a | PM 15 b | PM 15 c | PM 15 d                                       |
|--------|---------|---------|---------|---------|-----------------------------------------------------|-------------------------------------------------|---------|---------|---------|-----------------------------------------------|
| GoH    | 1       | 1       | 1       | 2       | 1                                                   | MAWF                                            | 1       | 1       | 2       | 1                                             |
| GoH    | 1       | 1       | 1       | 2       | 1                                                   | FAO; MAWF; Ministry of youth, sport and culture | 1       | 2       | 2       | 1                                             |
| DSNGoH | 1       | 1       | 1       | 2       | 1                                                   | MAWF                                            | 1       | 1       | 2       | 1                                             |
| DSNGoH | 1       | 1       | 1       | 2       | 1                                                   | MAWF                                            | 1       | 1       | 2       | 1                                             |
| DSNGoH | 1       | 1       | 1       | 2       | 1                                                   | MAWF                                            | 1       | 1       | 2       | 1                                             |
| DSNGoH | 1       | 1       | 1       | 2       | 1                                                   | MAWF                                            | 1       | 1       | 2       | 1                                             |
| DSNGoH | 1       | 1       | 1       | 2       | 1                                                   | MAWF                                            | 1       | 1       | 2       | 1                                             |
| DSNGoH | 1       | 1       | 1       | 2       | 1                                                   | MAWF                                            | 1       | 1       | 2       | 1                                             |
| DSNGoH | 1       | 1       | 1       | 2       | 1                                                   | MAWF                                            | 1       | 1       | 2       | 1                                             |
| NEYO   | 1       | 1       | 1       | 1       | 1                                                   | 1                                               | 1       | 1       | 1       | 1                                             |
| NEYO   | 1       | 1       | 1       | 1       | 1                                                   | 1                                               | 1       | 1       | 1       | 1                                             |
| NEYO   | 1       | 1       | 1       | 2       | 2                                                   | 1                                               | 1       | 2       | 1       | 1                                             |
| NEYO   | 1       | 1       | 1       | 1       | 1                                                   | 1                                               | 1       | 1       | 2       | 1                                             |
| NEYO   | 1       | 1       | 1       | 2       | 1                                                   | 1                                               | 1       | 2       | 1       | 1                                             |
| NEYO   | 2       | 1       | 1       | 1       | 1                                                   | MAWF                                            | 1       | 2       | 1       | 1                                             |
| NEYO   | 1       | 1       | 1       | 2       | 1                                                   | MAWF                                            | 1       | 1       | 1       | In youth group                                |
| NEYO   | 2       | 1       | 1       | 2       | 1                                                   | Garden Job                                      | 1       | 1       | 2       | 1                                             |
| NEYO   | 1       | 1       | 1       | 2       | from school my grade 10                             | 1                                               | 1       | 2       | 1       | from the organisation NEYO/NOYD               |
| NEYO   | 2       | 1       | 1       | 2       | to my work mate is where Acquire another experience | MAWF                                            | 1       | 1       | 2       | and throughout the saws youth league messages |

|        | PM 16               | PM 17 | PM 18                                                                                                          | PM 19                                |
|--------|---------------------|-------|----------------------------------------------------------------------------------------------------------------|--------------------------------------|
| GoH    | income; training    | 8     | accessible to young people that we given training to. Also is the only open space close to the source of water | not used                             |
| GoH    | income; food        | 8     | Just to train and encourage people that they can produce veg in the city                                       | not used                             |
| DSNGoH | training            | 2     | Is well fertilized and close to the community                                                                  | not used                             |
| DSNGoH | knowledge           | 2     | because its close to the community                                                                             | not used                             |
| DSNGoH | income; food        | 3     | because its good when it become to growth of seed                                                              | not used                             |
| DSNGoH | training            | 7     | because its next to the school and there is enough space                                                       | It was just urban nothin was located |
| DSNGoH | training; knowledge | 2     | it well fertilized and close to the community                                                                  | none                                 |
| DSNGoH | training            | 2     | it is well fertile and close to the community                                                                  | none                                 |
| DSNGoH | training; knowledge | 2     | because it is close to the community                                                                           | none                                 |
| NEYO   | 1                   | 1     | 1                                                                                                              | 1                                    |
| NEYO   | 1                   | 1     | 1                                                                                                              | 1                                    |
| NEYO   | 1                   | 1     | 1                                                                                                              | 1                                    |
| NEYO   | 1                   | 2     | 1                                                                                                              | 1                                    |
| NEYO   | knowledge           | 3     | because there is water available and it is also safe                                                           | it was not used be us                |
| NEYO   | training            | 2     | project area                                                                                                   | gardening                            |
| NEYO   | because no work     | 2     | no other area                                                                                                  | it was for TB people area            |
| NEYO   | income; food        | 1     | is the only land we have no land                                                                               | 1                                    |
| NEYO   | training; food      | 2     | its the land we got from the city                                                                              | Nothing was used                     |
| NEYO   | income; food        | 1     | this is the land which we have only                                                                            | youth centre still it                |

|        | PM 20 | PM 21 a | PM 21 b | PM 21.1.                     | PM 21.2.            | PM 22 a | PM 22 b | PM 22 c                             |
|--------|-------|---------|---------|------------------------------|---------------------|---------|---------|-------------------------------------|
| GoH    | 3     | 2       | 1       | MAWF, FAO; Ministry of youth | training; materials | 1       | 2       | 1                                   |
| GoH    | 3     | 2       | 1       | 1                            | 1                   | 1       | 2       | 1                                   |
| DSNGoH | 7     | 2       | 1       | MAWF; UN                     | tools; materials    | 1       | 2       | 1                                   |
| DSNGoH | 7     | 2       | 1       | MAWF; UN                     | tools; materials    | 1       | 2       | 1                                   |
| DSNGoH | 7     | 2       | 1       | MAWF                         | tools               | 1       | 2       | 1                                   |
| DSNGoH | 7     | 2       | 1       | MAWF, UN                     | shade; seeds; tools | 1       | 2       | 1                                   |
| DSNGoH | 7     | 2       | 1       | MAWF; UN                     | tools; materials    | 1       | 2       | 1                                   |
| DSNGoH | 7     | 2       | 1       | 1                            | tools               | 1       | 2       | 1                                   |
| DSNGoH | 7     | 2       | 1       | MAWF, UN                     | tools; materials    | 1       | 2       | 1                                   |
| NEYO   | 1     | 1       | 1       | 1                            | 1                   | 1       | 1       | 1                                   |
| NEYO   | 1     | 1       | 1       | 1                            | 1                   | 1       | 1       | 1                                   |
| NEYO   | 1     | 1       | 1       | 1                            | 1                   | 1       | 1       | 1                                   |
| NEYO   | 64    | 1       | 2       | 1                            | 1                   | 1       | 2       | 1                                   |
| NEYO   | 33    | 2       | 1       | MAWF                         | training            | 1       | 2       | 1                                   |
| NEYO   | 25    | 1       | 2       | 1                            | 1                   | 1       | 2       | 1                                   |
| NEYO   | 30    | 1       | 2       | 1                            | 1                   | 1       | 1       | in our group for youth organisation |
| NEYO   | 22    | 2       | 1       | 1                            | 1                   | 2       | 2       | 1                                   |
| NEYO   | 110   | 1       | 2       | 1                            | 1                   | 1       | 2       | 1                                   |
| NEYO   | 33    | 2       | 1       | MAWF                         | training; seeds     | 2       | 2       | 1                                   |

|        | PM 23 a | PM 23 b | PM 23 c | PM 24 a | PM 24 b                    | PM 25                         | PM 26 a | PM 26 b | PM 26.1.                | PM 26.2.                                                          |
|--------|---------|---------|---------|---------|----------------------------|-------------------------------|---------|---------|-------------------------|-------------------------------------------------------------------|
| GoH    | 1       | 2       | 1       | 2       | specifically for the youth | English                       | 2       | 1       | community               | 200 N\$                                                           |
| GoH    | 1       | 2       | 1       | 2       | 1                          | English                       | 2       | 1       | community               | 200 N\$                                                           |
| DSNGoH | 2       | 1       | 1       | 2       | 1                          | Oshiwambo                     | 2       | 1       | community, ministry     | 500 N\$                                                           |
| DSNGoH | 2       | 1       | 1       | 2       | 1                          | Oshiwambo                     | 2       | 1       | community, ministry     | 1000 N\$                                                          |
| DSNGoH | 2       | 1       | 1       | 2       | people who we train        | Oshiwambo                     | 2       | 1       | community, ministry     | 500 N\$                                                           |
| DSNGoH | 1       | 1       | 1       | 2       | 1                          | Oshiwambo                     | 2       | 1       | ministry; fruit and veg | 500 N\$                                                           |
| DSNGoH | 2       | 1       | 1       | 2       | 1                          | Oshiwambo                     | 2       | 1       | community, ministry     | 500 N\$                                                           |
| DSNGoH | 2       | 1       | 1       | 2       | 1                          | Oshiwambo                     | 2       | 1       | everywhere              | 500 N\$                                                           |
| DSNGoH | 2       | 1       | 1       | 2       | 1                          | Oshiwambo                     | 2       | 1       | community, ministry     | 600 N\$                                                           |
| NEYO   | 1       | 1       | 1       | 1       | 1                          | English; Oshiwambo; Oshierero | 2       | 1       | community               | 150 N\$                                                           |
| NEYO   | 1       | 1       | 1       | 1       | 1                          | 1                             | 1       | 2       | 1                       | 1                                                                 |
| NEYO   | 1       | 1       | 1       | 1       | 1                          | Oshiwambo; English            | 2       | 1       | community               | 2                                                                 |
| NEYO   | 1       | 1       | 1       | 1       | 2                          | Oshiwambo                     | 2       | 1       | 1                       | nothing                                                           |
| NEYO   | 1       | 2       | 1       | 2       | 1                          | Oshiwambo                     | 2       | 1       | community               | not yet                                                           |
| NEYO   | 1       | 2       | 1       | 2       | 1                          | Oshiwambo                     | 1       | 1       | 1                       | 1                                                                 |
| NEYO   | 1       | 1       | 1       | 1       | 1                          | English; Oshiwambo            | 1       | 2       | 1                       | 1                                                                 |
| NEYO   | 1       | 2       | 1       | 2       | 1                          | English; Oshiwambo            | 1       | 1       | 1                       | 1                                                                 |
| NEYO   | 1       | 2       | 1       | 2       | 1                          | English                       | 2       | 1       | community               | we do not use to get per month, only harvest time after 3-4 month |
| NEYO   | 1       | 2       | 1       | 2       | 1                          | English; Oshiwambo            | 1       | 1       | 1                       | 1                                                                 |

|        | PM 27 a | PM 27 b | PM 27 c | PM 28 a | PM 28 b | PM 28.1 | PM 28.2 | PM 29 a | PM 29 b | PM 30 a | PM 30 b | PM 31                                                                                                                                                                   |
|--------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| GoH    | 1       | 2       | 1       | 1       | 2       | 1       | 1       | 2       | 1       | 1       | 2       | 1                                                                                                                                                                       |
| GoH    | 1       | 2       | 1       | 1       | 2       | 1       | 1       | 2       | 1       | 1       | 2       | 1                                                                                                                                                                       |
| DSNGoH | 2       | 2       | 1       | 1       | 2       | 1       | 1       | 2       | 1       | 2       | 1       | covered with a strong net against predators                                                                                                                             |
| DSNGoH | 2       | 2       | 1       | 1       | 2       | 1       | 1       | 2       | 1       | 2       | 1       | covered with a strong net against predators                                                                                                                             |
| DSNGoH | 2       | 2       | 1       | 1       | 2       | 1       | 1       | 2       | 1       | 1       | 2       | covered with a strong net against predators                                                                                                                             |
| DSNGoH | 2       | 2       | 1       | 1       | 1       | 1       | 1       | 2       | 1       | 2       | 1       | 1                                                                                                                                                                       |
| DSNGoH | 2       | 2       | 1       | 1       | 2       | 1       | 1       | 2       | 1       | 2       | 1       | covered with a strong net against predators                                                                                                                             |
| DSNGoH | 2       | 2       | 1       | 1       | 2       | 1       | 1       | 2       | 1       | 1       | 2       | covered with a strong net against predators                                                                                                                             |
| DSNGoH | 2       | 2       | 1       | 1       | 2       | 1       | 1       | 2       | 1       | 2       | 1       | covered with a strong net against predators                                                                                                                             |
| NEYO   | 2       | 1       | 1       | 1       | 1       | 1       | 1       | 1       | 1       | 1       | 1       | 1                                                                                                                                                                       |
| NEYO   | 1       | 1       | 1       | 1       | 1       | 1       | 1       | 1       | 1       | 1       | 2       | 1                                                                                                                                                                       |
| NEYO   | 1       | 1       | 1       | 1       | 1       | 1       | 1       | 1       | 1       | 1       | 1       | 1                                                                                                                                                                       |
| NEYO   | 1       | 1       | 1       | 1       | 1       | 1       | 1       | 1       | 2       | 1       | 2       | 1                                                                                                                                                                       |
| NEYO   | 2       | 1       | 1       | 1       | 1       | 1       | 1       | 1       | 1       | 1       | 1       | 1                                                                                                                                                                       |
| NEYO   | 1       | 1       | 1       | 1       | 2       | 1       | 1       | 2       | 1       | 1       | 2       | 1                                                                                                                                                                       |
| NEYO   | 1       | 1       | 1       | 1       | 2       | 1       | 1       | 1       | 2       | 1       | 2       | divide in small beds to plant crops                                                                                                                                     |
| NEYO   | 1       | 1       | 1       | 1       | 2       | 1       | 1       | 1       | 1       | 1       | 1       | In-group we were planning income or to get better future or to get some to feed our self with families etc.                                                             |
| NEYO   | 2       | 2       | 1       | 1       | 2       | 1       | 1       | 2       | 1       | 2       | 1       | project learning how to dig                                                                                                                                             |
| NEYO   | 2       | 2       | 1       | 1       | 2       | 1       | 1       | 2       | 1       | 2       | 1       | we start in team and then we continue digging the land with pick, fork. A harp of tools from ministry of agriculture then we divide it in plots each member get 3 plots |
| NEYO   | 1       | 1       | 1       | 1       | 1       | 1       | 1       | 1       | 1       | 1       | 1       | we just came up with an idea to do something to help our self in order to eat food and incomes in order to reduce unemployment in the country as well in future         |

|        | PM 32     | PM 33 a | PM 33 b | PM 33 c | PM 33 d | PM 33 e                                          | PM 34 a | PM 34 b | PM 34.1.                                                                                                         |
|--------|-----------|---------|---------|---------|---------|--------------------------------------------------|---------|---------|------------------------------------------------------------------------------------------------------------------|
| GoH    | 2         | 1       | 1       | 1       | 2       | 1                                                | 2       | 1       | The project was meant specially for the youth, but due to community demand we decided to accomodate them as well |
| GoH    | no answer | 1       | 1       | 1       | 2       | 1                                                | 2       | 1       | This project should be extended to the whole thirteen regions                                                    |
| DSNGoH | 1         | 1       | 2       | 1       | 1       | 1                                                | 2       | 1       | enough tools; water supply closer                                                                                |
| DSNGoH | 2         | 1       | 2       | 1       | 1       | 1                                                | 2       | 1       | enough tools; strong fence                                                                                       |
| DSNGoH | 2         | 1       | 2       | 1       | 1       | 1                                                | 2       | 1       | produce more to make more profit                                                                                 |
| DSNGoH | 1         | 1       | 2       | 1       | 1       | 1                                                | 1       | 1       | 1                                                                                                                |
| DSNGoH | 2         | 1       | 2       | 1       | 1       | some community steal the need, some burn it also | 2       | 1       | enough tools; strong net                                                                                         |
| DSNGoH | 2         | 1       | 2       | 1       | 1       | 1                                                | 1       | 1       | enough tools; strong fence                                                                                       |
| DSNGoH | 2         | 1       | 2       | 1       | 1       | 1                                                | 2       | 1       | enough tools; water supply closer                                                                                |
| NEYO   | 1         | 1       | 1       | 1       | 1       | 1                                                | 1       | 1       | 1                                                                                                                |
| NEYO   | 1         | 1       | 1       | 1       | 1       | 1                                                | 1       | 1       | 1                                                                                                                |
| NEYO   | 1         | 1       | 1       | 1       | 2       | 1                                                | 1       | 1       | 1                                                                                                                |
| NEYO   | 1         | 1       | 1       | 1       | 2       | 1                                                | 1       | 1       | 1                                                                                                                |
| NEYO   | 1         | 2       | 1       | 1       | 1       | 1                                                | 1       | 1       | 1                                                                                                                |
| NEYO   | 2         | 1       | 1       | 1       | 2       | 1                                                | 1       | 1       | 1                                                                                                                |
| NEYO   | 1         | 1       | 1       | 1       | 1       | 1                                                | 1       | 1       | 1                                                                                                                |
| NEYO   | 1         | 2       | 1       | 1       | 1       | 1                                                | 2       | 1       | owning project                                                                                                   |
| NEYO   | 8 months  | 1       | 1       | 1       | 2       | financial and tools we still lack of it          | 2       | 1       | cultivation style and the place of the project                                                                   |
| NEYO   | 1         | 1       | 1       | 1       | 1       | 1                                                | 2       | 1       | to expand the project to become big bigger even                                                                  |

|        | PM 35                                                                                                                                         | PM 36 a | PM 36 b | PM 36.1.                                                    | PM 36.2.                                                                        |
|--------|-----------------------------------------------------------------------------------------------------------------------------------------------|---------|---------|-------------------------------------------------------------|---------------------------------------------------------------------------------|
| GoH    | I recommend the project to be expanded to other region as it contribute to food security and improve standard of living for the rural people. | 2       | 1       | Community groups around Katutura and those at other regions | Mostly for technical advice and they can get seeds and gardening tools.         |
| GoH    | Yes, like at other regions young people are willing to do gardening at rural areas but they don't have support.                               | 2       | 1       | After school center/Khomasdal                               | used to train them on how to produce veg and feed the kids with this vegetables |
| DSNGoH | Yes                                                                                                                                           | 1       | 2       | 1                                                           | 1                                                                               |
| DSNGoH | To tell the Namibian people and the community that the garden is for development not to destroy it                                            | 1       | 2       | 1                                                           | 1                                                                               |
| DSNGoH | just to buy our enough tool to the garden and bring water supply closer to the garden                                                         | 1       | 2       | 1                                                           | 1                                                                               |
| DSNGoH | yes                                                                                                                                           | 1       | 2       | 1                                                           | 1                                                                               |
| DSNGoH | yes just to encourage Namibian people and the community that the project is for our development                                               | 1       | 2       | 1                                                           | 1                                                                               |
| DSNGoH | yes                                                                                                                                           | 2       | 1       | 1                                                           | 1                                                                               |
| DSNGoH | to go and help other people about make our yard garden at home                                                                                | 1       | 2       | 1                                                           | 1                                                                               |
| NEYO   | 1                                                                                                                                             | 1       | 1       | 1                                                           | 1                                                                               |
| NEYO   | yes                                                                                                                                           | 1       | 2       | 1                                                           | 1                                                                               |
| NEYO   | 1                                                                                                                                             | 1       | 1       | 1                                                           | 1                                                                               |
| NEYO   | 1                                                                                                                                             | 2       | 1       | 1                                                           | 1                                                                               |
| NEYO   | yes because you will get income after you selling and also health from your garden fruits after you eat                                       | 1       | 2       | 1                                                           | 1                                                                               |
| NEYO   | 1                                                                                                                                             | 2       | 1       | 1                                                           | 1                                                                               |
| NEYO   | Yes we must hard work and happy with our project willing to do every thing to be serious                                                      | 1       | 1       | 1                                                           | 1                                                                               |
| NEYO   | yes how to plant and transplanting                                                                                                            | 1       | 2       | 1                                                           | 1                                                                               |
| NEYO   | yes space between vegetable the sun 2cm and depth of seeding and sowing                                                                       | 1       | 2       | 1                                                           | 1                                                                               |
| NEYO   | I want to tell all Namibian people that let us do something , let us stop stealing others stuff. Let us produce our own food and incomes      | 1       | 2       | 1                                                           | 1                                                                               |

|        | FI 37 a | FI 37 b | FI 37 c | FI 37 d | FI 37 e | FI 38 a | FI 38 b | FI 38.1.                                     | FI 38.2.a | FI 38.2.b | FI 39 a | FI 39 b | FI 39.1. a | FI 39.1. b | FI 39.1. c | FI 39.1. d | FI 39.1. e                                                                    |
|--------|---------|---------|---------|---------|---------|---------|---------|----------------------------------------------|-----------|-----------|---------|---------|------------|------------|------------|------------|-------------------------------------------------------------------------------|
| GoH    | 2       | 1       | 1       | 1       | 1       | 1       | 2       | 1                                            | 2         | 1         | 2       | 1       | 1          | 1          | 1          | 2          | Got some material assistance from ministr of agriculture                      |
| GoH    | 2       | 1       | 1       | 1       | 1       | 1       | 2       | MAWF                                         | 1         | 2         | 1       | 1       | 1          | 1          | 1          | 2          | recieved materials and support from FAO                                       |
| DSNGoH | 2       | 1       | 1       | 1       | 1       | 1       | 2       | MAWF                                         | 1         | 2         | 2       | 1       | 1          | 1          | 1          | 2          | 1                                                                             |
| DSNGoH | 2       | 1       | 1       | 1       | 1       | 1       | 2       | MAWF                                         | 1         | 2         | 1       | 2       | 1          | 1          | 1          | 2          | 1                                                                             |
| DSNGoH | 2       | 1       | 1       | 1       | 1       | 1       | 2       | MAWF                                         | 1         | 2         | 1       | 2       | 1          | 2          | 1          | 2          | 1                                                                             |
| DSNGoH | 2       | 1       | 1       | 1       | 1       | 1       | 2       | MAWF                                         | 1         | 2         | 2       | 1       | 1          | 1          | 1          | 1          | 1                                                                             |
| DSNGoH | 2       | 1       | 1       | 1       | 1       | 1       | 2       | MAWF                                         | 1         | 2         | 2       | 1       | 1          | 1          | 1          | 1          | 1                                                                             |
| NEYO   | 1       | 1       | 1       | 1       | 1       | 1       | 2       | 1                                            | 1         | 1         | 2       | 1       | 1          | 1          | 1          | 1          | 1                                                                             |
| NEYO   | 1       | 1       | 1       | 1       | 1       | 1       | 2       | Municipalities                               | 1         | 2         | 1       | 2       | 1          | 2          | 1          | 1          | 1                                                                             |
| NEYO   | 2       | 1       | 1       | 1       | 1       | 1       | 1       | 1                                            | 1         | 1         | 1       | 1       | 1          | 1          | 1          | 1          | 1                                                                             |
| NEYO   | 1       | 1       | 1       | 1       | 1       | 1       | 1       | 1                                            | 1         | 2         | 1       | 2       | 1          | 1          | 1          | 2          | 1                                                                             |
| NEYO   | 2       | 1       | 1       | 1       | 1       | 1       | 2       | 1                                            | 1         | 2         | 2       | 1       | 1          | 1          | 1          | 1          | 1                                                                             |
| NEYO   | 2       | 1       | 1       | 1       | 1       | 1       | 2       | Municipalities                               | 1         | 1         | 2       | 1       | 1          | 1          | 1          | 1          | 1                                                                             |
| NEYO   | 1       | 1       | 1       | 1       | 1       | 1       | 2       | Penduka                                      | 1         | 2         | 1       | 1       | 1          | 1          | 1          | 1          | 1                                                                             |
| NEYO   | 1       | 1       | 1       | 1       | 1       | 1       | 2       | 1                                            | 2         | 1         | 2       | 1       | 1          | 1          | 1          | 1          | 1                                                                             |
| NEYO   | 2       | 1       | 1       | 1       | 1       | 1       | 2       | The Ministry of use, disability organisation | 1         | 2         | 1       | 2       | 1          | 1          | 1          | 1          | nothing supporting. We don't have any financing organisation, even government |
| NEYO   | 2       | 1       | 1       | 1       | 1       | 2       | 1       | 1                                            | 2         | 1         | 1       | 1       | 1          | 1          | 1          | 1          | 1                                                                             |

|        | FI 40                      | FI 41                  | IP 42                                                                                                          | IP 42.1.                                      |
|--------|----------------------------|------------------------|----------------------------------------------------------------------------------------------------------------|-----------------------------------------------|
| GoH    | 1                          | 1                      | basil, beetroot, cabbage, carrots, celery, dill, green pepper, lettuce, onion, Rape, radish, spinach, tomatoes | Customer demand                               |
| GoH    | 1                          | 1                      | Cabbage, cauliflower, celery, lettuce, onions, spinach, tomatoes                                               | Customer demand                               |
| DSNGoH | seeds; basic needs         | yes                    | green pepper, onion, spinach, tomatoes                                                                         | Customer demand                               |
| DSNGoH | seeds; bank                | yes                    | Cabbage, carrot, green pepper, onion, spinach, tomatoes                                                        | 1                                             |
| DSNGoH | seeds; basic needs         | yes                    | Cabbage, carrot, chillies, green pepper, onion, spinach, tomatoes spiesoisil, rolbet                           | seed grow fast; customer demand; provide food |
| DSNGoH | bank; help our self        | yes                    | Beetroot, Cabbage, carrot, eggplant, green pepper, lettuce, onion, spinach, tomatoes, spice                    | seed grow fast                                |
| DSNGoH | seeds; basic needs         | yes                    | carrot, green pepper, onion, spinach, tomatoes                                                                 | Customer demand                               |
| DSNGoH | seeds; basic needs         | yes                    | carrot, green pepper, onion, spinach                                                                           | Customer demand                               |
| DSNGoH | seeds; help our self; bank | yes                    | spinach, green pepper, carrot, onion                                                                           | Customer demand                               |
| NEYO   | 1                          | 1                      | onion, cabbage, tomato                                                                                         | good food                                     |
| NEYO   | we did not get anything    | No                     | omakembidi, spinach, tomatoes, calota                                                                          | seed grow fast                                |
| NEYO   | 1                          | 1                      | 1                                                                                                              | 1                                             |
| NEYO   | 1                          | 1                      | 1                                                                                                              | 1                                             |
| NEYO   | 1                          | 1                      | spinach, carrots, onions, water melon, maize, tomatoes and many more                                           | seed grow fast                                |
| NEYO   | 1                          | yes                    | cabbage, spinach, rise, carrots, tomatoes, onion                                                               | for development                               |
| NEYO   | we were not get any centis | 1                      | spinach, onions, tomatoes, cabbages, carrots                                                                   | Customer demand                               |
| NEYO   | 1                          | 1                      | Tomatoes, cabage and carrots                                                                                   | seed grow fast                                |
| NEYO   | 1                          | we gain nothing at all | spinach, onions, carrots, tomatoes                                                                             | acquire little space                          |
| NEYO   | 1                          | 1                      | tomatoes, cabbages, spinach, onion, watermelon, carrots                                                        | personal preference                           |

|        | IP 43                                                | IP 44 a | IP 44 b | IP 44.1.                                   | IP 44.2.                              |
|--------|------------------------------------------------------|---------|---------|--------------------------------------------|---------------------------------------|
| GoH    | Spinach, lettuce, tomatoes, green pepper and cabbage | 2       | 1       | cabbage; spinache; tomato                  | people like it and it is very healthy |
| GoH    | spinach, lettuce                                     | 1       | 1       | 1                                          | 1                                     |
| DSNGoH | spinach, tomatoes                                    | 2       | 1       | chillies; tomatoes                         | profit, easy to maintain              |
| DSNGoH | spinach and onion                                    | 2       | 1       | chillies; tomatoes                         | profit                                |
| DSNGoH | spinach                                              | 2       | 1       | chillies; maize                            | because people like it, profit        |
| DSNGoH | spinach, onion, lettuce and green pepper             | 2       | 1       | 1                                          | 1                                     |
| DSNGoH | spinach, tomatoes, carrot                            | 2       | 1       | carrot, chillies, tomatoes                 | profit, easy to maintain              |
| DSNGoH | spinach                                              | 2       | 1       | chillies; tomatoes                         | profit, easy to maintain              |
| DSNGoH | spinach, Parsley                                     | 2       | 1       | chillies; tomatoes                         | profit, easy to maintain              |
| NEYO   | onion                                                | 1       | 1       | 1                                          | 1                                     |
| NEYO   | 2                                                    | 1       | 1       | tomatoes; onion                            | 1                                     |
| NEYO   | 1                                                    | 1       | 1       | 1                                          | 1                                     |
| NEYO   | 1                                                    | 1       | 1       | 1                                          | 1                                     |
| NEYO   | 1                                                    | 2       | 1       | tomatoes, watermelon, maize and carrots    | you can plant them everywhere         |
| NEYO   | onion, cabbage                                       | 1       | 2       | 1                                          | to get income                         |
| NEYO   | 1                                                    | 1       | 2       | tears or coffee and planting trees (small) | 1                                     |
| NEYO   | cabbage and spinach                                  | 1       | 1       | 1                                          | 1                                     |
| NEYO   | spinach                                              | 1       | 2       | 1                                          | 1                                     |
| NEYO   | cabbages, tomatoes and spinach                       | 1       | 1       | 1                                          | 1                                     |

|        | IP 45 a | IP 45 b | IP 45 c | IP 45 d | IP 45 e | IP 45 f | IP 45 g | IP 45 h | IP 45 i | IP 45 j | IP 45 k | IP 46 a | IP 46 b | IP 46 c | IP 46 d | IP 47 a | IP 47 b | IP 47 c | IP 47 d |
|--------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|
| GoH    | 1       | 1       | 1       | 1       | 1       | 1       | 1       | 1       | 1       | 1       | 1       | 1       | 1       | 1       | 2       | 1       | 1       | 1       | 2       |
| GoH    | 1       | 1       | 1       | 1       | 1       | 1       | 1       | 1       | 1       | 1       | 1       | 1       | 1       | 1       | 2       | 1       | 2       | 1       | 1       |
| DSNGoH | 1       | 1       | 1       | 1       | 1       | 2       | 1       | 1       | 1       | 1       | 1       | 1       | 1       | 1       | 2       | 1       | 1       | 1       | 2       |
| DSNGoH | 1       | 1       | 1       | 1       | 1       | 1       | 1       | 1       | 1       | 1       | 1       | 1       | 1       | 1       | 2       | 1       | 1       | 1       | 2       |
| DSNGoH | 1       | 1       | 1       | 1       | 1       | 2       | 1       | 1       | 1       | 1       | 1       | 1       | 2       | 1       | 1       | 1       | 2       | 1       | 1       |
| DSNGoH | 1       | 1       | 1       | 1       | 1       | 1       | 1       | 1       | 1       | 1       | 1       | 1       | 1       | 1       | 1       | 1       | 1       | 1       | 1       |
| DSNGoH | 1       | 1       | 1       | 1       | 1       | 2       | 1       | 1       | 1       | 1       | 1       | 1       | 1       | 1       | 2       | 1       | 1       | 1       | 2       |
| DSNGoH | 1       | 1       | 1       | 1       | 1       | 2       | 1       | 1       | 1       | 1       | 1       | 1       | 1       | 1       | 2       | 1       | 1       | 1       | 2       |
| DSNGoH | 1       | 1       | 1       | 1       | 1       | 2       | 1       | 1       | 1       | 1       | 1       | 1       | 1       | 1       | 2       | 1       | 2       | 1       | 1       |
| NEYO   | 1       | 1       | 1       | 1       | 1       | 1       | 1       | 1       | 1       | 1       | 1       | 1       | 1       | 1       | 1       | 1       | 1       | 1       | 1       |
| NEYO   | 1       | 1       | 1       | 1       | 1       | 1       | 1       | 1       | 1       | 1       | 1       | 1       | 1       | 1       | 1       | 1       | 1       | 1       | 1       |
| NEYO   | 1       | 1       | 1       | 1       | 1       | 1       | 1       | 1       | 1       | 1       | 1       | 1       | 1       | 1       | 1       | 1       | 1       | 1       | 1       |
| NEYO   | 1       | 1       | 1       | 1       | 1       | 1       | 1       | 1       | 1       | 1       | 1       | 1       | 1       | 1       | 1       | 1       | 1       | 1       | 1       |
| NEYO   | 1       | 1       | 2       | 2       | 2       | 2       | 1       | 1       | 1       | 1       | 1       | 1       | 2       | 2       | 1       | 1       | 1       | 1       | 2       |
| NEYO   | 1       | 1       | 1       | 1       | 1       | 1       | 1       | 2       | 1       | 1       | 1       | 1       | 2       | 1       | 1       | 1       | 2       | 1       | 1       |
| NEYO   | 1       | 1       | 2       | 1       | 1       | 1       | 1       | 1       | 1       | 1       | 1       | 1       | 1       | 1       | 2       | 1       | 2       | 1       | 1       |
| NEYO   | 2       | 2       | 1       | 1       | 1       | 1       | 1       | 1       | 1       | 1       | 1       | 1       | 2       | 1       | 1       | 1       | 1       | 1       | 2       |
| NEYO   | 1       | 1       | 1       | 1       | 1       | 2       | 1       | 1       | 1       | 1       | 1       | 1       | 1       | 1       | 2       | 1       | 1       | 1       | 2       |
| NEYO   | 2       | 2       | 2       | 2       | 2       | 2       | 1       | 1       | 2       | 1       | 1       | 1       | 2       | 2       | 2       | 1       | 1       | 1       | 2       |

|        | IP 48 a | IP 48 b | IP 48 c | IP 49 a | IP 49 b | IP 49.1.                       | IP 50 a | IP 50 b | IP 50.1.                                  | IP 50.2.                           |
|--------|---------|---------|---------|---------|---------|--------------------------------|---------|---------|-------------------------------------------|------------------------------------|
| GoH    | 1       | 1       | 2       | 2       | 1       | mostly vegetables with herbs   | 2       | 1       | cattle manure and chemical for hydroponic | Okapuka and chemical from the shop |
| GoH    | 1       | 1       | 2       | 1       | 1       | 1                              | 2       | 1       | cattle manure and vermi compost           | Okapuka                            |
| DSNGoH | 1       | 1       | 2       | 1       | 2       | 1                              | 2       | 1       | cattle manure                             | MAWF                               |
| DSNGoH | 1       | 1       | 2       | 1       | 2       | 1                              | 2       | 1       | cattle manure                             | MAWF                               |
| DSNGoH | 1       | 1       | 2       | 2       | 1       | onions, spissl                 | 2       | 1       | cattle manure                             | MAWF                               |
| DSNGoH | 1       | 1       | 2       | 2       | 1       | lettuce and spinach            | 2       | 1       | cattle manure                             | MAWF                               |
| DSNGoH | 1       | 1       | 2       | 1       | 2       | 1                              | 2       | 1       | cattle manure                             | MAWF                               |
| DSNGoH | 1       | 1       | 2       | 1       | 2       | 1                              | 2       | 1       | cattle manure                             | MAWF                               |
| DSNGoH | 1       | 1       | 2       | 1       | 2       | 1                              | 2       | 1       | cattle manure                             | MAWF                               |
| NEYO   | 1       | 1       | 2       | 1       | 1       | 1                              | 1       | 1       | 1                                         | 1                                  |
| NEYO   | 1       | 1       | 1       | 1       | 1       | 1                              | 1       | 1       | 1                                         | 1                                  |
| NEYO   | 1       | 1       | 1       | 1       | 1       | 1                              | 1       | 1       | 1                                         | 1                                  |
| NEYO   | 1       | 2       | 1       | 1       | 2       | 1                              | 2       | 1       | 1                                         | 1                                  |
| NEYO   | 1       | 1       | 2       | 1       | 2       | 1                              | 2       | 1       | cattle manure                             | Okapuka                            |
| NEYO   | 1       | 1       | 2       | 1       | 2       | 1                              | 2       | 1       | cattle manure                             | Okapuka                            |
| NEYO   | 1       | 2       | 1       | 1       | 1       | 1                              | 2       | 1       | cattle manure                             | MAWF                               |
| NEYO   | 1       | 1       | 2       | 2       | 1       | tomatoes and cabbage           | 2       | 1       | cattle manure                             | Okapuka                            |
| NEYO   | 1       | 1       | 2       | 2       | 1       | roots crops, leaves and fruits | 2       | 1       | cattle manure                             | Okapuka                            |
| NEYO   | 1       | 1       | 2       | 1       | 2       | 1                              | 2       | 1       | cattle manure                             | Okapuka                            |

|        | IP 51 a | IP 51 b | IP 51.1.                       | IP 52 a | IP 52 b | IP 52.1. | IP 52.2.        | IP 53 a | IP 53 b | IP 53 c | IP 53 d | IP 53 e  | IP 54        | IP 55      | IP 55.1. a | IP 55.1. b | IP 55.1. c | IP 55.1. d | IP 55.2. a | IP 55.2. b | IP 55.3.                                      |
|--------|---------|---------|--------------------------------|---------|---------|----------|-----------------|---------|---------|---------|---------|----------|--------------|------------|------------|------------|------------|------------|------------|------------|-----------------------------------------------|
| GoH    | 2       | 1       | Aphis, cutworm and red spider  | 2       | 1       | 1        | From the market | 2       | 2       | 1       | 1       | 1        | South Africa | 50 l       | 2          | 1          | 1          | 1          | 2          | 1          | the more you use much there more you pay more |
| GoH    | 2       | 1       | Aphis, worms                   | 2       | 1       |          | From the shop   | 1       | 1       | 1       | 1       | Agri-Gro | South Africa | 50 l       | 2          | 1          | 1          | 1          | 2          | 1          | as much as you use the more you pay           |
| DSNGoH | 2       | 1       | white pests                    | 2       | 1       | Namadots | MAWF            | 2       | 2       | 1       | 1       | 1        | China        | 700 l      | 2          | 1          | 1          | 1          | 1          | 2          | 1                                             |
| DSNGoH | 2       | 1       | Namadots                       | 2       | 1       | DDTs     | MAWF            | 1       | 2       | 1       | 1       | 1        | China        | 700 l      | 2          | 1          | 1          | 1          | 1          | 2          | 1                                             |
| DSNGoH | 2       | 1       | tape worm                      | 2       | 1       | 1        | MAWF            | 2       | 2       | 1       | 1       | 1        | South Africa | 125        | 2          | 1          | 1          | 1          | 1          | 2          | 1                                             |
| DSNGoH | 2       | 1       | white pest                     | 2       | 1       | 1        | MAWF            | 1       | 2       | 1       | 2       | 1        | China        | 700        | 2          | 1          | 1          | 1          | 1          | 2          | 1                                             |
| DSNGoH | 2       | 1       | white pests                    | 2       | 1       | Namadots | MAWF            | 1       | 2       | 1       | 1       | 1        | China        | 700 l      | 2          | 1          | 1          | 1          | 1          | 2          | 1                                             |
| DSNGoH | 2       | 1       | Namadots                       | 2       | 1       | DDTs     | MAWF            | 2       | 2       | 1       | 1       | 1        | none         | 600 l      | 2          | 1          | 1          | 1          | 1          | 2          | 1                                             |
| DSNGoH | 2       | 1       | Namadots                       | 2       | 1       | DDTs     | MAWF            | 1       | 2       | 1       | 1       | 1        | China        | 700 l      | 2          | 1          | 1          | 1          | 1          | 2          | 1                                             |
| NEYO   | 1       | 1       | 1                              | 1       | 1       | 1        | 1               | 1       | 1       | 1       | 1       | 1        | 1            | 1          | 1          | 1          | 1          | 1          | 1          | 1          | 1                                             |
| NEYO   | 1       | 1       | 1                              | 1       | 1       | 1        | 1               | 1       | 2       | 1       | 1       | 1        | 1            | 40 l       | 2          | 1          | 1          | 1          | 1          | 2          | 1                                             |
| NEYO   | 1       | 1       | 1                              | 1       | 1       | 1        | 1               | 1       | 1       | 1       | 1       | 1        | 1            | 1          | 1          | 1          | 1          | 1          | 1          | 1          | 1                                             |
| NEYO   | 1       | 1       | 1                              | 1       | 1       | 1        | 1               | 1       | 1       | 1       | 1       | 1        | 1            | 1          | 1          | 1          | 1          | 1          | 2          | 1          | 1                                             |
| NEYO   | 2       | 1       | birds                          | 1       | 2       | 1        | 1               | 1       | 2       | 1       | 1       | 1        | South Africa | 15         | 2          | 1          | 1          | 1          | 1          | 2          | 1                                             |
| NEYO   | 2       | 1       | pesticide for insect           | 2       | 1       | chemical | MAWF            | 1       | 2       | 1       | 1       | 1        | 1            | 1          | 2          | 1          | 1          | 1          | 1          | 2          | 1                                             |
| NEYO   | 1       | 1       | 1                              | 1       | 1       | 1        | 1               | 1       | 2       | 1       | 1       | 1        | 1            | 60         | 2          | 1          | 1          | 1          | 1          | 1          | 1                                             |
| NEYO   | 2       | 1       | chewing pest and stinking pest | 1       | 2       | 1        | 1               | 1       | 2       | 1       | 1       | 1        | South Africa | much water | 2          | 1          | 1          | 1          | 2          | 1          | 1                                             |
| NEYO   | 1       | 2       | 1                              | 1       | 2       | 1        | 1               | 1       | 2       | 1       | 1       | 1        | Namibia380   | 2          | 2          | 2          | 1          | 1          | 1          | 1          | 1                                             |
| NEYO   | 2       | 1       | birds                          | 1       | 2       | 1        | 1               | 1       | 2       | 1       | 1       | 1        | South Africa | 25         | 2          | 1          | 1          | 1          | 1          | 2          | 1                                             |

|        | IP 56 a | IP 56 b | IP 56 c | IP 56 d | IP 56 e | IP 57 a | IP 57 b | IP 57.1. | IP 58 a | IP 58 b | IP 58 c | IP 58 d | IP 58 e | IP 58 f | IP 58 g | IP 58 h | IP 58 i | IP 58 j | IP 58 k | IP 58 l | IP 58 m | IP 58 n | IP 58 o |
|--------|---------|---------|---------|---------|---------|---------|---------|----------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|
| GoH    | 1       | 1       | 1       | 2       | 1       | 2       | 1       | market   | 1       | 1       | 2       | 2       | 2       | 1       | 1       | 1       | 1       | 1       | 2       | 2       | 2       | 2       | 1       |
| GoH    | 1       | 1       | 1       | 2       | 1       | 2       | 1       | shop     | 1       | 1       | 2       | 1       | 2       | 1       | 1       | 1       | 2       | 1       | 2       | 1       | 1       | 1       | 1       |
| DSNGoH | 1       | 1       | 1       | 1       | 2       | 2       | 1       | MAWF     | 1       | 2       | 1       | 1       | 2       | 1       | 1       | 1       | 1       | 1       | 2       | 1       | 2       | 1       | 1       |
| DSNGoH | 1       | 1       | 1       | 1       | 2       | 2       | 1       | MAWF     | 1       | 1       | 1       | 1       | 2       | 1       | 1       | 1       | 1       | 1       | 2       | 1       | 2       | 1       | 1       |
| DSNGoH | 1       | 1       | 1       | 1       | 2       | 2       | 1       | MAWF     | 1       | 2       | 1       | 1       | 2       | 1       | 1       | 1       | 1       | 1       | 2       | 2       | 2       | 1       | 1       |
| DSNGoH | 1       | 1       | 1       | 1       | 2       | 2       | 1       | MAWF; UN | 1       | 2       | 1       | 1       | 2       | 1       | 1       | 1       | 1       | 1       | 2       | 1       | 2       | 1       | 1       |
| DSNGoH | 1       | 1       | 1       | 1       | 2       | 2       | 1       | MAWF     | 1       | 1       | 1       | 1       | 2       | 1       | 1       | 1       | 1       | 1       | 2       | 1       | 2       | 1       | 1       |
| DSNGoH | 1       | 1       | 2       | 1       | 1       | 2       | 1       | MAWF     | 2       | 1       | 2       | 2       | 2       | 1       | 2       | 1       | 1       | 2       | 2       | 2       | 2       | 1       | 1       |
| DSNGoH | 1       | 1       | 1       | 1       | 2       | 2       | 1       | MAWF     | 1       | 2       | 1       | 1       | 2       | 1       | 1       | 1       | 1       | 1       | 2       | 1       | 2       | 1       | 1       |
| NEYO   | 1       | 1       | 1       | 2       | 1       | 1       | 1       | 1        | 1       | 1       | 1       | 1       | 1       | 1       | 1       | 1       | 1       | 1       | 1       | 1       | 1       | 1       | 1       |
| NEYO   | 1       | 1       | 1       | 1       | 1       | 1       | 1       | 1        | 1       | 1       | 1       | 1       |         | 1       | 1       | 1       | 1       | 1       | 1       | 1       | 1       | 1       | 1       |
| NEYO   | 1       | 1       | 1       | 1       | 1       | 1       | 1       | 1        | 1       | 1       | 1       | 1       | 1       | 1       | 1       | 1       | 1       | 1       | 1       | 1       | 1       | 1       | 1       |
| NEYO   | 1       | 1       | 1       | 1       | 1       | 1       | 1       | 1        | 1       | 1       | 1       | 1       | 1       | 1       | 1       | 1       | 1       | 1       | 1       | 1       | 1       | 1       | 1       |
| NEYO   | 1       | 1       | 1       | 2       | 1       | 2       | 1       | NEYO     | 1       | 2       | 1       | 1       | 1       | 1       | 1       | 1       | 1       | 1       | 2       | 1       | 2       | 1       | 1       |
| NEYO   | 1       | 1       | 1       | 2       | 1       | 2       | 1       | MAWF     | 1       | 1       | 1       | 1       | 1       | 1       | 1       | 1       | 1       | 1       | 1       | 1       | 1       | 1       | 1       |
| NEYO   | 1       | 1       | 1       | 2       | 1       | 2       | 1       | 1        | 1       | 1       | 1       | 1       | 1       | 1       | 2       | 1       | 1       | 1       | 1       | 1       | 1       | 1       | 1       |
| NEYO   | 1       | 2       | 1       | 2       | 1       | 2       | 1       | 1        | 1       | 1       | 1       | 2       | 1       | 1       | 2       | 1       | 1       | 1       | 2       | 1       | 2       | 1       | 1       |
| NEYO   | 1       | 1       | 1       | 2       | 1       | 2       | 1       | 1        | 1       | 1       | 1       | 2       | 2       | 1       | 2       | 1       | 2       | 1       | 1       | 1       | 2       | 1       | birds   |

|        | IP 59                                                                |
|--------|----------------------------------------------------------------------|
| GoH    | Lack of support from the Ministries and NGOs.                        |
| GoH    | manure cause if the soil is lack of fertilizer produce less          |
| DSNGoH | Kindly for the Ministry to bring us water supply close to the garden |
| DSNGoH | water supply is far from the garden                                  |
| DSNGoH | we did not get any help from the government                          |
| DSNGoH | Some community steal the net and put fire on the net                 |
| DSNGoH | The main supply for the water is too far                             |
| DSNGoH | water the main supply is too far                                     |
| DSNGoH | water supply is far from the garden                                  |
| NEYO   | 1                                                                    |
| NEYO   | ohatute noudjuu                                                      |
| NEYO   | 1                                                                    |
| NEYO   | 1                                                                    |
| NEYO   | birds and we the net surrounding the garden                          |
| NEYO   | financial problem                                                    |
| NEYO   | 1                                                                    |
| NEYO   | theft and deliver vehicle                                            |
| NEYO   | we do not have enough land and transport                             |
| NEYO   | there is a problem of theft and transport for manure                 |

|        | IP 60                                                                                                                                                                                 |
|--------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| GoH    | We need more support from the Ministries in terms of materials and exposures, marketing of product and also empower us by taking us or using us to train others at the rural villages |
| GoH    | More support in terms of materials seeds, fertilizer                                                                                                                                  |
| DSNGoH | For the Ministry to send us to the other garden in different region                                                                                                                   |
| DSNGoH | Kidly to tell the Ministry to send us to go and visit other garden from different region                                                                                              |
| DSNGoH | In moment we wantend to be given money at the end of month                                                                                                                            |
| DSNGoH | Just to tell the community that the garden its for them and it bring the development in their community                                                                               |
| DSNGoH | To the Ministry not to leaves us like that but to give us job to the other region                                                                                                     |
| DSNGoH | kindly for the ministry to look toward us and probably give us job                                                                                                                    |
| DSNGoH | the ministry to send us to other garden to gain more knowledge                                                                                                                        |
| NEYO   | 1                                                                                                                                                                                     |
| NEYO   |                                                                                                                                                                                       |
| NEYO   | 1                                                                                                                                                                                     |
| NEYO   | 1                                                                                                                                                                                     |
| NEYO   | we toughly you for knowledge we get from the training and we are going to use our knowledge to train our community members                                                            |
| NEYO   | we need help from the government to give us job in the government                                                                                                                     |
| NEYO   | 1                                                                                                                                                                                     |
| NEYO   | yes because we got knowledge of doing the plot                                                                                                                                        |
| NEYO   | the limited time of getting certificate. The transport for transporting our goods. We r not selling as a team. We need financial resource, support and shops to sell the crops        |
| NEYO   | we get more knowledge of how to prepare garden and give information of garden to our community to make their own garden to get profit and food                                        |

### **Appendix 3 – Interviews Windhoek**

#### **1. Interview with Agrigronamibia conducted on the 05.07.12**

Where do you get your seeds from?

*We are importing them from South Africa.*

Do you sell any local varieties?

*No.*

Are Agra and Starke Ayres selling seeds from other sources than South Africa?

*No.*

So, people can only buy seeds from South Africa in Windhoek and no local varieties?

*Yes. Namibia is not producing any seeds. We are totally dependent on the imports from South Africa.*

#### **2. Interview conducted with Mrs Moongela from City of Windhoek on the 02.08.2012**

Is urban agriculture part of the land use planning in Windhoek?

*No it is not. There are farming activities in Brakwater. But Brakwater is only part of the city of Windhoek since a couple of years. For the core city it is not part of the plans.*

So there is no policy on urban agriculture?

*No, there is no policy or law on it either.*

Are you aware of the fact that it is taking place in Windhoek?

*No I did not know.*

What would happen if someone comes and asks to do urban agriculture in Windhoek?

*That would be ok with us, as long as it is not in a high risk zone, like close to streets or something.*

Did someone come to ask?

*No. I think, that people prefer it if cultivation is taking part in the rural areas or peri-urban areas and then sold in the city.*

### 3. Questions asked during the work at MAWF in 2012

#### **Interview with Kanguvi, G. - Technical project coordinator Ministry of Agriculture, Water and Forestry**

##### Garden of Hope:

Who are the stakeholders from Garden of hope?

*The stakeholders are the Ministry of Youth, National service, Sports and Culture and the MAWF.*

What is the purpose of the project?

*The garden is mainly for training the rural youth in micro-gardening.*

How long did the development of the garden take?

*It took around two years, there were some financial problems occurring.*

Are they networking with other projects?

*Yes. With the After-school daycare center and Namgreen. They are training them.*

How did you support them?

*We built the garden with them, gave the some tools, seeds and manure.*

What do you think are the main problems?

*They do not do enough weeding and not taking care of it proper. They could use even more space but they do not.*

##### NEYO:

Who are the stakeholders in NEYO?

*The stakeholders are the MAWF and the AIDS care trust.*

How did the project develop?

*The AIDS Care trust started the project. They were planting vegetables in order to give the people coming to take their medicine something proper to eat. After a while no one took care of the garden anymore. Then NEYO decided to use the area and asked us if we could train them. Since then we are constantly training groups of around 30 to 60 people, mainly women. It took a couple of month to start with them. We train them and provided them with tools and seeds.*

Dr. Sam Nujoma Garden of Hope:

Who are the stakeholders in Dr. Sam Nujoma Garden of Hope?

*It is us, the Ministry of Regional and Local Government, Housing and Rural Development, the Ministry of Education and the Council. But they only show up at election time, like in the other gardens as well. Meanwhile we do all the work with them.*

How did the project evolve?

*In total the usable area would be 100m x 100m, it is all surrounded by fences already, but it is not levelled yet. To level it heavy machinery is needed. This could be provided either from the municipality or directly from a private company, mainly because of organizational and financial issues. The whole project was financed by the regional council and the Ministry of Education, they provided the land. We provided the infrastructure, including: cleaning and levelling of the area and putting manure. It took around two weeks. After that we started training them. We are helping them out and working together with them until today.*

*In the beginning the idea was to train school children in gardening. But then the garden needed to move due to constructions in 2010. It took us and the community around two months to build up this new plot. The objective then changed to the training of adults only. They should acquire knowledge about gardening in order to use it to grow crops in their own backyards. No children were allowed anymore. It seems to be better if the plot is just for training and the production just takes place in their backyards. They only work properly if someone is pushing them. If not, nothing is happening.*

In general:

What is the biggest problem in terms of land?

*The biggest problem is that suitable land for UA is insecure. I have seen many gardens vanishing, due to construction. Especially in Katutura space is the major concern.*

Where do the projects get their water from?

*It is supplied by the municipalities free of charge.*

How do you help the projects in Windhoek?

*Whenever someone or a group of people calls for our help, we help them where we can. Mainly during the installation process, but also in terms of weekly visits in order to maintain the garden and a constant training in proper gardening practices, pests, disease and weed control. As well as help with marketing including transport to the market. Additionally, help with community issues are offered. We also supply seeds supply and help them planting.*

Where do you get the fertilizer from?

*We buy it at Meatco's Feedlot at Okapuka.*

What is the overall ma management purpose in Windhoek?

*It is to reduce poverty and hunger by a daily availability of fresh vegetables for home consumption and the generation of income. Especially important is to increase food security of the most vulnerable members and people living with HIV / AIDS.*

#### **Interview with Shilunga, P. - National Project Coordinator Ministry of Agriculture, Water and Forestry**

What is the legal status of UA in Namibia?

*In general there is no policy or law in Namibia concerning UA and UAP. But, the agriculture policy and the green screen policy can be applied.*

*We are currently busy working on the legalization of UAP and UA in Namibia. We try to communicate the need of UAP, especially to the city of Windhoek, so that they consider spaces within the city planning already, but so far the communication failed.*

#### **Interview with Sánchez, R. – Plant Protection Expert Ministry of Agriculture, Water and Forestry:**

Which pests are occurring in the gardens in Windhoek?

The main pests in the UAP in Windhoek are: the genius Aphis, Fruit Fly, Thrips and Lepidopteras (Cutworm). In terms of Fungi, the main species are: Rhizotornia, Sclerotium, Alternaria, Cercospora, Collecthotricum and Fusarium (soil).

We are controlling this pest and fungi mainly with: Cupriflow, Oscar, Amistar and Iprodione.

#### Appendix 4 – Data Species Windhoek

| Scientific Name                    | English Name           | NEYO | Dr. Sam Nujoma garden of hope | Garden of Hope | Native | Invasive |
|------------------------------------|------------------------|------|-------------------------------|----------------|--------|----------|
| Amaranthus                         | Amaranth/Ekwakwa       |      |                               | 1              | X      |          |
| Argemone ochroleuca                | White-flowered Mexican | 1    | 1                             | 1              |        | X        |
| Berchemia discolor                 |                        | 1    |                               |                | X      |          |
| Brasil - Emily                     |                        |      |                               | 1              |        |          |
| Broccoli - STAR 2207               |                        |      | 1                             |                |        |          |
| Carbbage – Copenhagen market       |                        | 1    |                               | 1              |        |          |
| Carbbage - Drumhead                |                        | 1    | 1                             |                |        |          |
| Carbbage – glory of Enkhuizen      |                        | 1    |                               |                |        |          |
| Carrot - Kuroda                    |                        | 1    | 1                             | 1              |        |          |
| Cauliflower - STAR 4419            |                        |      | 1                             | 1              |        |          |
| Celery - Tall Utah                 |                        |      |                               | 1              |        |          |
| Citrus                             |                        | 1    |                               | 1              |        |          |
| Citrus paradisi                    | Grape fruit            | 1    |                               |                |        |          |
| Dodonea viscosa                    | Sand olive             | 1    |                               |                |        |          |
| Eggplant - Black King              |                        |      | 1                             |                |        |          |
| Fragaria                           | Strawberry             |      |                               | 1              |        |          |
| Garden beetroot – Detroit dark red |                        | 1    | 1                             | 1              |        |          |
| Laggera decurrens                  | Bitter bush            |      |                               | 1              | X      |          |
| Lettuce – eish pelleted            |                        | 1    | 1                             |                |        |          |
| Lettuce – great lakes              |                        |      | 1                             |                |        |          |
| Leucaena leucocephala              | Leucaena               | 1    |                               |                |        | X        |
| Mangifera indica                   |                        |      |                               | 1              |        |          |
| Musa acuminata × balbisiana        |                        |      |                               | 1              |        |          |
| Onion – grano select               |                        | 1    | 1                             | 1              |        |          |
| Oxalis species                     | clover                 |      |                               | 1              |        | X        |
| Parsley – Italien giant            |                        | 1    | 1                             |                |        |          |
| Pepper – California wonder         |                        | 1    | 1                             | 1              |        |          |
| Pepper – cayenne long slim         |                        |      | 1                             |                |        |          |
| Psidium guajava                    |                        |      |                               | 1              |        | X        |
| Radish-Comet                       |                        |      |                               | 1              |        |          |
| Schinus terebinthifolius           | Brazilian pepper tree  |      |                               | 1              |        | X        |
| Sclerocarya birrea                 | Marula                 | 1    |                               |                | X      |          |
| Spring onion - Slender star        |                        |      |                               | 1              |        |          |
| Sweet corn - Gladiator             |                        | 1    | 1                             | 1              |        |          |
| Swiss chard – ford hook giant      |                        | 1    | 1                             | 1              |        |          |
| Tomato - rodade                    |                        | 1    | 1                             | 1              |        |          |
| Watermelon – crimson sweet         |                        | 1    |                               |                |        |          |

Two species could not be identified

## Appendix 5 – Interview Berlin Spreegarten

How did the project develop?

*The area was used by a beach bar before. In 2011 it was brought off by a “Baugenossenschaft”. Their goal was that it remains access able for the public. They did a call for proposals. One person submitted the idea of starting a garden. The proposal won and he send E-Mails to his friends, asking who wants to join. A so called Snowball principle developed and the group emerged.*

*The gardening group did not exist before. It is not a community garden, more a group of people who wants to do gardening.*

*It was decided to do raised bed because it was an industrial area before. We decided that there needs to be space for a wheelbarrow. Afterwards everyone started building their own plot. The initiator ordered soil from the surrounding area. It is no biological soil.*

Are you in contact with other gardening groups?

*Not really, but some of us are part of other projects as well.*

How would you describe the group?

*It is a homogenous group of around 20 people. Most of them are between 20 and 40 years old and belong to the academic middle class. There is no hierarchical group structure. We are not rally in contact with each other, if, only via mailing lists.*

Where do the gardeners mainly come from?

*Two have a Turkish migration background, other than that we are mainly Germans.*

Do you have any problems?

*Sometimes some vegetables get stolen. A building opposite the garden is planned this will seriously affect the attractiveness of the garden and is a reason for some people to stop participating in the project.*

Why do the people in your group do gardening?

*Just for fun. They want to know how things are growing.*

Where do you get your water from?

*First we only used Spree water. It was quite exhausting especially in the summer month. After a while we all put money together and invested in a pump. Now we are still using the Spree water but the way to get it is much easier.*

Do you have tools?

*Yes some, people brought them.*

What kinds of seeds are used in the garden and where do they come from?

*We do not have any guidelines or something. Biological seeds are not a must.*

*I think some people are keeping them from the last harvest and others by them in the supermarket.*

Do you have problems with pests?

*Yes, mainly with aphids. But I think no one is using chemical pesticides. Some are using organic ones, like stinging nettle brews.*

Are you using fertilizer?

*Yes stinging nettle sewage.*

Do you sell your produce?

*No.*

## **Appendix 6 – Interview Berlin Rosa Rose**

Are there more men or woman working in the project?

*Definitely more women than men.*

Do you network with other gardens?

*Yes, mainly with Ton, Steine, Gärten, Prinzessinengärten, Laskerwiesen and Tempelhoferfeld. For example in terms of organizing transport and distribution of peat together.*

How do you communicate within the project?

*Communication and information exchange takes place via mailing lists.*

Where do you get your tools from?

*The tools are either form members or gifts.*

Where do you get your seeds from?

*Some of us get them from cooperatives like: social seeds. Other gardeners are also buying their seeds from the supermarket, exchange them with families and friends or keep them from the last harvest.*

Did you receive professional advice while starting the project?

*No, but we worked together with an independent neighbourhood initiative. In terms of work power, access to water and a place where they could log up their tools.*

Do you have problems with pest? If yes, what do you do against them?

*We mainly have problems with slugs. We are not using chemical pesticides in the garden but it I cannot speak for everyone.*

Are you using fertilizer? If yes, where do you get it from?

*We are using horse manure, guinea pig manure, stinging nettle swill and compost. We either produce it ourselves, get them as a donation or buy it in a shop.*

Do you sell your produce?

*No.*

## **Appendix 7 – Interview Berlin Bunte Beete**

Are there more men or woman working in the project?

*Like in all the projects in Berlin, definitely more woman.*

Which background do the gardeners have?

*I would say there is someone from every social class. We are mainly people from the community. The community is a mix of cultures, so are we.*

On you blog you indicated that the garden received EU-funding. How?

*The area of the school belongs to the Senate Department for Education, Youth and Sport. The received money for the redevelopment of the area in order to contribute to the ecological release. They gave us some for soil, tool and fruit trees.*

*We have a contract with the Senate Department for Education, Youth and Sport, but our partner is the school. We do not pay rent but we are working at the school grounds as well.*

Are you networking with other projects?

*You can say that we were the pioneers. We helped a lot of other projects to develop.*

Is the media interested in the garden?

*It is amazing. We receive request from newspapers, television and students.*

Where do you get your seeds from?

*We acquire them from various sources. Some bring them from their home countries or from holidays. Other by them at supermarkets; get them from botanical gardens or via contacts to other gardeners in Germany.*

How do you communicate, via mailing lists?

*You no some of us are quite old. So we normally just meet in the garden and talk.*

Do you sell your produce?

*No.*

Do you have some problems?

*Not really. Ones in a while someone vegetables get stolen, but apart from this nothing really.*

## Appendix 8 – Data Species Berlin

| English Name          | German Name                         | Latin Name                                   | Family             | Spreegarten | Rosa Rose | Rote Beete | Invasive | Native |
|-----------------------|-------------------------------------|----------------------------------------------|--------------------|-------------|-----------|------------|----------|--------|
| Alpine currant        | Johannisbeere                       | Ribes alpinum                                | Grossulariaceae    |             |           | 1          |          | 1      |
| American Marigold     | Amerikanische Ringelblume           | Tagetes erecta                               | Asteraceae         |             |           | 1          |          |        |
| Apple tree            | Apfelbaum                           | Malus domestica                              | Rosaceae           |             |           | 1          |          |        |
| Arugula               | Ruccula                             | Eruca sativa                                 | Brassicaceae       | 1           |           | 1          |          |        |
| Asters                | kurzstielige Herbstastern           | Aster alpinus L.                             | Asteraceae         |             |           | 1          |          | 1      |
| Basil                 | Basilikum                           | Ocimum basilicum                             | Lamiaceae          | 1           | 1         | 1          |          |        |
| Beam tree             | Gewöhnliche Meltbeere               | Sorbus aria                                  | Rosaceae           |             |           | 1          |          | 1      |
| Beetroot              | Rotebeete                           | Beta vulgaris                                | Amaranthaceae      | 1           | 1         |            |          |        |
| Birdseed              | Breit-Wegerich                      | Plantago major                               | Plantaginaceae     |             | 1         |            |          | 1      |
| Black bean            | Schwarze Bohnen                     |                                              |                    |             |           | 1          |          |        |
| Black currant         | Schwarze Johannisbeere              | Ribes nigrum                                 | Grossulariaceae    |             | 1         | 1          |          |        |
| Black mulberry        | Schwarze Maulbeere                  | Morus nigra                                  | Moraceae           |             |           | 1          |          |        |
| Blackberry            | Brombeere                           | Rubus fruticosus                             | Rosaceae           |             |           | 1          |          |        |
| Boar thistle          | Gänsedestel                         | Sonchus arvensis subsp. arvensis L.          | Asteraceae         | 1           |           |            |          | 1      |
| Borage                | Borretsch                           | Borago officinalis                           | Boraginaceae       |             | 1         |            |          |        |
| Bol tree              | Buchsbaum                           | Bulus                                        | Bulaceae           |             | 1         |            |          | 1      |
| Broad-leaf (plantain) | Breit Wegerich                      | Plantago major                               | Plantaginaceae     | 1           |           |            |          | 1      |
| Brussel sprout        | Rosekohl                            | Brassica oleracea                            | Brassicaceae       |             |           | 1          |          | 1      |
| Bush vetch            | Zaun-Wicke                          | Vicia sepium L.                              | Fabaceae           |             | 1         |            |          | 1      |
| Butter cup            | Butterblume/ Sumpfdotterblume       | Caltha palustris                             | Ranunculaceae      |             |           | 1          |          | 1      |
| Camomile              | Kamille (Bodegold)                  | Matricaria chamomilla                        | Asteraceae         |             | 1         |            |          |        |
| Carrot                | Möhre                               | Daucus carota ssp. Sativus                   | Apiaceae           | 1           | 1         | 1          |          |        |
| Catswort              | Katzenminze                         | Nepeta cataria                               | Lamiaceae          | 1           |           |            |          |        |
| Chard                 | Mangold                             | Beta vulgaris cicla                          | Amaranthaceae      | 1           | 1         |            |          |        |
| Chard (red)           | Mangold (rot)                       | Beta vulgaris cicla                          | Amaranthaceae      |             |           | 1          |          |        |
| Chard (yellow)        | Mangold (gelb)                      | Beta vulgaris cicla                          | Amaranthaceae      |             |           | 1          |          |        |
| Cherry                | Kirsche                             | Prunus padus                                 | Rosaceae           |             | 1         |            |          | 1      |
| Chestnut              | Kastanie                            | Castanea dentata                             | Fagaceae           |             |           | 1          |          |        |
| Chili                 | Chili                               | Capsicum annum L. and Capsicum frutescens L. | Solanaceae         |             | 1         | 1          |          |        |
| Chives                | Schnittlauch                        | Allium schoenoprasum                         | Amaryllidaceae     | 1           | 1         |            |          |        |
| Chrysanthemum         | Wucherblume                         | Chrysanthemum carinatum                      | Asteraceae         |             | 1         |            |          |        |
| Clover                | Klee                                | Trifolium dubium Sibth                       | Fabaceae           |             | 1         | 1          |          | 1      |
| Common grape vine     | Wein                                | Vitis vinifera subsp. Sylvestris             | Vitaceae           |             | 1         | 1          |          | 1      |
| Common honeysuckle    | Wald Heckenkirsche                  | Lonicera periclymenum L.                     | Caprifoliaceae     |             |           | 1          |          | 1      |
| Common ivy            | Gemeiner Efeu                       | Hedera helix L.                              | Araliaceae         |             |           | 1          |          | 1      |
| Compact dock          | Rispen Fuchsschwanz                 | Rumex thyrsiflorus                           | Polygonaceae       | 1           |           |            |          |        |
| Corn                  | Mais                                | Zea mays                                     | Poaceae            |             | 1         | 1          |          |        |
| Corn buttercup        | Acker Hahnenfuß                     | Ranunculus arvensis                          | Ranunculaceae      | 1           |           |            |          |        |
| Cornel cherry         | Kornelkirsche ein Hartriegelgewächs | Cornus mas                                   | Cornaceae          |             |           | 1          |          |        |
| Cornflower            | Kronblume                           | Centaurea cyanus                             | Asteraceae         | 1           |           |            |          |        |
| Cottonwood tree       | Pappel                              | Populus                                      | Salicaceae         |             |           | 1          |          |        |
| Cramp bark            | Gemeiner Schneeball                 | Viburnum opulus                              | Adolaceae          |             |           | 1          |          | 1      |
| Creeping salibush     | Spieß Melde                         | Atriplex hastata                             | Ranunculus ficaria | 1           |           |            |          | 1      |

| English Name            | German Name                | Latin Name                      | Family         | Spreegarten | Rosa Rose | Rote Beete | Invasive | Native |
|-------------------------|----------------------------|---------------------------------|----------------|-------------|-----------|------------|----------|--------|
| Dahlia                  | Dahlie Georgine – Dahlie   | Dahlia                          | Asteraceae     |             |           | 1          |          |        |
| Daisy                   | Gänseblümchen              | Bellis perennis                 | Asteraceae     |             | 1         |            |          |        |
| Dandelion               | Löwenzahn                  | Taraxacum officinale            | Asteraceae     | 1           | 1         |            |          |        |
| Dill                    | Dill                       | Anethum graveolens              | Apiaceae       | 1           | 1         | 1          |          |        |
| Dog rose                | Hagebutte                  | Rosa canina                     | Rosaceae       |             | 1         | 1          |          | 1      |
| Echinacea maii sunshine | gelb goldener sonnenhut    | Rudbeckia hirta L.              | Asteraceae     |             |           | 1          |          |        |
| Eggplant                | Aubergine                  | Solanum melongena               | Solanaceae     |             | 1         | 1          |          |        |
| Elderberry              | Holunder                   | Sambucus                        | Adolaceae      |             |           | 1          |          | 1      |
| Escallion               | Lauchzwiebel               | Allium fistulosum               | Amaryllidaceae |             |           | 1          |          |        |
| Firethorn               | Feuerdorn                  | Pyracantha                      | Rosaceae       |             |           | 1          |          |        |
| Gaillardia              | Kokardenblume              | Gaillardia aristata             | Asteraceae     |             | 1         |            |          |        |
| Garden cosmos           | Schmuckkörbchen            | Cosmos bipinatus                | Asteraceae     | 1           |           | 1          |          |        |
| Garden lupin            | Vielblättrige Lupinie      | Lupinus polyphylus              | Fabaceae       |             | 1         |            |          |        |
| Garden nightshade       | Schwarzer Nachtschatten    | Solanum Nigrum                  | Solanaceae     | 1           |           |            |          |        |
| Garden patience         | Großer Ampfer              | Rumex patientia                 | Polygonaceae   |             | 1         |            |          |        |
| Garlic mustard          | Knoblauchsrauke            | Alliaria petiolata              | Brassicaceae   |             |           | 1          |          | 1      |
| Glossy-leaved orache    | Glanz-Melde                | Atriplex sagittata Borkh.       | Amaranthaceae  | 1           | 1         | 1          |          |        |
| European goldenrod      | Gewöhnliche Goldrute       | Solidago virgaurea L.           | Asteraceae     |             | 1         |            |          | 1      |
| Good King Henry         | Guter Heinrich             | Chenopodium bonus-henricus      | Amaranthaceae  |             |           | 1          |          |        |
| Grasses                 | Gräser                     |                                 |                |             | 1         |            |          |        |
| Green cabbage           | Grünkohl                   | Brassica oleracea var. capitata | Brassicaceae   |             | 1         |            |          |        |
| Ground ivy              | Gundermann                 | Glechoma hederacea              | Lamiaceae      |             |           | 1          |          |        |
| Hasel nut tree          | Blutahorn                  | Corylus malina Purpurea         | Betulaceae     | 1           |           |            |          |        |
| Hawk's-beard            | Wiesen-Pippau              | Crepis biennis                  | Asteraceae     |             |           | 1          |          |        |
| Hasel nut bush          | Gemeiner Haselnußstrauch   | Corylus avellana                | Betulaceae     |             |           | 1          |          | 1      |
| Hibiscus                | Hibiscus                   | Hibiscus mutabilis              | Malvaceae      |             | 1         |            |          |        |
| Hokkaido pumpkin        | Hokkaido Kürbis            | Cucurbita maxima                | Cucurbitaceae  |             |           | 1          |          |        |
| Honeydew (melon)        | Honigmelone                | Cucumis melo                    | Cucurbitaceae  |             |           | 1          |          |        |
| Huckleberry             | Schwarzbeere               | Solanum scabrum                 |                |             |           | 1          |          |        |
| Hybrid plane            | Ahornblättrige Platane     | Platanus hispanica              | Platanaceae    |             |           | 1          |          |        |
| Iris                    | Schwertlilie               | genus Iris                      | Iridaceae      |             | 1         |            |          |        |
| Lavender                | Lavendel                   | Lavandula angustifolia          | Lamiaceae      |             | 1         |            |          |        |
| Lemon balm              | Zitronenmelisse            | Melissa officinalis             | Lamiaceae      | 1           | 1         |            |          |        |
| Lemon Gem               | Gewürztagetes              | Tagetes tenuifolia              | Asteraceae     |             | 1         |            |          |        |
| Lilac tumip cabbage     | Lila Kohlrabi              | Brassica oleracea               | Brassicaceae   |             |           | 1          |          |        |
| Lollo Rosso             | Lollo Rosso                | Lactuca sativa var. crispa      | Asteraceae     |             |           | 1          |          |        |
| Mache                   | Feldsalat                  | Valerianella locusta            | Caprifoliaceae | 1           | 1         |            |          |        |
| Malva                   | Malve                      | Malva sylvestris                | Malvaceae      | 1           | 1         |            |          |        |
| Marguerite              | Wiesen-Margerite           | Leucanthemum vulgare            | Asteraceae     |             | 1         | 1          |          | 1      |
| Marigold                | Garten Ringelblume         | Calendula officinalis           | Asteraceae     |             | 1         | 1          |          |        |
| Moss                    | Moos                       |                                 |                |             | 1         |            |          |        |
| Nasturtium              | Kapuziner kresse           | Tropaeolum majus                | Tropaeolaceae  |             | 1         |            |          |        |
| Oblong-leaf orache      | Langblättrige Melde        | Atriplex oblongifolia           | Amaranthaceae  |             | 1         |            |          |        |
| Oleander                | Oleander                   | Nerium oleander                 | Apocynaceae    |             | 1         |            |          |        |
| Onion                   | Zwiebeln                   | Allium cepa                     | Amaryllidaceae |             | 1         |            |          |        |
| Oregon-grape (tall)     | Stechdornblättrige Mahonie | Mahonia aquifolium              | Berberidaceae  |             |           | 1          |          |        |

| English Name        | German Name                     | Latin Name                                                         | Family            | Spreegarten | Rosa Rose | Rote Beete | Invasive | Native |
|---------------------|---------------------------------|--------------------------------------------------------------------|-------------------|-------------|-----------|------------|----------|--------|
| Paprika             | Paprika                         | <i>Capsicum annuum</i> var. <i>argulosum</i> Mill.                 | Apiaceae          | 1           | 1         |            |          |        |
| Parsley             | Petersilie                      | <i>Petroselinum crispum</i>                                        | Apiaceae          | 1           | 1         | 1          |          |        |
| Peach tree          | Pfirsichbaum                    | <i>Prunus persica</i>                                              | Rosaceae          |             | 1         | 1          |          |        |
| Peppermint          | Minze                           | <i>Mentha piperita</i>                                             | Lamiaceae         | 1           | 1         | 1          |          |        |
| Phlox               | Flammenblume                    | <i>Phlox paniculata</i> L.                                         | Polemoniaceae     |             | 1         |            |          |        |
| Physalis            | Physalis                        | <i>Physalis peruviana</i>                                          | Solanaceae        |             |           | 1          |          |        |
| Pieplant            | Rhabarber                       | <i>Rheum rhabarbarum</i>                                           | Polygonaceae      |             | 1         | 1          |          |        |
| Pilewort            | Scharbockskraut                 | <i>Ranunculus ficaria</i>                                          | Ranunculaceae     |             |           | 1          |          |        |
| Plum                | Zierpflaume                     | <i>Prunus cerasifera</i> Atropurpurea                              | Rosaceae          |             | 1         |            |          |        |
| Pomegranate         | Granatapfel                     | <i>Punica granatum</i>                                             | Lythraceae        |             | 1         |            |          |        |
| Pumpkin             | Kürbis                          | <i>Cucurbita maxima</i>                                            | Cucurbitaceae     | 1           | 1         |            |          |        |
| Radish              | Radieschen                      | <i>Raphanus sativus</i>                                            | Brassicaceae      | 1           | 1         | 1          |          |        |
| Raspberry           | Himbeeren                       | <i>Rubus idaeus</i>                                                | Rosaceae          | 1           |           |            |          | 1      |
| Red Bean            | rote Bohne                      |                                                                    | Tribus Phaseoleae |             |           | 1          |          |        |
| Red poppy           | Roter Mohn                      | <i>Papaver rhoeas</i>                                              | Papaveraceae      |             | 1         | 1          |          |        |
| Rosemary            | Rosmarin                        | <i>Rosmarinus officinalis</i>                                      | Lamiaceae         |             | 1         | 1          |          |        |
| Round zucchini      | Runde Zucchini                  | <i>Cucurbita pepo</i>                                              | Cucurbitaceae     |             |           | 1          |          |        |
| Rowan               | Vogelbeere                      | <i>Sorbus aucuparia</i>                                            | Rosaceae          |             | 1         |            |          | 1      |
| Sage                | Salbei                          | <i>Salvia officinalis</i> , spp.                                   | Lamiaceae         |             | 1         | 1          |          |        |
| Sanicle (wood)      | Wald Sanikel                    | <i>Sanicula europaea</i>                                           | Apiaceae          |             |           | 1          |          |        |
| Sedum               | Fettherne                       | <i>Sedum album</i> L.                                              | Crassulaceae      |             |           | 1          |          | 1      |
| Shepherd's purse    | Hirtentäschel                   | <i>Capsella</i>                                                    | Brassicaceae      |             | 1         |            |          |        |
| Sorrel              | Sauerampfer                     | <i>Rumex acetosa</i> L.                                            | Polygonaceae      |             | 1         | 1          |          |        |
| Spinache            | Spinat                          | <i>Spinacia oleracea</i>                                           | Amaranthaceae     | 1           | 1         | 1          |          |        |
| Spring onion        | Frühlingszwiebel                | <i>Allium fistulosum</i>                                           | Amaryllidaceae    | 1           |           |            |          |        |
| Stinging nettle     | Brennnessel                     | <i>Urtica dioica</i>                                               | Urticaceae        | 1           | 1         |            |          |        |
| Strawberry          | Erdbeere                        | <i>Fragaria ananassa</i>                                           | Rosaceae          | 1           | 1         | 1          |          |        |
| String beans        | Grüne Bohnen                    | <i>Phaseolus vulgaris</i>                                          | Fabaceae          | 1           | 1         | 1          |          |        |
| Sugar beet          | Branderburger Rübe / Zuckerrübe | <i>Beta vulgaris</i> subsp. <i>vulgaris</i>                        | Amaranthaceae     |             | 1         |            |          |        |
| Sugar snaps         | Zuckerschoten                   | <i>Pisum sativum</i> subsp. <i>sativum</i> convar. <i>aliphium</i> | Fabaceae          |             |           | 1          |          |        |
| Summer lilac        | Schmetterlingsflieder           | <i>Buddleja davidii</i>                                            | Scrophulariaceae  | 1           | 1         | 1          |          |        |
| Sunflower           | Sonnenblume                     | <i>Helianthus annuus</i>                                           | Asteraceae        | 1           | 1         | 1          |          |        |
| Sweet chestnut      | Esskastanie                     | <i>Castanea sativa</i>                                             | Fagaceae          |             |           | 1          |          |        |
| Sweet William       | Bartnelke (rot)                 | <i>Dianthus barbatus</i>                                           | Caryophyllaceae   |             | 1         |            |          |        |
| Thistle             | Disteln                         | <i>Cirsium vulgare</i>                                             | Asteraceae        | 1           |           |            |          | 1      |
| Thorn apple         | Stechapfel                      | <i>Genus datura</i>                                                | Solanaceae        |             |           | 1          |          |        |
| Thyme               | Thymian                         | <i>Thymus vulgaris</i>                                             | Lamiaceae         |             | 1         |            |          |        |
| Tomato              | Tomate                          | <i>Lycopersicon esculentum</i>                                     | Solanaceae        | 1           | 1         | 1          |          |        |
| Tufted Sedge        | Steife Segge                    | <i>Carex elata</i> All.                                            | Cyperaceae        |             | 1         |            |          | 1      |
| Treacle wallflower  | Acker-Schötchen                 | <i>Erysimum cheiranthoides</i>                                     | Brassicaceae      |             | 1         |            |          | 1      |
| Tump cabbage        | Kohlrabi                        | <i>Brassica oleracea</i> spp.                                      | Brassicaceae      | 1           | 1         |            |          |        |
| Tumips              | Herbstrübe                      | <i>Brassica rapa</i> subsp. <i>rapa</i>                            | Brassicaceae      |             | 1         |            |          |        |
| Wartburg star       | Frühsommer Aster                | <i>Aster tongolensis</i>                                           |                   |             |           | 1          |          |        |
| White campion       | Weißer Nachtkelch               | <i>Silene latifolia</i> alba                                       | Caryophyllaceae   |             |           | 1          |          |        |
| White forget-me-not | Hain-Vergissmeinnicht           | <i>Myosotis nemorosa</i> Besser                                    | Boraginaceae      |             | 1         |            |          | 1      |
| White goosefoot     | Weißer Gänsefuß                 | <i>Chenopodium album</i> L.                                        | Chenopodium       |             | 1         |            |          | 1      |
| Woodruff            | Waldmeister                     | <i>Galium odoratum</i>                                             | Rubiaceae         |             |           | 1          |          |        |
| Yarrow (common)     | Schafgarbe                      | <i>Achillea millefolium</i> L.                                     | Asteraceae        |             | 1         | 1          |          | 1      |
| Zucchini            | Zucchini                        | <i>Cucurbita pepo</i>                                              | Cucurbitaceae     | 1           | 1         | 1          |          |        |