



Review of Garden Based Production Activities For Food Security in Zimbabwe

A Study for the Food and Agriculture Organisation
Working Group on Gardens
Zimbabwe

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List of Abbreviations

ACWG	Agriculture Coordination Working Group
AGRITEX	Agricultural Extension Services
AIDS	Acquired Immuno Deficiency Syndrome
AREX	Agricultural Research and Extension
CADEC	Catholic Development Trust
CAFOD	Catholic Foundation of Overseas Development
COSV	Italian Solidarity in the World
CRS	Catholic Relief Services
CTDT	Community Technology Development Trust
DACHICARE	Danai Childcare Organization
DFID	Department for International Development
DTC	Development Technology Center
ECHO	European Commission Humanitarian Aid Office
EU	European Union
FAO	Food and Agriculture Organization
FAVCO	Fruit and Vegetable Company
FCTZ	Farm Community Trust Zimbabwe
FOSENET	Food Security Network
FOST	Farm Orphan Trust
GTZ	German Technical Cooperation of Experts
GWG	Gardens Working Group
HIV	Human Immuno Deficiency Syndrome
HPC	Horticultural Promotion Council
HRC	Horticultural Research Center
IDE	International Development Enterprises
LEAD	Linkages for the Economic Advancement of the Disadvantaged
M&E	Monitoring and evaluation
MOA	Ministry of Agriculture
MOE	Ministry of Education
MOH	Ministry Of Health
NANGO	National Association of Non-governmental Organizations
NFN	Natural Farming Network
NGO	Non-governmental organization
NR	Natural Region V
NTS	National Tested Seeds
OPV	Open Pollinated Varieties
OVC	Orphans and Vulnerable Children
PLWA	People Living With Aids
RUDO	Rural Unity for Development Organization
SAFIRE	Southern Alliance for Indigenous Resources
SCC	Swedish Cooperative Centre
SRHBC	Seke Rural Home Based Care
UN	United Nations
UNICEF	United Nations Children's Fund
USAID	United States Agency for International Development
UZ	University of Zimbabwe
WVI	World Vision International
ZWB	Zimbabwe women's bureau

EXECUTIVE SUMMARY

Gardening activities have a long history of implementation in the country. Recently, they have received more recognition of their importance and support from donors and other institutions, particularly as the effects of HIV/AIDS and consequent malnutrition have become more apparent.

This review of garden based activities in Zimbabwe was commissioned by the FAO/NGO/MOA Gardens Working Group (GWG). It involved desk studies, interviews and Case Studies. An inventory of the institutions supporting garden activities (Annex 2), a bibliography of garden related resource materials (Annex 3) and four Case Studies (Annex 4) are presented. The review is intended to form the basis for exchange of experiences and learning, improve the understanding of appropriate gardening interventions, and assist in planning for broader and more detailed studies.

The potential to improve household, community and national food and nutrition security through garden activities is high if issues of water availability, cost and availability of inputs, marketing, and farmer empowerment can be addressed. Most institutions have been supporting software (training) and recurrent (inputs and equipment) aspects of garden production, with limited support to hardware (dams, boreholes etc).

The major issues identified during the study included lack of a repository of knowledge for information on gardens and resource restrictions at both support organizational and farmer levels. Issues of beneficiary targeting, appropriateness of support and sustainability were also highlighted.

The following recommendations were made on the basis of the review findings:

Establishing a Knowledge-Base for Garden Activities

Using the Inventory and Bibliography databases developed as part of this review, it is recommended to establish a Knowledge Base for garden activities in the form of comprehensive electronic databases of support activities and another for research, extension and production information (resource materials). Existing data bases in FAO and other institutions in or outside the GWG could be used as the basis for formulating the proposed. In the interim, responsibility for collection, storage, analysis and dissemination of information and coordination of garden support activities should be vested in the GWG and copies of the same should be kept at AREX. In tandem, AREX should be capacitated to manage and maintain the data bases. Institutions supporting gardening activities should consciously involve AREX at all levels in all stages of implementation.

Water development and holistic programs

Greater emphasis be placed on water development and that support institutions should work together and prioritise the provision of “hardware” requirements of gardens, invest in water-harvesting and extraction technologies such as small dams construction, borehole drilling and sand abstraction, and to adopt a livelihoods (holistic) approach to support programmes. Given the water shortage constraints faced by most communities, drip kits offer great promise. Logically, the simpler the technology, and the easier it is to repair and maintain the equipment, the better. It is also recommended that a practical research study to compare the competing types of drip kits and determine the most suitable under smallholder conditions be commissioned as well. Some “Best Bet” technologies involving user friendly water extraction technologies like manual pumps driven by rotary action and windmills could be used and would be beneficial especially to those of lesser physical strength such as women, children, the elderly, and the chronically ill..

Crop production and protection

Crop production and protection information, particularly information on low input cost techniques and alternative methods of pest and diseases control needs to be readily available to support staff and farmers. Low cost production and protection methods like permaculture and Integrated Pest Management (IPM) should be promoted. In the same vein, information on the properties of herbs should also be made readily available, and that unfounded claims on medicinal properties, particularly curative properties for HIV/AIDS are discouraged. It is recommended that the GWG commission the collation of accurate information on herbs and the production of a manual on the production, processing, uses and proven qualities of herbs. Sweet potatoes offer an excellent source of nutrients from both tubers and leaves. Pathogen free and high yielding varieties are available in the country and should be included in the gardens.

Production guidelines/training manuals and extension

Albeit at a high cost, it is recommended that GWG commissions the preparation of relevant guidelines/manuals/pamphlets for the different levels (Extension staff, farmers and other interested parties) based on known best practices. Some of the materials could be translated into the main dialects for distribution to farmers. AREX in consultation with other stakeholders and with adequate resources should be the leading player in preparation and distribution of the materials. In terms of extension, it is paramount that AREX staff who are non-horticulturist be trained to improve their capacity to support farmers. The use of proven extension techniques of on-farm methods and result demonstrations can be employed. Lead/contact farmers can be used as focal points for these demonstrations. These could be used in the context of Farmer Field Schools, Junior Farmer Field Schools, Associations, or other mechanisms that bring people of common interest and goals together.

Beneficiary targeting

It is recommended that a number of basic steps including a clear definition of the purpose of the support and the target group, a comparison of the resources available to the target group against the resources needed to effectively implement the programme, and the necessity of providing the missing ingredients be taken to ensure effective implementation. It is paramount to use targeting indicators that are relevant to the purpose of the support and the target group. Poverty is the single most relevant factor in assessing vulnerability, and it follows that poverty/wealth indicators are the most efficient way of identifying vulnerability.

Farmer owned research

It is recommended that the GWG could consider farmer owned research initiatives identified during the review and encourage members and other support organizations to use them as they foster ownership and sustainability.

Garden Fencing

Live fencing technologies be supported and additional research effort be put into improving their effectiveness for garden protection. A number of “Best Bet” technologies involving woodlot nurseries (for fencing poles and reduce pressure on the environment), agro forestry gardens (including fruit trees) and other labour saving innovations could be used.

Input Supplies

The GWG should encourage the use of voucher systems for inputs acquisition amongst all support institutions in order to support local agro-dealers and create sustainability. There is need therefore for information on modalities of the system to be disseminated widely.

Sustainability

Sustainability considerations should be evident in the planning stages of an intervention programme, as well as being an important aspect of impact evaluation. Some tried and tested methodologies like the Sustainframe can be used to assess sustainability.

1. Introduction

Gardening activities (self-supporting or externally supported) have a long history of implementation in the country. Before they were recognized as sources of income, gardening activities were considered as women's activities and did not attract much attention. However, as the socio-economic environment changed, perceptions changed and gardens became an economic powerhouse. By the year 2002, about 28500ha, were estimated to be under horticulture production (*This figure seems to include only those gardens that were either registered with HPC or had some market gardening component. The small gardens and others not involved in marketing could have been excluded*). Of this hectareage, 1000ha was planted to flowers, 2500ha to deciduous fruits, 10 000ha to vegetables and 15000ha to citrus fruits (HPC, 2002). As their contribution to the economic well being of households and the nation increased more and more interest in gardens was generated and institutional support to gardening activities improved and increased. The drastic effects of HIV/AIDS and the desire to mitigate the effects of the pandemic resulted in increased interest in gardens as well.

All types of crops including flowers, grain, fruits, vegetables and herbs can be produced in gardens; hence they have the potential to provide all that entails food and nutrition security. They facilitate dietary diversification so long as all other inputs like fertilizer, manure, chemicals, labour, information, and production expertise are available.

Institutions have been reported to support garden production activities in various ways and increased support has been noted in the recent past. While it is commendable that support is increasing, it is necessary that a common understanding of the industry (who is doing what, where, how) be established. This will reduce confusion and facilitate future planning and rationalization of support. To contribute towards this understanding the Gardens Working Group (GWG) commissioned this study with the main objective of improving the understanding of garden based production activities for food security in Zimbabwe. The review was to form the basis for a more widespread in-depth study of the garden production activities that would establish detailed specifics on garden production activities in the country. This report is the outcome of that review.

2. Objectives of the study

As stated in the Terms of Reference, the main objective of the review was to improve the understanding of garden based production activities for food and nutrition security in Zimbabwe. The specific objectives of the review were to contribute to:

- a) Formulation of a platform for the exchange of experiences and learning around different types of gardens.
- b) An assessment of technical, institutional, social and economic conditions under which it may be possible to replicate or scale up support to these activities.
- c) An improved understanding of appropriate interventions to increase the productivity and use of gardens in different environments.

The specific output of the review is a report containing a review of the technical, institutional, social and economic strengths, weaknesses, opportunities and constraints around garden based production activities with the following annexes:

- An inventory of the organizations and projects supporting garden production activities in different contexts (Annex 2)
- A bibliography of existing and in preparation resource materials, guidelines and training materials on garden activities (Annex 3) and

- 3-4 Case Studies of contrasting examples for in depth assessment and analysis (Annex 4).

2.1 Research methodology

With guidance from the FAO, GWG and ACWG, the FAO database, researchers' own knowledge, and the NANGO directory, institutions that were more likely to be involved in gardening activities, were identified. From these, 61 were sampled for interviews and in depth studies. The identified institutions were grouped according to the type of support they offered, resulting in the following categories:

- a) The Government of Zimbabwe,
- b) Donors,
- c) International NGOs,
- d) Projects,
- e) Local NGOs,
- f) Institutions (hospitals, schools, colleges, research and training institutions), and
- g) Private organizations.

After categorization, interviews were carried out in Harare and in a limited number of outside localities using a checklist in order to ensure a comprehensive coverage of issues. In cases where representatives of institutions could not be interviewed physically, the checklist was mailed with a request to complete their responses. Focus group discussions were held with farmers during the case studies. Checklists were also developed for the case studies, for individual garden owners, and for extension workers (Annex 8).

2.2 Limitations of the study

The main limitations of the study were:

- a) Time limitations resulted in limited geographic coverage. This necessitated the use of mailed checklists, which in most cases the responses were not encouraging compared to those that were physically administered.
- b) Personnel movements in most of the institutions resulted in loss of institutional memory hence difficulties in obtaining quantitative data.
- c) For institutions that operated district offices, it was difficult to get detailed information at head offices.
- d) There was a possibility for double counting the gardens because of partnerships amongst institutions.
- e) Projects which have supported gardens in the past have been completed and the relevant information is not readily available.
- f) Securing appointments with some institutions turned out to be a serious challenge thereby delaying progress.
- g) General lack of accurate information and knowledge.

2.3 Report Structure

The report generally follows the structure of the Terms of Reference (Annex 1) under the headings of Technical, Institutional, Human and Social, and Financial aspects and issues, with additional sections on the inventory, bibliography and case studies. Each of these sections also covers an analysis of aspects and issues raised. Recommendations are contained in section 7.

3. Findings and Analysis

The findings of this study are based on information from interviews with supporting institutions, completed checklists, limited literature review, case studies, researchers' own knowledge, and information from other reliable sources.

3.1 SWOT Analysis

The strengths, weaknesses, opportunities and constraints of garden based production activities were examined in the SWOT analysis in Table 1. The SWOT analysis formed the basis for the analysis of technical, institutional, human and social and financial aspects of garden based production activities.

Table 1 SWOT Analysis for Garden Production Activities in Zimbabwe

	Technical	Institutional	Socio-economic
Strengths	<ul style="list-style-type: none"> • Intensive farming and high chances for increased productivity and quality • Low cost technologies available and applicable • All types of crops produced in gardens • Entry point for skills training 	<ul style="list-style-type: none"> • The same piece of land used to produce a number of crops in the same year • Management committees assist in coordinating activities in group gardens • Community gardens reach more people • Decision making in individually managed gardens less bureaucratic 	<ul style="list-style-type: none"> • People have always had gardens. • Sources of food and nutrition security • Facilitate dietary diversification • Source of income and employment for families • Enhance social cohesion in community and communal gardens • Entry point for environmental management.
Weaknesses	<ul style="list-style-type: none"> • Inadequate water supplies in most gardens • Poor price negotiation skills in farmers resulting in unproductive produce prices • Lack of post-harvest know-how and handling facilities • Difficulty in measuring impacts of nutrient provision • Lack of financial, technical, and extension resource materials • Lack of information on suitability of new technologies for smallholders • Seasonality of water supplies • Lack of information on herbs 	<ul style="list-style-type: none"> • Absence or use of old resource materials by institutions • Garden management committees are not always effective • Lack of knowledge on contract farming • Lack of consistency in production, quality and delivery. • Poor record keeping by implementing institutions (failure to locate the gardens) • Communal model prone to failure • Lack of information and clarity of purpose reduces effectiveness of planning and support • Promotion of herbs as cure for HIV/AIDS • High turnover of staff and poor institutional memory 	<ul style="list-style-type: none"> • Seasonality of use increases food and nutrition insecurity risk • Overexploitation of the wild gardens resulting in extinction • Lack of knowledge for the potential value and contribution of garden to household food security • Lack of control of resources and income by women • Unavailability of labour in PLWA and other vulnerable groups • Targeting criteria for vulnerability are often single issue based and ineffective

Opportunities	<ul style="list-style-type: none"> • Intensification of water harvesting technologies • Intensification of water conservation techniques • Off-season production of vegetables attracts high incomes • Use of multipurpose plants in live fencing • Herbs offer benefits if promotion is based on proven qualities • More effective technical equipment and support based on better information 	<ul style="list-style-type: none"> • Enhancing crop/livestock interactions • Collaboration to enhance a holistic approach to garden support • Willingness of the private sector to participate • Multipurpose use of water. • Better planned interventions based on better information • Climate of cooperation between donors and NGOs offers opportunity to develop knowledge databases for gardens 	<ul style="list-style-type: none"> • Source of empowerment for the vulnerable members of the society • Women are the majority of participants • Biodiversity conservation through use of wild vegetables and plants. • The vulnerable children can be supported through schools • More appropriate support for vulnerable as well as better off households based on better information and planning • Social cohesion
Threats	<ul style="list-style-type: none"> • Water provision can be expensive • Pest and diseases can be a serious problem. • High costs and unavailability of inputs. • Inadequate rainwater to harvest from 	<ul style="list-style-type: none"> • Most food and nutrition insecure farmers are far from the major markets • High costs of fencing • Unreliable and expensive transport • AREX resource and capacity weaknesses • Distorted exchange rate makes support very expensive • Territorial and competitive attitudes amongst NGOs leading to lack of cooperation 	<ul style="list-style-type: none"> • Competition for labour between fields and gardens • Labour may not be available for PLWA • Women may lose control of market gardens • Competing uses for water – household, livestock – have higher priority than gardens

3.2 Garden Classification

Classification of gardens varied and was dependent on the source of information, with different terms being used by different people and organizations to classify the same types of gardens. For example, community gardens were referred to as group, family or consolidated and household gardens as kitchen or individual gardens. Generally, management arrangements, the objective for which the garden was set up, garden ownership or its location were some of the most common factors used to classify gardens.

To avoid confusion, and for purposes of this study, the following classifications were adopted:

- a) Community
- b) Communal
- c) Household
- d) Institutional
- e) Wild

These classifications, their characteristics, and the relative advantages and disadvantages of each are described in Annex 5.

3.3 Role of Gardens

3.3.1 Food and Nutrition Security

Although malnutrition had largely been kept under control in the country, the prevailing socio-economic challenges and the drastic effects of HIV/AIDS are likely to increase peoples' vulnerability to malnutrition and related illnesses. The provision of adequate fruit and vegetable therefore becomes paramount.

Gardening activities in the smallholder sector offer a primary source of food and nutrition security, both from the fact that people consume what they produce and sell surplus to get income that is used to buy food, goods and services. If water is not limiting, gardens can be put to productive use throughout the year. Maize (Open Pollinated Varieties) and other seed were reportedly produced in the gardens as a way of reducing inputs costs. Grain requirements were also supplemented in the gardens during the dry season. Having experienced mid-season droughts and serious crop failures in the recent years, farmers deliberately plant staples in lower lying gardens during summer because these gardens retain residual moisture better compared to arable fields, thus increasing the chances of a successful crop and attainment of food security. In addition to other uses (school fees, clothing, food etc.), income from market gardening is also used to finance operations in the arable fields, pay school fees, purchase farm implements (hoes, ploughs, hose pipes and irrigation equipment) and other goods and services.

It is important to note that the individual non-supported garden has a very important role to play in the provision of household nutrition. They are usually small (100m² or less) and normally found in the backyard or in vleis. Even though the owners may also be members of communal, community or individual supported gardens, households will invariably have another non-supported small garden somewhere. Such gardens are the best show of household eating patterns because this is where they produce without institutional influence. In addition, this is where the actual food security providers (women) make decisions as far as what to grow and how to dispose of the surplus.

The recently introduced herbal gardens offer a source of medicinal remedies for the relief of common ailments and some HIV/AIDS related symptoms. Save for a few organizations met during this study, most of them indicated they were promoting the use and production of tested and tried herbs. While some farmers met during the study had received training and were clear as to how some of the modern herbs were used, others were not clear and still required more training and exposure.

3.3.2 Social Benefits

Community and communal gardens provide a forum for working together and sharing of knowledge amongst farmers. The need to work together being fuelled by common purpose and in the process community cohesion is enhanced. As long as the objective of supplying food and nutrition security remains prime, women remain in control. However, this ceases to exist when they become market oriented because men then take over especially the marketing and cash handling aspects, which sometimes impact negatively on the women and children. Gardening was reported to increase environmental consciousness and awareness in communities and increases their desire to protect and manage it profitably.

3.4 Technical Framework

3.4.1 Farming Systems

The various farming systems found in Zimbabwe are described on the basis of the natural regions which are demarcated according to climate, soils, slope and secondary terrain features (CSO, 2004). In the high rainfall areas like Mashonaland East (Murewa, Seke, Chinhamora, parts of Mutoko), Manicaland and parts of Mashonaland West, quality vegetable and fruit production is possible year round, although at high cost of pest and disease protection in summer. Where gardens get waterlogged in summer, farmers produce vegetables in the dry lands. In places like Chimanimani, Rusitu and Honde Valleys fruit production (bananas, pineapples, citrus, guavas, avocados, etc) is year round, and farmers from these areas often depend on fruits more than on field crops for their food and nutrition security.

Natural Regions I & II

Natural regions I and II are the major fruit and vegetable production centres especially of cool climate types, and are the major production zones for export and market gardening. They are closer to the major marketing centers hence may not face serious transportation challenges. The zones are characterized by intensive crop production and rainfall ranges from 800-1200mm per year. Until the new millennium, large-scale commercial farms which produced specialized cash crops for export were located in these regions.

Seasonality in garden production in some of the areas is mainly due to water logging in low lying areas, higher incidence of pest and diseases and higher costs of control for the smallholder farmers in summer. At the same time, these are the areas of intensive crop production, and labour usage is biased towards field crops during this period as farmers put more emphasis on the husbandry of major food security and commercial crops. In addition, there is a proliferation of indigenous vegetables and wild fruits, which can be used to bridge the gap created by the abandonment of the gardens during the same period.

Natural Regions III & IV

Natural regions III and IV experience rainfall averages of 650 and 400mm per year respectively. Farming systems range from semi-intensive crop production in natural region III to semi-extensive production in region IV. Group gardening is more appropriate in these areas because water sources are sparsely located. Irrigation water usually dries up before the end of the dry season due to high rates of evaporation and infiltration. Soil, fertility and water management are therefore paramount in order to ensure efficient resource use, and hence an increase in productivity. However, the distance from the major marketing centers increases as compared to gardens in NRs I and II, thereby posing transportation challenges for the farmer. Processing and value addition would benefit farmers in these areas. In the dry season gardens are abandoned as water sources dry up.

Natural Region V

This region receives an average of 300-400mm of rain per annum. The best agricultural enterprise in the area is extensive livestock ranching because vegetation growth is sparse. However, with the opening up of farms to new settlements, these areas have also been inhabited by crop producers. Drought tolerant varieties are the only ones that can perform with any degree of success in this region. The provision of protein is not generally a major challenge because people have access to livestock. It is the provision of energy and

micronutrients that is a major challenge because access to vegetables and fruits is limited due to poor access to water, and staple crops often fail due to poor rainfall.

Gardens are concentrated around the few water sources (mostly dams and boreholes) in the region. As a result group gardens are more popular. An advantage to garden producers is the fact that the area receives low rainfalls hence pest and disease pressures during summer are lower, and the region could produce vegetables and fruits throughout the year if water availability could be improved. Good soil fertility and water management through use of appropriate irrigation technologies, organic matter conservation, biomass transfer, and other natural additives as well as mulching and intercropping would be beneficial. Water harvesting would also be a necessity to expand areas under gardens, especially where underground water is difficult to access.

3.4.2 Garden Sizes

There was no garden or individual plot holding size that could be given as average in a given area or institution, because sizes varied greatly depending on prevailing conditions, which included the following:

- a) Availability of water
- b) Number of beneficiaries
- c) Availability of land
- d) Availability of fencing
- e) Availability of labour
- f) Irrigation technology
- g) Whether the purpose of the garden was merely for household nutrition or for market gardening
- h) Area put under effective production

Community, communal and institutional gardens generally tend to be the largest in size followed by the individual ones. It is therefore more representative to talk about size ranges than average size. The ranges encountered for each class of gardens are given in Table 2. It is also important to note that Community Gardens are in fact a group of individually owned and managed gardens. These gardens vary widely in size, ranging in our data from 400m² to 8 ha. and the individually owned plots within these gardens normally ranged from 0.01ha (100m²) to 0.05 (500m²).

3.4.3 Water Sources

Gardens reported by supporting institutions or visited, drew water from one or more of the following sources:

- a) Open shallow wells,
- b) Rivers/streams,
- c) Dams,
- d) Boreholes and deep wells,
- e) Rain water,
- f) Infiltration pits and
- g) Springs,

The most common water sources were open shallow wells, rivers and small dams followed by boreholes, deep wells, rainwater, infiltration pits and springs. Springs were however, normally used for drinking water and rarely for irrigation. The different water sources had their advantages and disadvantages as shown in Annex 6.

In interviews and responses from checklists, the majority of NGOs reported that most of the water sources (regardless of the type) dried up before the next rains. In some cases boreholes were broken down and communities found it expensive or difficult to repair, resulting in crop failure. Water, soil and environmental conservation efforts were reported in most projects particularly where there was communal use of water from dams, rivers and streams. Works to protect the dam, its catchment and downstream were evident when Case Study 2 was visited.

It was noted during the study, that water related issues were invariably high, if not at the top, of community priorities. The total amount of water available, the often conflicting uses of water, and the seasonality of supply are therefore important considerations in planning and implementation of garden support activities. These issues impact on the type and design of support provided, and indeed whether that support will result in viable gardens. There is evidence (such as unused drip kits) that these factors have sometime not been given sufficient consideration. The pressure on delivery rather than sustainability has perhaps been exacerbated by the move from development to emergency relief in recent years.

As a sidelight to the above, there appears to be a general lack of data on current water sources, their uses, and seasonality of supply on which proper planning could be based.

3.4.4 Water Lifting and Delivery Technologies

Several technologies were reportedly used to lift and deliver water for irrigation purposes and these include the following in order of frequency of use:

a) Buckets

Buckets were the most commonly used to lift water from rivers, streams, canals, shallow or deep wells, and to transfer from boreholes. From deep wells the bucket was used with a rope. The use of the buckets for irrigation was reportedly easy and faster although the labour input was higher and water use less efficient.

b) Siphons

These were common to those who irrigated from dams and channeled water through canals. Some farmers especially those irrigating from shallow wells also used siphons (Case Study 4). Siphons were reported to be simple and released labour to do other things because management requirements were low, although soil displacement at the point of discharge could be a cause for concern. The cost of the pipes under the prevailing macroeconomic environment affected profitability.

c) Gravity

Some gardens that irrigated by flood used gravity and this was common in plantations of bananas or sugarcane and some vegetables. The system is commonly used in valleys like Honde and Rusitu and in some places in Nyanga where water is channelled from hills and mountains to the fields by gravity. Some dams were reportedly discharging by force of gravity. It is a simple and cost effective method to use where the gradient permits.

e) Pumps (Treadle, Elephant)

The use of treadle pumps was reportedly on the increase in gardens. Although they had a high initial capital requirement the benefits reportedly outweighed the cost. They were reported to save labour especially where they were used to pump into reservoirs, which facilitated irrigation scheduling. They were used to relieve labour requirements in loading drip tanks. Elephant pumps are based on rope and washer technology, and provide an even simpler version of water lifting technology compared to the treadle pump because they were hand driven in a rotary motion as opposed to leg powered high step motion. Both pumps are manufactured locally and require simple maintenance.

f) Taps and Hoses

These were common in urban and peri-urban areas and institutions where there was piped water. Their use is dependent on the seasonal rainfall and water availability. If water availability was poor use of hoses was banned. Use was also reported in rural areas where there were boreholes or dams with high head, or where siting of constructed reservoirs allows gravity flow to gardens.

g) Drip Kits

Use and popularity of drip kits was reportedly on the increase in communal areas. Kits distributed have normally been 100 or 200m², although a 10m² kit has recently been introduced for urban and backyard garden use. Communities that received adequate training and used the kits were reported to have experienced great improvements in crop productivity and nutrition as well as income levels. Some were reported to have bought the 500m² kits in order to increase the area under production, while others opened up other plots using the same kits.

Some kits were reportedly not being used despite the envisaged advantages because farmers were reported to have received the kits without training on their use. Some did not have perennial water sources hence could not use the kits throughout the year. For others, particularly where beneficiaries were old or suffering from HIV/AIDS infection the labour needed to fill the tanks was unbearable or just not available. Those who received the initial kits had instructions to mount them at about 1.2m above the ground and the tank itself is about 1m high. Effectively, water had to be lifted to a height of + or - 2.2m in a tin/bucket/can. This proved to be a challenge to some resulting in non-use of some of the units. With experience mounting instructions were later changed to suit requirements of head, area to be irrigated and labour availability. Current recommendations are generally 1m for flat ground, which may be reduced on sloping ground. Insufficient head will result in uneven water distribution over the garden, and consequent patchy production. The treadle pump is also being used to fill tanks to ease the labour requirement.

Annex 7 shows some of the advantages and disadvantages of the different water lifting and delivery technologies used in gardens.

3.4.5 Maintenance of Irrigation Equipment and Infrastructure

Where there was communal ownership or use of the irrigation infrastructure (fences, canals, pumps, the water source etc), a committee was usually elected to oversee issues of maintenance. The committees had budgets, which were made up by regular subscriptions from users or sales of produce. Farmers maintained pipes and similar equipment that brought water onto each farmer's field/plot individually. Where necessary and they required similar replacements, they pooled their resources and procured in bulk at lower prices. Some communities, especially those with boreholes, were reported to have failed to maintain their facilities because of unavailability or high cost of the spare components. Such faults were likely to have negative impacts on food and nutrition provision because they took longer than normal to rectify. Dams and all other water sources require less external support in terms of maintenance hence can be more efficient and reliable in providing water if it is available.

Although relatively unknown in Zimbabwe, solar powered pumps may have a place in the future of water lifting technologies in Zimbabwe. As shown in Annex 7, each technology has its own strengths and weaknesses which need to be considered when planning support to gardens. The challenge is to find the right mix of value for money, matching the requirements, and the ability of the target beneficiaries to operate and maintain the equipment. Where funds are limited the choice could be limited to the manually operated

technologies. Ease of operation of manually powered pumps is an issue, particularly for labour stressed households, with a number of opinions expressed regarding the difficulty of the stepping action required with the treadle pump as compared with the rotary action employed with the elephant pump. At the high end of the scale it would appear that windmills have not received the attention they deserve yet they could provide answers to current problems.

Sprinkler systems are rare in supported gardens, which until recently have been flood irrigated by bucket, siphon, tap and hose, or a combination of these. The major disadvantage of these systems is the amount of water required, which limits the number of beneficiaries, and the ability to provide for alternative uses. The introduction of drip kits in sizes and designs suitable for smallholders has the potential to have a major impact. There are however, conflicting opinions on the suitability, quality and effectiveness of the different designs of drip kits being promoted, and a lack of comparative research under smallholder conditions.

3.4.6 Crop Production

Most cropping programs mentioned included the production of common vegetables like rape, tomatoes, cabbages, onion, sugarloaf, covo, carrots, butternut, pumpkin, lettuce, spinach, amaranths, okra and some indigenous ones like *Cleome gynandra*, *Brassica juncea* and *cowpea*. Rape, covo, tomatoes, onion and cabbages were the major crops, and land was allocated in that order. While on one hand it is an advantage for farmers to produce the crops that they are used to, it limits them to traditional markets, which do not pay so well unless they add value to their produce. Such vegetables are bulky and difficult to transport and can pose major problems to farmers. Gradual diversification into the production of specialized crops (mange tout peas, brinjals, baby marrows, sweet corn etc) would transform smallholder horticulture positively. However, for purposes of household food and nutrition security, they suffice. In addition to vegetables, particularly in the bigger gardens, farmers engaged in maize production for green mealies, mealie-meal or seed (Open Pollinated Maize Varieties mostly). Most of the gardens (in light of the HIV/AIDS pandemic) reported had diversified into herbal production. However, some of the farmers met expressed lack of information regarding their uses, possessing and knowledge of the resultant benefits.

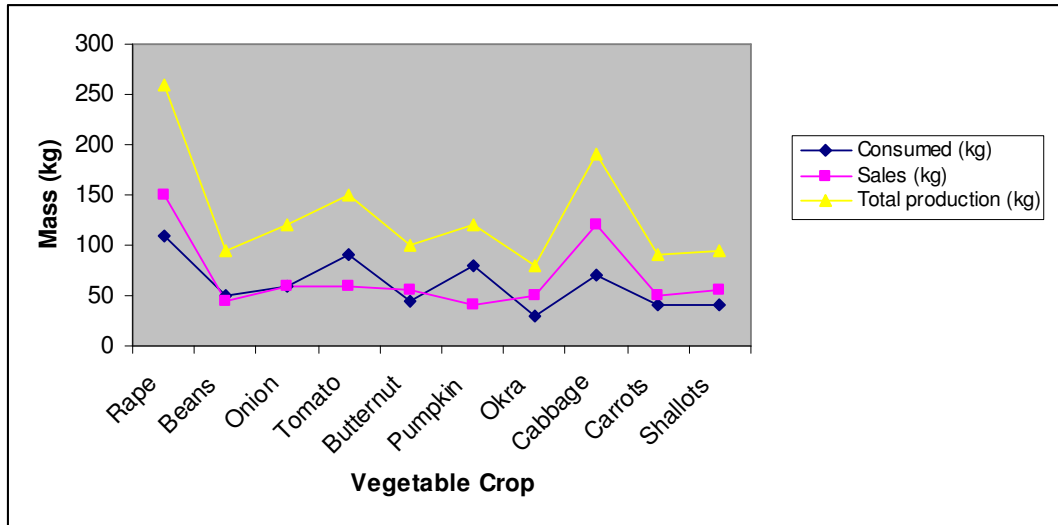
In some gardens particularly those irrigated from dams, there were sections left aside for orchards and the proliferation of indigenous vegetables. This diversification in cropping widens the food and nutrition base at low cost. Again the combination of the two types of vegetables (exotic/indigenous) closes the “relish gap” that usually occurs between September and December annually. The orchards visited had excellent citrus, avocado and mango trees as well as banana plantations.

In the choice of crops, issues arise around ease of production, the capability of beneficiaries to adapt to new crops, the balance of own consumption and income generation, and the importance of local markets as opposed to opportunities for more lucrative urban markets. To make these choices more difficult there is a lack of readily available information on both technical and financial aspects of production, processing, preservation and value adding. This was more evident with the herbal plants promoted. Some organizations have become over-enthusiastic, promoting herbs on unsubstantiated claims of HIV/AIDS curative qualities, rather than on their known beneficial qualities.

Information on production from gardens was not readily available, and the data given below is cited only as an example of what was achieved in a particular case, not as average or expected production. In one of the Case Studies carried out by Plan International in

Tsholotsho in 2004, a 100m² drip kit supported the production of 1310 kg of various vegetables in that year, in addition to maize, and yields per crop are shown in Figure 1.

Figure 1. Vegetable Production (Kg) From 100m² Meter Plot Over a Year (2004)



Source: Plan International, 2004

Of the total mass produced approximately half was eaten and the other half sold, valued at around US\$150.00 at that time. (Due to rapid inflation it is more meaningful to quote income in US dollar equivalents at the time). These studies showed that the drip kits had potential to improve household food security especially in the drier areas where water availability is poor.

Besides provision of the different nutrients, the various crops produced contribute differently to the farmers' income. Table 2 shows the contribution by each crop to the total income realized from the same 100m² garden.

Table 2 Income Contribution of Crops from 100m² Irrigated Plot

Crop	Income (USD)	Percentage contribution to total income
Rape	7.5	5.73
Beans	11.5	8.78
Onions	30	22.90
Tomato	30	22.90
Butternut	5	3.82
Pumpkin	4.5	3.44
Okra	6	4.58
Cabbage	6.5	4.96
Carrots	8	6.11
Shallots	22	16.79
Total income	131	100.00

Source: Plan International, 2004

The figures illustrate that while the leafy vegetables rape and cabbage were the highest producers, and were sold in larger quantities, onions, tomatoes and beans were of higher value per kg, and contributed together over 50% of the income derived from sales.

a) Pest and Diseases Management

The management of pests and diseases was not pleasing especially in the group garden visited in Natural Region V. They lacked knowledge on scouting for pests and diseases; differentiation of pest and disease damage and identification. Generally, issues of pest and diseases management require a practical and participatory approach together with farmers for the best results.

b) Crop Production Technologies

Crop production technologies like manuring, mulching, intercropping and conservation agriculture were reportedly on the top of the list of information packages for the farmers. Evidence for the use of these technologies was seen in the supported group as well as the individual non-supported gardens visited. Farmers therefore seem to be aware of the importance of these technologies and derive benefits from using them.

c) Post Harvest Processing and Storage

It was noted that post-harvest processing, value addition, preservation and storage training programs were lagging behind. This was referred to by representatives of institutions and noted when Case Study 2 was visited. Dozens of fruits from the live hedge were rotting when the farmers could have processed them into jam for their consumption or sale. Such programs would benefit farmers who have transport problems or are too far from the markets.

d) Crop - Livestock Interactions

Efforts to promote crop - livestock interactions were isolated and slow to take up. Gardening is just one component of these interactions hence the need to actively support all components. The *Musha Integrated Resource Production System* being introduced by Plan International is one such approach whereby garden support comes as part of a cycle, which includes, small stock, arable cropping, cattle production and the household. The result is that the household is supported in its entirety.

e) Seasonality

Gardening is more lucrative during the dry than rainy season because pest and disease pressures are too high in the rainy season, resulting in very high costs of protection and failure to produce by most smallholder farmers. In some cases, gardens become waterlogged and hence are left fallow, while vegetable production is transferred to the fields. Competition for labour is high in summer because that is when field crops are at peak demand for labour resulting in gardens being sacrificed. The need to reduce the risk of staple crop failure also results in gardens being planted to maize at the expense of vegetables in summer because gardens often have better residual moisture. The provision of adequate household nutrition therefore becomes compromised during this period. In the event that garden production continues despite all the setbacks, farmers can make more money because of supply shortages.

Of importance to note however, was the fact that for some communities, the proliferation of indigenous vegetables during the rainy season reduces desperation for relish hence loyalty is deliberately diverted to field crops. However, others suffer serious relish inadequacies and are at risk for malnutrition and food inadequacy.

f) Fencing

Where organizations supported fencing, they supplied the complete kits. In view of sustainability, some institutions went on to assist farmers to establish live fences. However, some of the living fences were reportedly destroyed by termites or they took too long to provide an effective barrier from animals thereby necessitating the provision of a short wire

mesh that is adequate to keep out animals during the initial phases until the live fence is established.

Institutions that could not afford the cost of fencing sometimes support software and recurrent aspects of gardening for those that are already fenced, even though some of them might be brushwood fenced. This practice sends conflicting environmental conservation messages to the communities. Government policies on environment do not allow the cutting down of living trees but the anticipated assistance from institutions can actually encourage people to cut down trees in order to protect their gardens. In so doing food security is ensured yet it is immediately threatened by environmental degradation. The challenge therefore is how to provide protection effectively at the lowest cost environmentally and financially.

3.5 Institutional Framework

3.5.1 Organizations Supporting Gardens and type of support

In preparing the inventory of organizations supporting gardening activities, a matrix was developed to record information about each organization in terms of type of support, sizes of gardens supported, irrigation technologies used, crops promoted, water sources and garden management system amongst others. Annex 2 provides the detailed inventory. The various institutions supporting garden activities were divided into the following categories:

a) Government of Zimbabwe

Support to gardens is through AREX, which offers extension services and trains farmers in aspects of crops and livestock production and marketing, and also assists farmers form linkages with suppliers and buyers of produce. AREX, although with a limited budget and resources, is the institution with long term responsibility for gardening operations in all the farming sectors in the country, and is the key to sustainable interventions. With adequate funding, the institution has potential to assist farmers nationwide. Ministry of Health and Child Welfare was instrumental in establishing nutritional gardens throughout the country in the 1992/93 drought. It also supports garden activities through the promotion of dietary diversification and training in appropriate food processing and storage technologies.

Through the Ministry of Education, Sport and Culture gardening skills are imparted to school children and tertiary students using institutional gardens as a practical teaching tool. Their coverage is also countrywide

b) Donors and International NGOs

Although modalities of operation differ amongst donors, most of them provide funding for gardens through registered international NGOs, which in turn channel the funding through local partners who then implement the projects. The international NGOs will in turn assist in project planning and monitoring, and provide training for local partners. There are exceptions to this mode of operations, as some International NGOs implement projects directly with the communities.

c) Projects and Local NGOs

Local NGOs and projects are directly involved with the day to day management of activities together with communities and relevant government departments. They complement government efforts by providing farmer training in aspects of gardening, environment and other social issues, and by facilitating government departments to carry out their duties.

d) Training Institutions and Centres of Learning

Various institutions such as universities and colleges of agriculture provide training in scientific research and general horticulture production to scholars, students, extension personnel and farmers. They either generate their own funds; or receive grants from

government or donors to support their operations. Other institutions like churches, orphanages, hospitals and old peoples' homes teach people nutritious eating and food preparation skills. Produce from the gardens is used to feed inmates and surplus generated is sold to raise income.

e) Private Sector Organizations

The private sector players include inputs suppliers and buyers of produce. Some buyers received grants on behalf of farmers from donors. They managed the grants, which enabled farmers to access the right inputs, provided technical backup, provided transport to ferry produce at nominal fees (e.g. \$200.00/kg in June 2005) and paid for the produce at prevailing market rates. Some of the buyers like FAVCO gave farmers interest free production support loans (as much as \$35m in one case) and other accessories like packaging materials, in order to facilitate production. This effort by the private sector builds business attitudes and ethics in the smallholder-farming sector and enhances farmers' capacity to produce high value crops for specialized markets. Most of the buyers now employ agronomists who provide technical backstopping to farmers.

Inputs suppliers like Prime Seeds and Pannar Seeds also reacted in relevant ways, preparing seed packages that are sensitive to HIV/AIDS nutritional requirements. The packages were designed to provide adequate nutritional requirements for PLWA. These companies also employ agronomists for technical support and farmer training. Others print (on seed packets) simple and easy to use, teach-yourself production instructions.

Support to gardens can be divided into hardware (dams, boreholes, fences, drip kits, garden tools), recurrent (inputs) and software (training of all kinds). It was observed that most institutions supported recurrent and software packages of gardening, while only a few involved themselves in hardware. The construction of dams or boreholes was therefore not widespread, and hence possibly one of the reasons why water came up as a major limiting factor to gardening. Interesting to note also was the shift in focus from supporting larger community to smaller individual/household gardens. Some of the reasons given included the increased need for improved nutrition at household levels for PLWA and the availability of higher levels of management at household levels. Also, group gardens tend to be far from homesteads (up to 2km, refer to Case Study 2), which can be laborious for PLWA, children and elderly people.

3.5.2 Objectives for Supporting Gardens

Institutions interviewed presented a range of objectives for setting up or supporting gardens. These included:

- a) The provision of food and nutrition security,
- b) Specific interest in nutrition for PLWA
- c) Income generation (market gardening)
- d) Poverty alleviation
- e) Employment creation
- f) Humanitarian support (no marketing)
- g) Skills training
- h) Orphan and vulnerable children care
- i) Fostering community cohesion

The provision of food security is relatively easy to quantify, and most institutions seemed to have made measurable impacts. However, it was very difficult to measure the impact of gardening on the nutritional well being of the communities or households. Only inferences could be used in this regard. There is need therefore, for institutions to formulate measurable

milestones that could be used to evaluate the impact of gardening on nutritional well being of communities and or households.

The reasons why various institutions provided support to gardens ranged from purely humanitarian to purely profit based, with various combinations in between. This becomes an issue when either the purpose is not clearly stated, or alternatively the support provided does not match the purpose. Clarity of purpose and information on resources available to the target group are essential pre-requisites of effective planning and provision of relevant support. A classic example of inappropriate and ineffective support has been the distribution of drip kits where water is not available. At the other end of the scale was an anecdote where a farmer with a large (0.5 ha) garden was provided with a 100m² drip kit, which he discarded.

3.5.3 Garden Management

Different management structures for gardens are found in the country and the major types per category are shown in Table 3.

Table 3. Types of Garden Management

Garden Category	Type of management
Individual (supported)	Overseer committee (households manage own garden)
Individual non-supported	Individual (household head or appointee)
Community	Committee
Communal	Committee/Local Chief
Wild	No management but all can harvest
Institutional	Member of staff

The overseer committee in individual supported gardens has the responsibilities of coordinating the beneficiaries, distributing equipment and inputs and monitor production and use of equipment. Households are responsible for the day-to-day management of their gardens.

Depending on the size of the gardens, some community or communal gardens have several committees responsible for various aspects like dam and water management, catchment protection, seed and input procurement, and marketing (refer to Case Study 2). Management structures of this nature can be found in the great majority of the gardens established pre-2001. Constitutions, regular meetings, minutes of meetings and records of activities are some of the tools used in the management of gardens. Farmers are assisted by support institutions to draw up constitutions, which become the garden management reference resource.

Members of staff who in most cases are agriculture teachers or nutritionists, manage institutional gardens. They report to their heads of departments who in turn report to the most superior office at the institution. The individual non-supported gardens are managed by the family head or someone appointed by the family head, as in the case of Vambe garden (Case Study 4).

3.5.4 Geographic Coverage

Most organizations support gardens in rural areas and very little is being done at present to provide support to gardening in urban and peri-urban areas. Communities in peri-urban areas are usually self-sustaining and finance their own gardening activities. They have good access to the fresh markets and benefit from the high prices for fresh produce. Most households in

urban areas have small household or kitchen gardens that support their daily family needs and the surplus could be sold.

3.5.5 Land and Garden Ownership

Most of the gardens are sited as a result of local level land-use plans by local leadership, though in some cases relevant government Ministries have been involved. In these plans, gardens are usually located in vleis (observing the 30m distance from rivers or streams) to enable easy access to irrigation water and fertile soils. Sadly, these local level plans are sometimes disregarded resulting in some gardens being sited without any environmental considerations thereby causing soil erosion and siltation of water sources. This is a major challenge in the low rainfall areas where in search for water, some gardens have been located right on the riverbed (Environment 2000, pers. comm.).

While land is jointly owned in communal gardens, in community gardens, each farmer has their own holdings, the size of which is determined by the number of beneficiaries, land and water availability. Although inheritance is acceptable in community and communal gardens, responsible committees vet such transfers. Where land and water are not limiting, new applications can be accepted on the basis of agreed conditions. In polygamous situations, land allocation considerations differed from garden to garden. Whereas in some gardens, a man and his many spouses, as long as each one of them contributed labour and all other costs as an individual, they each were allocated a piece of land. In others, they were still considered a household and the land was allocated to the household head, the husband. How he shared it amongst his many wives was private business.

Even though women may be allocated land in group gardens, culturally that land belongs to the husband and in some cases the husbands still make decisions as to how produce is disposed of and subsequently usage of the money obtained there from. This scenario has potential to negatively affect household food and nutrition security.

Ownership in household gardens is simpler because the land belongs to the household head, who is the father in most cases. Inheritance is automatically from the head to his last son unless otherwise, like the case of Vambe garden where heir ship was given to the 5th daughter; (refer to Case Study 4). Women are users and not owners of land traditionally.

Institutional gardens belong to the institutions and a staff member (usually the agriculture/horticulture teacher or nutritionist in hospitals) is in charge of operations. They are answerable to the head of the department who in most cases reports to the head of the institution. They are responsible for all operations in the gardens. It is their responsibility to appoint caretakers in their absence. In some tertiary colleges it was reported that the students in consultation with the member of staff were responsible for their crop in the garden. They made their own arrangements whenever they were not at college.

Income disposal from institutional gardens depends on the purpose for which the garden was established, and the individual situation of the institution. For example produce from gardens can be consumed in institutions with boarding facilities or sold if there is surplus. Income from the sales could be shared between reinvestment into the garden and for operational costs of the institution. Arrangements were different where schools for example took care of vulnerable children. Income from the garden was used to pay school fees, buy uniforms, books etc for the children and surplus income was shared between the school and reinvestment. Some of the vegetables and fruits were distributed to the vulnerable children for consumption at home.

3.5.6 Inputs Supply Systems

At initiation, almost all externally supported gardens obtained their starter inputs from the support institutions. Thereafter they sourced from local or long distance suppliers either individually or as groups. Because of high transport costs and monopoly, some local suppliers were reportedly too expensive necessitating in some cases farmers to travel to the nearest towns or cities to purchase required inputs. Those farmers that had contracts with buyers obtained their inputs on contract and the cost of the inputs was deducted from the purchase price of the produce. The general unavailability of inputs experienced countrywide affected vegetable production particularly where market gardening was concerned. Some farmers, through assistance by NGOs and other support institutions, produce own seed in order to cut down on the cost of inputs and improve accessibility. The use of permaculture and organic farming techniques was also promoted as a means not only of reducing input costs but producing healthy foods.

In those cases where farmers received inputs from support institutions, the major side effect was destabilizing local input supply systems. In addition, this also destroyed farmers' initiative in sourcing inputs, thus creating local unavailability. Alternative supply mechanisms like the voucher systems which involve local suppliers need to be considered for sustainability.

3.5.7 Extension Mechanisms

The government through AREX has extension structures from national through to ward level. However, until the late 90s smallholder horticulture was not a major priority within the then AGRITEX and as a result it did not receive the attention it deserved and its contribution to food and nutrition security was therefore compromised. Some of the AREX staff are agronomists not horticulturists hence need training for them to effectively support gardening activities. The department, though with limited resources was an obvious key player in all the activities carried out by most NGOs at farmer levels.

A few NGOs employed personnel at the various levels from national to district or ward. These officers assist farmers with crop production and marketing information. It was reportedly expensive and unsustainable for NGOs to employ support staff at all levels, and hence most of them worked in collaboration with staff from relevant ministries and departments.

Over and above collaboration with AREX, many institutions, particularly those promoting drip kits, reported the use of local farmers as lead or contact farmers and adoption of the Farmer Field Schools approach in extension. These lead farmers could be Master Farmers, or those exhibiting greater than average gardening skills, have the ability to assist in training others, and whose gardens are accessible for use in demonstration and training purposes. These were reported to offer more practical extension and facilitated better outreach to farmers.

A continuing constraint which arose during this review was the paucity of detailed information available on support to garden activities, the effectiveness of this support, and the impact on target beneficiaries. There is also a lack of up to date extension and cost/benefit material available or suitable training modules. While AREX is clearly the responsible organization, it does not at this point in time have the capacity or resources to gather and maintain information. Consequently there is no "Repository of Knowledge" on gardening activities. A central issue for deliberation is how such information can be collected, managed, stored and accessed.

3.5.8 Opportunities for Joint Planning, Monitoring and Evaluation and Record Keeping

Joint planning, M&E and record keeping for organizations in gardening activities is a possibility because all of them in one-way or the other work with AREX. It is therefore possible to plan and monitor projects jointly, and facilitating AREX to play a central role and to keep records. It must be recorded however that AREX is currently suffering from severe resource and capacity constraints. Participation of the private sector should also be encouraged, as they are the ultimate users of garden produce.

3.5.9 Marketing and Post Harvest Activities

Although most organizations were vocal about promoting production for marketing, they were silent about facilitating the actual process of marketing. Those who preferred silence admitted that marketing was a difficult subject because of the conditions in which the farmers lived:

- a) Most of the farmers are far from the conventional markets, which are known to pay better. These markets require that produce be delivered crisp fresh usually before 7 a.m. and farmers can rarely meet this requirement.
- b) Failure by the farmers to maintain consistency in terms of quality and quantity because of lack of know how and poor post-harvest handling facilities.
- c) Formal markets usually pay by cheque, which usually involves 4 day waiting period in urban areas. For the smallholder farmers who usually travel long distances and have cash flow problems this is a serious constraint. Banks in communal areas (commonly POSB) may take up to 21 days to clear cheques.
- d) Poor price negotiation skills on the part of the farmer. Buyers determine the prices without considering production costs thereby threatening the farmers' business and ultimately household food and nutrition security.
- e) Poor transport infrastructure to support marketing in the rural areas.
- f) Lack of proper record keeping and water and sanitation scares away some of the markets particularly the export because of safety concerns.

Processing and value addition, which are seemingly, viable options for those farmers who are out competed on the fresh market did not seem to have taken off as would have been expected. Farmers would benefit if they could process and add value to their produce thus enabling them to reach far off markets without perishability constraints.

3.6 Human and Social Aspects and Issues on Gardens

3.6.1 Labour Requirements

Labour requirements are low in gardens because the areas are usually small. In those gardens visited, most farmers worked with their families and spent about 16 hours (refer to Case Study 2) per week in the garden. Hired labour spent about 8 hours per week or less. There was labour sharing in the family with the men concentrating mainly on land preparation and marketing (if the garden was set up for market gardening) while women and children did the planting and crop husbandry.

It should be noted that between dry land and garden enterprises labour sharing was biased towards field crops in summer. Unless the garden was planted to cereals during summer it would often be abandoned for dry land farming, and relish would be obtained from processed vegetables, pumpkin and *B. juncea* intercropped with maize and indigenous varieties of vegetables. A few farmers especially in the peri-urban Chinhamora and Seke areas, planted vegetables in the dryland fields in the rainy season, though at a higher cost of protection. The income however, was also high because of scarcity.

3.6.2 Knowledge, Empowerment and Dissemination

Although most institutions reportedly trained farmers in issues of gardening and related areas, very few reported use of or distribution of manuals or guidelines to the farmers. This creates dependence on the part of the farmers, and in the absence of support institutions they may not be able to operate. This was reflected in Case Study 2 where the farmers reported to have received training but still required training in the same aspects and their knowledge of crop protection was low. The use of resource materials is a powerful way to disseminate information and empowers the farmers.

3.6.3 Life Skills Development

Gardening gives dependable life skills to both the young and the old. Besides just gardening, institutions reported other projects including, livestock and dairy, food processing and crafts that were aimed at giving participants survival skills.

3.6.4 Behavior Change

Most people are yet to change their consumption patterns from just sadza (cooked maize meal) and vegetables to a more diversified diet. Food preparation methods also need to be improved so that people have access to a variety of dishes of the same product. The introduction of culinary herbs is a step in the right direction.

3.6.5 Beneficiary Selection Mechanisms

NGOs' involvement in beneficiary selection was reportedly limited to awareness creation and training in most cases. During these sessions in which all participants and their leadership attended, the selection criteria were discussed thereby setting guidelines for the actual selection, which was the responsibility of the community. Thereafter, if the NGOs had to be involved, it was mainly during the verification process. Development organizations used different criteria in targeting participants but mostly placed emphasis on vulnerable groups in communities and various indicators were used including:

Poverty and Vulnerability

Targeting the poor, vulnerable, orphans, widows, victims of natural disasters, women and child headed households or the elderly is socially correct, but in some cases it is not cost effective and stalls development because such a target group is economically too weak to achieve much and or inspire others. Food and nutrition security achievement is a result of a holistic approach and requires that other aspects of agriculture (livestock ownership, drought power availability, availability of farm implements, etc) be in place, and such target groups may not possess any of those. The impact of gardening will therefore be very difficult to quantify. It might be necessary to include other people who are resource endowed in order to balance the groups. For the sake of sustainability, institutions need to consider a holistic approach in supporting gardening activities.

Chronic Illness

Seeking the participation of the chronically ill can be viewed in two ways. On one hand it gives hope to those who would otherwise have given up and improves on their nutritional well being. On the other hand, it may result in the creation of stigmas hence may have a negative impact. Some gardens were reportedly referred to as "AIDS gardens". There is need also to consider the types of technologies introduced and the distance which they have to walk to work in their gardens unless they have caregivers who work on their behalf. If they are too weak to work then assistance may never be used.

Women, Children and Youth

For purposes of food security, and life skills development this target group is appropriate as long as they remain in control. However, they are unlikely to have good access to implements and other aspects, which if not taken care of may affect progress negatively. Since women and children are supposed to be subordinate to their husbands and fathers respectively, there is need to create awareness in men so that they give them full support without wishing to be direct beneficiaries.

Institutions

Most of those who supported institutional gardens were in a way targeting the vulnerable but through institutions. In the case of schools, all the children (the vulnerable included) get access to life skills training though the vulnerable will get relish and fees, uniforms and other school needs paid for through the garden. In hospitals, orphanages or old peoples' homes access to fruit and vegetables was increased and where possible the inmates took part in garden activities. The institutions benefited from selling surplus produce.

The Farmer with Capacity

The private sector coverage narrows towards those few that have high potential (have farm assets, perennial water, skills, and in some cases the right technology, and are willing to take gardening as a business). As a result their target group is a limited selected individuals or households. These individuals may be grouped for purposes of transportation only but work and receive training as individuals. Where they worked with groups it was reportedly those few group members showing high potential and rarely the whole group. The prime objective is profit making not food security or poverty alleviation, and hence the focus on promising individuals and households. The poor and usually food and nutrition insecure, are thus sidelined and are unlikely to receive direct support from private enterprise. In the longer term however benefits are likely to accrue through increased direct and indirect employment opportunities.

The need to clearly define the purpose of the support has already been touched on before, and this is equally important in selecting relevant targeting criteria. While private enterprise organisations are clear and effective in their targeting, the same cannot always be said for those targeting vulnerable groups. The tendency to use single characteristics such as "women headed households" or "households with a chronically ill member" as a means of targeting vulnerability has not proved effective (ICRISAT reports on agricultural interventions 2003/04 and 2004/05). These characteristics contribute towards vulnerability, but do not constitute sole criteria. There are many better off women headed households, elderly headed households, households hosting orphans, and households with chronically ill heads or members. It is becoming increasingly obvious that primary wealth/poverty indicators such as asset ownership and income need to be used as an initial screen.

The necessity to match type of support to the purpose of the support has been highlighted, however it is also necessary to match the type of support to the resources and capabilities of the target group. It is pointless providing support which requires technical know how, water and labour to households which do not have these resources, or do not have the knowledge and skills to utilise the support.

3.7 Financial Aspects and issues on gardens

3.7.1 Cost of Garden Set Up

It was difficult to give a general guide for the costs of setting up a garden because such costs were garden and time specific, and detailed information was generally lacking from

institutions supporting gardens. Cost estimates are further complicated by the different official exchange rates, coupled with unpredictable shifts in official exchange rate policy. An example of the difficulties faced in financing gardens is given in Table 5 below.

Figures obtained from Networking For People Living With HIV/AIDS indicated the cost of setting up a 50m x 50m garden at the end of 2003/beginning of 2004 as Z\$1.5m, and Z\$8m to set up the same size garden at the beginning of 2005. Table 4 compares these cost estimates using the US\$ exchange rate¹.

Table 4. Cost comparison of a 50m x 50m garden over a One Year Period

Size of garden	Date	Actual cost Z\$	Approx Equivalent Cost US\$
2500 m ²	January. 2004	\$1.5 million	\$375
	January 2005	\$8 million	\$1 290

¹ Indicative rates used for official rate were 4000 for January 2004 and 6200 for January 2005

At the time of writing this report, the cost of erecting the same garden in January 2005 would have been approximately ZD31,605,000.00 (US\$1.00:Z\$24,500.00). However, the real cost of materials would have made that amount inadequate thereby compelling support institutions bring in more foreign currency (more that US1290), if the garden were to be adequately fenced. This example graphically illustrates the difficulties of dealing with dramatically increasing real costs and the high cost of supporting gardens using foreign currency.

The economic problems in Zimbabwe and the exchange rate distortion under which supporting organizations must operate, makes the provision of support to gardens, and indeed any kind of support, very expensive compared to the same support in neighboring countries. The cost distortions do not apply to items purchased outside the country which can be paid for in foreign currency, but to locally paid for goods and services. This factor has the unfortunate side effect of discouraging local purchase with additional negative effects on the local economy.

3.7.2 External vs. Local Resources

Both institutions and farmers referred to the use of local rather than external resources for sustainability. This included the use of live fences, manure, indigenous vegetables, herbs and construction materials. In the case of live fences, the constraint was that they took long to provide effective barriers to animals and in some cases they were prone to termite attack thereby affecting establishment. There was need therefore for a nursing wire until the live fence took off.

3.7.3 Input vs. Output Costs

With the cost of inputs ever rising, most farmers resort to Low Input Agriculture whereby they use less and less of externally obtained inputs and increase the use of locally obtained organic materials. As a result, it is possible they can realize high incomes against Low Input backgrounds. Such was the case with Vambe garden. Their total expenditure on rape in 2004 was \$1 015 500.00 while the gross income was \$3 784 500.00. Table 5 shows the income and expenditure for Vambe garden (Case Study 4)

Table 5. Cost Of Inputs vs. Outputs for Rape Grown on 0.3ha (Vambe Garden 2004)

Input	Cost (\$)
Seed (50g)	8 000.00
Fertilizer (15kg)	37 500.00
Dimethoate (100ml)	100 000.00
Transport	360 000.00
Manure	150 000.00
Labour	450 000.00
Total Costs	1 015 500.00
Income (4.8t) sold at \$5000.00/5kg bundle)	4 800 000.00
Net income from rape	3 784 500.00

Source: Vambe garden, 2004

3.7.4 Financial Benefits

Garden production activities have potential to generate income as well as being a source of employment for the unemployed. As reported by Ms Vambe (Case Study 4), she realized Z\$15m from the garden in 2004 and she managed to pay for the electrification of her homestead, her father's and brother's homesteads, buy clothing, food and other goods. She also managed to save some money for reinvestment into the garden business. Most supported gardens operate on a much smaller scale than this, however there is a dearth of information on which financial benefits can be estimated.

Availability of information in the financial area is no better than in other areas. The lack includes information on costs at institutional, community and household levels, and on income from the various enterprises supported. This lack of basic information leads to lack of financial analysis on the benefits and costs of support from the supporting institutions point of view, and to the profitability or return to resource inputs of gardening as an enterprise or as a food security activity.

3.8 Summary of Gaps and Issues Identified

Throughout this report various gaps/issues have been raised at the end of each section, many of which are common or cross cutting. These gaps/issues are summarized in Table 6.

Table 6 Summary of Gaps and issues identified by the study

Gaps	Issues
Lack of information	Refers to information for planning, technical or financial.
Water availability	Seasonal in most areas
Institutional responsibility	-AREX responsible for garden activities but has poor access to resources. -Some AREX personnel need horticulture training
Appropriateness of support	-Support not matching objectives of support, resources and capacities of target group. -Definition of target group and targeting criteria not always clear/relevant -Target group sometimes considered out of the community context
Garden protection	-Not all institutions afford permanent fencing (expensive) -Live fences do not offer adequate protection at initial stages -Environmental threats due to brushwood fencing
Labour	-Lack of because household members or hired labour is not available -Or lack because beneficiaries are ill
Inputs	-Not always readily available -Donated inputs sometimes come late -Local supplies not reliable/expensive
Sustainability	-Poor understanding of the means of assessing the likelihood of achieving sustainability -Some interventions introduced are not appropriate.

4. Inventory

The Inventory developed as part of this review contains information on 46 lead organizations providing support to gardens throughout the country. The inventory (Annex 2) contains information on location of projects, types of gardens supported, type of support, irrigation technologies, water sources, partnerships and other important data. It also shows the type of information that is generally lacking across institutions and this is particularly useful for planners and other decision makers. With further development and updating the inventory is a very useful source of data.

5. Bibliography

The Bibliography of resource materials is presented in Annex 3. It was established that most NGOs did not have any resource materials for use during the implementation of garden activities. Instead, they employed skilled permanent or hired personnel who had either horticulture or agriculture qualifications. These provided staff training or visited the projects and provided on-site advice. In the absence of the resource persons, farmers did not have reference materials. A few NGOs however, used resource materials either made from within or adopted from other institutions (mainly research and training institutions). Suppliers of inputs also provided resource materials and in some cases printed production information on seed packages. The most common types of resource materials encountered were: Books; Manuals; Posters and pamphlets and Production guides.

The materials available were produced for the different players in gardening (farmers or advisory staff). Some were for free while others were sold. Others were library copies, which could only be accessed by authorized users. Some institutions like Kushinga Pikelela College of Agriculture, SCC and Zimbabwe Farmers Union adapted the resource materials to the different categories of farmers and produced some in vernacular. Some institutions were, however, using old materials, which needed updating in order for them to conform to current requirements (like use of chemicals in pest and diseases control).

6. Case Studies

In choosing the specific case studies, considerations for the various garden classifications, natural regions, ownership, management, objectives for which the garden was set up, and support received were made. Efforts to select a cross section of garden types were made, and logistical arrangements and costs were also considered in the selection process. It was intended to include a fifth case study of a Zunderamambo garden; however it proved to be impossible to arrange a suitable time for a visit until the date of completion. Table 7 shows summary characteristics of the selected case studies:

Table 7. Characteristics of the Four Selected Case Studies

Characteristics	Case Study			
	Fambidzanai	Gwitima	Vambe	Mr. Z. Maseko
Natural Region	II	V	II	V
Classification	Institutional	Community	Individual (non-supported)	Individual (non-supported)
Purpose	Research and promotion	Food security	Market garden	Food security
Water source	Borehole	Earth dam	Earth dam	Water harvesting

Findings from these case studies are summarized in Table 8. Detailed information on each one of them is found in Annex 4.

Table 8. Summary Findings of the Cases Studies

Name of garden	Type of garden	Size of garden	Crops produced	Estimated gross annual income
Fambidzanai	Institutional	2.5ha	Covo, rugare, lettuce, cabbage, rape, chinese cabbage, hot chillies, nyeve, pumpkin leaves and fruits, okra, tsunga, amaranthus, black jack, fruits and nuts	Z\$20. 4m
Gwitima	Group	6ha	Tomatoes, sweet cabbage onions, covo, rape, green mealies, beans, sugar cane sweet potato, citrus, guavas, bananas and pawpaws	Z\$260m
Vambe	Individual (non-supported)	1.5ha	Rape, covo, tomatoes, onion pumpkin leaves, <i>Brassica juncea</i> and bananas	Z\$15m
Mr. Z. Maseko	Individual (non-supported)	0.5ha	Rape, cabbage, tomatoes onion, nyeve, tsunga okra, beans, cowpea and sugarcane. Oranges, pawpaws, guavas, matamba, lemons n'ii, masau, matohwe, naartjes, peaches avocado, bananas and mangoes.	Figures not available

7 Recommendations

Based on the above review and analysis of issues raised, a series of recommendations are presented logically to improve the effectiveness of gardening for food security in Zimbabwe. These recommendations are made on behalf of the GWG and prioritization and implementation is the responsibility of same.

7.1 Establishing a Knowledge-Base for Garden Activities

Using the Inventory and Bibliography databases developed as part of this review, it is recommended to establish a Knowledge Base for garden activities in the form of comprehensive electronic databases of support activities and another for research, extension and production information (resource materials). Existing data bases in FAO and other institutions in or outside the GWG could be used as the basis for formulating the proposed. In the interim, responsibility for collection, storage, analysis and dissemination of information and coordination of garden support activities should be vested in the GWG and copies of the data bases should be kept at AREX while the institution is capacitated to enable it to assume its long term responsibility. Institutions supporting gardening activities should consciously involve AREX at all levels in all stages of implementation.

7.2 Water development and holistic programs

That greater emphasis be placed on water development and that support institutions should work together and prioritise the provision of “hardware” requirements of gardens, invest in water-harvesting and extraction technologies such as small dams construction, borehole drilling and sand abstraction, and to adopt a livelihoods (holistic) approach to support programmes. Given the water shortage constraints faced by most communities, drip kits offer great promise. Logically, the simpler the technology, and the easier it is to repair and

maintain the equipment, the better. It is also recommended that a practical research study to compare the competing types of drip kits and determine the most suitable under smallholder conditions be commissioned as well. Some “Best Bet” technologies involving user friendly water extraction technologies like manual pumps driven by rotary action and windmills could be used and would be beneficial especially to those of lesser physical strength such as women, children, the elderly, and the chronically ill.

7.3 Crop production and protection

That crop production and protection information, particularly information on low input cost techniques and alternative methods of pest and diseases control needs to be readily available to support staff and farmers. Low cost production and protection methods like permaculture and Integrated Pest Management (IPM) should be promoted. In the same vein, information on the properties of herbs should also be made readily available, and that unfounded claims on medicinal properties, particularly curative properties for HIV/AIDS are discouraged. It is recommended that the GWG commission the collation of accurate information on herbs and the production of a manual on the production, processing, uses and proven qualities of herbs. Sweet potatoes offer an excellent source of nutrients from both tubers and leaves. Pathogen free and high yielding varieties are available in the country and should be included in the gardens.

7.4 Production guidelines/training manuals and extension

Albeit at a high cost, it is recommended that GWG commissions the preparation of relevant guidelines/manuals/pamphlets for the different levels (Extension staff, farmers and other interested parties) based on known best practices at present. Some of the materials could be translated into the main dialects for distribution to farmers. Again, AREX in consultation with other stakeholders and with facilitation should be the leading player in preparation and distribution of the materials. In terms of extension, it is paramount that AREX staff who are non-horticulturist be trained to improve their capacity to support farmers. The use of proven extension techniques of on-farm methods and result demonstrations can be employed. Lead/contact farmers can be used as focal points for these demonstrations. These could be used in the context of Farmer Field Schools, Junior Farmer Field Schools, Associations, or other mechanisms that bring people of common interest and goals together.

7.5 Beneficiary targeting

It is recommended that a number of basic steps including a clear definition of the purpose of the support and the target group, a comparison of the resources available to the target group against the resources needed to effectively implement the programme, and the necessity of providing the missing ingredients be taken to ensure effective implementation. It is paramount to use targeting indicators that are relevant to the purpose of the support and the target group. Poverty is the single most relevant factor in assessing vulnerability, and it follows that poverty/wealth indicators are the most efficient way of identifying vulnerability.

7.6 Farmer owned research

It is recommended that the GWG could consider farmer owned research initiatives identified during the review and encourage members and other support organizations to use them as they fostered ownership and sustainability.

7.7 Garden Fencing

That live fencing technologies be supported and additional research effort be put into improving their effectiveness for garden protection. A number of “Best Bet” technologies

involving woodlot nurseries (for fencing poles and reduce pressure on the environment), agro forestry gardens (including fruit trees) and other labour saving innovations could be used.

7.8 Input Supplies

That the GWG should encourage the use of voucher systems for inputs acquisition amongst all support institutions in order to support local agro-dealers and create sustainability. There is need therefore for information on modalities of the system to be disseminated widely.

7.9 Sustainability

Sustainability considerations should be evident in the planning stages of an intervention programme, as well as being an important aspect of impact evaluation. Some tried and tested methodologies like the Sustainframe can be used to assess for sustainability. The Sustainframe functions with three assessment parameters explained as follows:

Need: There must be a basic need for the intervention, and the benefits must be readily recognized by those affected. Community participation in needs analysis, priority setting and planning is a pre-requisite in fulfilling this criteria

Workability: Interventions, either physical or behavioral, must actually work, provide the benefits intended, and satisfy the needs. Access to relevant information will allow basic technical, financial and market feasibility studies on which to base decisions in the planning stage.

Capability: The targeted beneficiaries, institutions, or those with long term responsibility must be able to adopt, operate, manage, and maintain the interventions (as appropriate), to continue satisfying the needs. Training and capacity building programmes for both support staff and farmers are the key in attaining capability

These criteria are applicable to garden activities and it is recommended that this simple tool be adopted by the GWG (and other organizations supporting garden activities) as a measure of sustainability

8 Conclusion

The above recommendations are based on what is considered necessary to improve the effectiveness of support to garden activities. No attempt has been made to cost these recommendations, and while the recommendations are presented in logical order, and ideally should be implemented as a package, no attempt has been made to prioritize the activities recommended. These tasks must remain the responsibility of the Gardens Working Group.

It is also important that the support provided matches the community and household resources and capabilities. If resources and/or capabilities are lacking, then the support programme will need to supply the missing ingredients. If this is not possible then the support programme will need to be amended. Attention to the above factors will help to ensure effective and efficient allocation of resources hence sustainable programs.

ANNEX 1 Terms of Reference

FAO Working Group on Gardens - Zimbabwe

Terms of Reference

Review of garden based production activities for Food security in Zimbabwe

1 Background

Garden based production activities have always played a role in the different farming systems in Zimbabwe. However, more recently there has been increased interest in supporting garden production activities as a means to mitigate the impacts of HIV/AIDS on some of the most vulnerable households. Of particular interest is the role that garden based activities may contribute to:

- Ensuring that the micro-nutrient requirements of PLWA are met:
- Dietary diversification through small scale production activities around: indigenous and exotic vegetables, fruit trees, herbs and medicinal plants, poultry, fish, rabbits, guinea pigs and bee keeping, etc.
- Improved livelihoods and increased purchasing power through savings on food bills and income from sales of garden surplus.
- Contributing to a reduction in time and labour constraints of PLWA or their care givers, by enabling production activities closer to the homestead, and, or introducing labour saving technologies and techniques.
- Attitude and awareness of balanced diets and food preparation

Garden activities may take place at different levels and contexts, for example household, community, schools, clubs and associations; in rural, urban and peri-urban areas; and with different age and gender groups. Systems will also vary according to the eco-system and whether or not there is water available.

2 Justification

The FAO/NGO/MOA Gardens Working Group (GWG) has been established as a mechanism to facilitate the exchange of technical and strategic information and experiences that will contribute towards improving gardening practices in the country. The GWG has identified the need to review existing and on-going experiences on gardens as an initial activity. In addition there has not been a comprehensive review of the current garden practices although many organisations have assisted in the setting up of such an initiative. There has also been no analysis to assess the impact of garden based activities on food security.

A review of existing garden based production activities will contribute to:

- the exchange of experiences and learning around different types of gardens;
- the assessment of the technical, institutional, social and economic conditions under which it may be possible to replicate or scale up support to these activities;

- Improved understanding of appropriate interventions to increase the productivity and use of gardens in different environments.

3 Outputs

The review will produce a report that is a maximum of 20 pages (plus annexes) with a 2 page executive summary. This will include:

- A review of the technical, institutional, social and economic strengths, weaknesses, opportunities and constraints around garden based production activities with the following annexes:
 - a) An Inventory of projects and organisations supporting garden production activities in different contexts
 - b) Bibliography of existing (and in preparation) resources, guidelines and training materials on garden activities, and identification of gaps and needs for further development or adaptation of resource materials.
 - c) Case-studies (3-4) of contrasting case examples for in-depth assessment and analysis. This will include attitude change in vegetable consumption. (Each case study: maximum 5 pages in the annexes)

4 Methodology

The review will be conducted in three parts:

4.1 Desk-based study

The desk-based study will be conducted in order to gather information on vegetable production, existing manuals, guidelines, through the collation of documents and reports from government departments, INGOs, national NGOs, web-based searches, networks and other relevant working groups (e.g. UNICEF chaired nutrition group), email, and telephone contacts. It will be supplemented by individual interviews where necessary. This will form the basis of the inventory and preliminary SWOT analysis.

4.2 In-depth case studies

The desk-based study will also form the basis for the identification of a limited number of in-depth case studies for field based visits and interviews. The case studies will be identified in order to illustrate different institutional settings (e.g. household, community, school), different agro-ecological conditions/regions, specific technical constraints (water and soil management,), and social contexts (gender, age, labour and time availability).

4.3 Round table meeting of Gardens Working Group

The third part of the review will be achieved through a half day round table meeting of the Garden Working Group, whereby the preliminary results of the review and the draft proposal for the formative evaluation will be presented and discussed.

5 Key issues for consideration

The review should provide a holistic assessment of gardening activities in relation to the food chain (i.e. production, post-harvest processing, conservation, storage, food quality and safety, marketing, utilisation and consumption). Key issues for consideration have been categorised as follows

5.1 Garden classification

- Community, Zunderamambo, homestead, school systems, hospitals, clinics, institutional gardens, ARES

5.2 Technical

- Improved technologies (e.g. permaculture, conservation agriculture, Low input gardening LIG), use of drip kits, post harvesting, preservation, preparation
- Size and scale of plots
- Fencing
- Water source, (dams boreholes, wells streams), water lifting and delivery systems, conservation and management technologies and techniques (e.g. drip irrigation,
- Different agro-ecological and climatic conditions
- Soil fertility: manuring, conservation agriculture mulching
- Pest and disease incidence and control
- Maintenance and spare parts for equipment (e.g. drip kits)
- Seasonality, dry season versus rains, cold versus warm
- Crop mix and diversity- traditional vegetables versus "modern"
- Vegetable (exotic v indigenous) , herb, fruit tree systems/ sources of seed
- Crop-livestock (incl fish) interactions
- Efficacy of medicinal herbs and plants for amelioration of HIV/AIDS related conditions and other opportunistic diseases

5.3 Institutional

- ARES- information on hectareage
- Land ownership and in particular gender considerations around inheritance,
- School gardens and management issues (e.g. school holidays, revenue from sales etc)
- Input supply systems- credit, contract farming (seed, cuttings, water, fertiliser, etc)
- Extension support mechanisms, (Lead farmers,
- Opportunities for joint planning, monitoring and evaluation and record keeping
- Training, support and supervision required and channels

ANNEX 2 Inventory of Institutions Supporting Gardens for Food Security

The Inventory is an Excel file which is too wide for satisfactory printing as part of a report. It is provided as an electronic file. Additional electronic copies are available from Greatminds (Pvt) Ltd.

ANNEX 3 Bibliography of Garden Related Literature and Resource Materials

GARDEN RELATED BIBLIOGRAPHY

Year	Author	Title	Publisher	Type	location	Accessibility
?	Africare	Bird's eye chili, Mhiripiri, Growers guide	Africare	Guidelines	Africare	Available to development staff
?	Chingarire, C	The drip irrigation kit. Trainers manual	?	Manual	Africare	Available to development staff
1992	Rappaport, R	Controlling Crop Pests and Diseases	Macmillan Press Ltd	Tropical Agricultural Extension Handbooks	AREX	Authorised accessibility
Nil	Acland, J. D	East African Crops. An Introduction to the production and plantation crops in Kenya, Tanzania and Uganda.	Longman by arrangement with FAO.	Book	AREX	Authorised accessibility
2002	Kwaramba, J. R.	Litchi Production.	AGRITEX	Handout	AREX	Authorised accessibility
1996	Gilbert, Z. and Hadfield, J	Down-To-Earth. Fruit and Vegetable Gardening in South Africa	Struik publishers	Book	AREX	Authorised accessibility
2000	Varela, A. M. and Seif, A. A.	Pest Management Manual for Brassicas	GTZ, icipe	Manual	AREX	Authorised accessibility
2000	Varela, A. M. and Seif, A. A.	Pest Management Manual for Tomatoes	GTZ, icipe	Manual	AREX	Authorised accessibility
1989	Godfrey-Sam-Agrey, W. and Tekie, Y	Principles of Horticultural Crop Production; Vegetable Crops. Horticultural Training manual. Improvement and Expansion of Horticulture in Communal Areas of Zimbabwe	UNDP/FAO ZIM/86/021.	Manual	AREX	Authorised accessibility
1987	Peirce, L.	Vegetables. Characteristics, Production and Marketing	John Willey and Sons, Inc	Book	AREX	Authorised accessibility
2002	Dobson, H., Manyangarirwa, W., Karuma, J., and Chiimba, W	Integrated Vegetable Pest Management. Safe and sustainable protection of small-scale Brassicas and tomatoes	Natural Resources Institute, University of Greenwich	Handbook	AREX	Authorised accessibility

GARDEN RELATED BIBLIOGRAPHY

Year	Author	Title	Publisher	Type	location	Accessibility
1993	Oldrieve, B.	Conservation farming for commercial small scale cooperative farmers in Zimbabwe.	Prestige business services	Book	AREX	Authorised accessibility
2001	Verkerk, R	Shamwari Dzemurimi. Kuziva nekuchengetedza Zvikara zvehudyi	Imperial College of Science Technology and medicine	Book	AREX	Available
2000	Pontius, J., Dilts, R., and Bartlett, A	From Farmer Field Schools to Community IPM	FAO Community IPM Programme	Book	AREX	Authorised accessibility
1993	Hall, D	A garden of Plenty	Africasouth Learner series	Book	AREX HTP	Authorised accessibility
2004	Chinyemba, A et al	From humble roots to nutritious dishes	Creative Images	Book	BTZ	For Sale
2004	Dhliwayo-Chiunzi, P. D	From Roots to Riches. A guide to profitable production of sweet potatoes	Creative Images	Book	BTZ	For Sale
1989	Arendse, W., et al .	Pesticides: Composition, use and hazards	Agrook 29. CTA.	Book	CTA	Hand out
1997		LEISA. ILEIA Newsletter for Low External Input and Sustainable Agriculture. Rebuilding lost soil fertility	ILEIA	Nwesletter	CTDT	Subscription
1998	CTDT	National Workshop on Traditional Vegetables and underutilized Crops /Plants of Zimbabwe	CTDT	Workshop proceedings	CTDT	Authorised accessibility
1999		Uncultivated food plants	UBINIG	Workshop proceedings	CTDT	Authorised accessibility
1999	Maundu, P. M et al	Traditional Food Plants of Kenya	Kenya Resource Centre for Indigenous Knowledge	Book	CTDT	Authorised accessibility
1995	Guarino, L	Traditional African Vegetables	IPGRI	Workshop proceedings	CTDT	Authorised accessibility
1997	CTDT	Prioritization of Indigenous Vegetables	CTDT	Report	CTDT	Authorised accessibility
1997	CTDT	The role of indigenous vegetables in Zimbabwe	CTDT	Report	CTDT	Authorised accessibility
1997	CTDT	Indigenous vegetables and their occurrence in Zimbabwe	CTDT	Survey report	CTDT	Authorised accessibility

GARDEN RELATED BIBLIOGRAPHY

Year	Author	Title	Publisher	Type	location	Accessibility
2002		Vegetables for sustainable food and nutritional security in the new millennium. International Conference on Vegetables	ALFA Lazrites	Workshop proceedings	CTDT	Authorised accessibility
	E2000	Zvidzido zvekurima michero	E2000	Hand out	E2000	Available to farmers
2005	E2000	An environmental Education and sustainability guide for teachers and curriculum planners in Zimbabwe	E2000	Guidelines	E2000	Available to schools
		Kupfuya Nyuchi	E2001		E2001	Available to farmers
	Mabvakure, T	Zimbabwe Special days for 2006. International year of Deserts and desertification 2005	E2001	Guidelines	E2001	Available to schools
1992	Mollison, B et al	Introduction to permaculture.	Tutorial Press	Book	Fambidzanai Training Center	For Sale
1995	Mann, S	Permaculture. A sustainable way of farming	Fambidzanai	Book	Fambidzanai Training Center	For Sale
1998	Fambidzanai	Propagating plants. An organic approach	Mambo Press	Book	Fambidzanai Training Center	For Sale
Nil	Vukasm, H. L	Production without destruction	Fambidzanai	Book	Fambidzanai Training Center	For Sale
2001		Improving Nutrition through Home Gardening. A training Package for preparing Field Workers in Africa.	FAO	Training manual	FAO	Accessible
2004	Machakaire, V	Vegetable Production Recommendations for Seke and Goromonzi Farmers		Guidelines and posters	FAO	Accessible
?	Masarirambi, M. T	Kurima muriwo nemichero	GOAL	Manual	GOAL	Available for the farmer
2005	LAED Trust	Guidelines for use and maintenance of family drip kits	LEAD Trust	Guidelines	GOAL	Available for the Extension worker
2004	Masarirambi, M. T	Vegetable and fruit production manual	GOAL	Manual	GOAL	Available for extension officers
1992	Kader, A.A	Post harvest Technology of Horticultural Crops	University of California Division of Agriculture and Natural Resources	Book	HRC	Authorised accessibility
1980	Samson, J. A	Tropical Fruits	Longman Group Uk Limited	Book	HRC	Authorised accessibility

GARDEN RELATED BIBLIOGRAPHY

Year	Author	Title	Publisher	Type	location	Accessibility
1990	Nagy, S et al	Fruits of tropical and sub-tropical origin	Nil	Book	HRC	Authorised accessibility
1968		Tropical crops: dicotyledons 1&2	Longmans Green and Co Ltd	Book	HRC	Authorised accessibility
1972	Purseglove, J. W	Tropical crops: monocotyledons 1&3	Longmans Green and Co Ltd	Book	HRC	Authorised accessibility
1954	Childers, N. F	Modern Fruit science	Horticultural Publications	Book	HRC	Authorised accessibility
1990	Snowdon, A. L	A color atlas of post harvest diseases and disorders of fruit and vegetables Volume 1. General Introduction and Fruits	CRC Press Inc	Book	HRC	Authorised accessibility
1951	Chandler W. H	Deciduous Orchards,	Henry Kimpton London	Book	HRC	Authorised accessibility
1961	Garnaud, J.	Advances in Horticultural Science and their applications:	Pergamon Press	Proceedings of the XVth International Horticultural Congress	HRC	Authorised accessibility
1972	Walls, I. J.	Tomato Growing today	Newton Abbot London North Pomfret	Book	HRC	Authorised accessibility
1983	Nel, J. P	Deciduous fruits and vines: Pests and diseases and their control	David Philip	Book	HRC	Authorised accessibility
1987	Weichmann, J	Post harvest Physiology of vegetables	Dekker	Book	HRC	Authorised accessibility
1954	Childers, N. F	Fruit Nutrition	Soemerset Press, Sormerville	Book	HRC	Authorised accessibility
1981	Purseglove, J. W, et al	Spices Volume 1 and 2	Longman United states of America	Book	HRC	Authorised accessibility
1924	Cruess W. V.	Commercial Fruit and vegetable Products	Mc-graw Hill Book Company	Book	HRC	Authorised accessibility
1989	Burton, W. G	The Potato	Longman Scientific and Technical Publishers	Book	HRC	Authorised accessibility
?	Chigumira-Ngwerume, F	Response of two traditional Brassica vegetable species to spacing, organic and inorganic fertilization	HRC	Scientific Paper	HRC	Authorised accessibility

GARDEN RELATED BIBLIOGRAPHY

Year	Author	Title	Publisher	Type	location	Accessibility
2001	United Nations Administrative Committee on Coordination	Nutrition and HIV/AIDS	Institute of Food and Nutrition UZ	Policy Paper #20	Institute of Food nd Nutrition UZ	Available to authorized users
2000	James, P et al	Ending Malnutrition by 2020: an agenda for change in the millenium	Institute of Food and Nutrition UZ	Report	Institute of Food nd Nutrition UZ	Available to authorized users
1996	James, C. S.	Analytical Chemistry of foods	Blackie Academic & Professional	Book	Institute of Food nd Nutrition UZ	Authorised accessibility
1990	Walker, A. F	Applied Human Nutrition for food scientists and home economists	Ellis Horwood	Book	Institute of Food nd Nutrition UZ	Authorised accessibility
2004	Chimwara, D	Drip irrigation principles and practices	Personal copy	Guidelines	LEAD	Personal copy
2002	Makasa, M et al	Production manual for small scale farmers in Zimbabwe	LEAD PME	Manual	LEAD	Available to partners
2002	Makasa, M et al	Cultural guidelines for production of carrots in Zimbabwe	LEAD PME	Guidelines	LEAD	Available to partners
2002	Manda, P. J	How to maximise your yields of ammaranthus	LEAD PME	Guidelines	LEAD	Available to partners
2003	Ford, D.	Drip kit training and resource manual	LEAD/USAID	Manual	LEAD	Available to partners
1989	Vowles, M	Conservation Tillage. A handbook for commercial farmers in Zimbabwe	Monsanto ZFC	Handbook	Monsanto ZFC	For Sale
2000	Witoshynsky, M	The water harvester. Episodes from the inspired life of Zephaniah Phiri	Weaver Press	Book	Mr. Maseko's home (Case Study 3)	For Sale
1997	Bijlsma, M	Living Positively. Nutrition guide for people with HIV/AIDS	Mutare City Health Department	Guidelines	Mutare City Health Department	Hanout
Nil	Elwell, H., and Maas, A	Natural Pest and Disease Control	Natural Farming Network Zimbabwe	Book	Natural Farming Network Zimbabwe	For Sale
	Oldrieve, B.	Well Watered Gardens	River Of life	Manual	Rivr of life	?
	RUDO	Gardens, Self-help Garden Project	RUDO	Implementation manual	RUDO	Available to development staff

GARDEN RELATED BIBLIOGRAPHY

Year	Author	Title	Publisher	Type	location	Accessibility
?	Chugumira, A and Nyakurai, R.	Nutrition training manual. For training people involved in household nutrition gardens	RUDO	Manual	RUDO	Available to development staff
1987	Ruigi and Rukuni	Irrigation policy in Kenya and Zimbabwe	University of Nairobi	Book	RUP-UZ	Authorised accessibility
	Chigumira-Ngwerume, F	Principles of planning vegetable production. With drought in mind. Vegetables book 1.	SCCROSA	Book	SCCROSA	For Sale
1995	Epstein, L	Food for people living with HIV/AIDS	NAP+ Network of African People Living with HIV/AIDS	Cookbook	The Center	Available for sale
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ANNEX 4 Case Studies

CASE STUDY 1. TRAINING INSTITUTIONS* FAMBIDZANAI PERMACULTURE CENTER

1. Background

Established in 1988 and situated about 22km outside Harare, off the road to Kariba is Fambidzanai Permaculture Center, a registered local Trust. It is itself located in natural woodlands and aims to empower people with sustainable technologies of utilizing the existing biodiversity and assist those who cannot afford the cost of inputs. Proven technologies are delivered in a participatory way to the people of Zimbabwe and the region/world. The courses are practical thereby providing the actual experience of what it takes to apply the technology. Indeed this is a Farmer Field School away from own field.

The Center's mission statement is to: *Revitalize growth, spread local knowledge and introduce relevant skills and knowledge to restore peoples' confidence in their ability to produce off the land, working creatively and in harmony with nature.* To achieve the mission statement, the following courses are offered (for gardeners, farmers, students, NGO staff, government staff and any other interested people) within or outside Zimbabwe:

- Permaculture land use design
- Nursery management
- Natural pest and disease control
- Organic herb gardening
- Natural food and nutrition alleviation (for PLWA)
- Food processing
- Thatching
- Beekeeping

At the time of this study, it cost Z\$1 250 000.00/person/week (lower for groups) to attend any of the courses. Course durations varied and could be as long as two years culminating in a Diploma in Permaculture. Most people reportedly preferred the one week intensive courses and the most commonly requested ones were permaculture and herb processing/drying. The center offers full board facilities and shuttle services from Harare by arrangement. As many as 30 people can be accommodated at a time and priority is given to rural communities.

Fambidzanai covers an area of about 47ha of which the garden is about 2.5ha all of which can be irrigated. The garden is the responsibility of the two instructors, (Messrs Kaviri and Mukwanda at the time of this study). They had a labour force of two permanent workers and 7 casuals (there is potential for 10 during peak periods).

2 Garden Operations

Types of Crops Produced

The center produced nurseries for most of the herbs, covo, *rugare*, lettuce, cabbage, green pepper, onion rape, chinese cabbage and hot chillies, nyeve, pumpkin leaves, fruit trees, okra, tsunga, ammaranthus and black jack. The crops were reportedly available throughout the year. Indigenous and exotic tree seedlings are also produced.

Garden sales and training fees constituted most of the income generated by the center. Monthly sales totaled \$600 000.00, \$200 000.00 and \$900 000.00 for the garden, orchard and nursery. Of interest to most consumers/buyers were kitchen and medicinal herbs which included the following:

- Achnaecia,
- Moringa,
- Gutokola,
- St. John's Wort and
- Stinging Nettle.

These are said to be immuno-boosters, which are reportedly useful in cases of HIV/AIDS infection. Some money was also generated from garden tours, which cost \$5000.00/person at the time of this report.

Inputs

The center produces its own seed of lettuce, tsunga and chillies. The rest of the seed requirements are obtained from Harare.

Irrigation

The center has two high yielding boreholes but only one operates at a time. Water is pumped into an old swimming pool that is inhabited by ducks whose droppings mix with the water resulting in liquid manure. This manured water was then delivered into the garden through hoses. Thus is a good example of crop/livestock interaction.

3. Outreach Gardening Program

This program started in 1999 and targeted existing individual gardens due to resource limitations to fund new structures. In the existing structures, permaculture and a wider variety of crops and plants were introduced. This resulted in those gardens having long and short term plants, herbs, vegetables, fruits as well as water and soil conservation works hence productivity increased. Although the gardens are individually owned, the owners belong to groups, which are the point of entry for the program. Elected management committees run the affairs of the groups.

The program operates in Juru (Mash East), Kezi (Matebeleland) and Svosve (future plan) communal areas. There are 60 gardens at each site (Juru and Kezi respectively) and an officer to service the communities. Since the beginning, the center was overwhelmed by the demand for herbal gardens possibly due to the extent of vulnerability to HIV/AIDS and the envisaged benefits to PLWA. Most gardens range in area from 100m² – 300m².

In areas outside the project sites, extension services are offered upon request and participants pay for the cost of extension. Field days are sponsored regularly and these form a platform for extension to members and non-members.

4. Garden Classification and Type of Assistance

Experiences with the community gardens were not pleasing hence the move to supporting individual gardens and success was overwhelming. These individuals however, belong to groups for purposes of extension and marketing.

The center provides seedlings for herbs, fruit trees and some nitrogen fixing trees. They also distribute seed for Open Pollinated Varieties of maize. Amongst other topics, farmers are trained in herb processing after which they could sell the herbs to Fambidzanai if they faced marketing problems. They also promoted the production and marketing of conventional vegetable crops like onion, garlic and others.

Stakeholder Collaboration

Farmer training was carried out in collaboration with AREX. There was close collaboration with SCOPE whereby they brought their trainees to the center for practical sessions and this constituted a source of income for the center.

5 Donors

Save for VECO (sponsors Juru project) and HEKS (sponsors Kezi project) the center does not have any donors. It is sustained by sales from the garden, orchard and payments made by trainees. Farmers were expected to finance the Svosve project.

6. SWOT Analysis

An analysis of the Strengths, weaknesses, opportunities and challenges relating to Technical, Institutional and Socio-economic issues about Fambidzanai Training Center is given in Table 1.

Table 1. SWOT analysis for Fambidzanai

	Technical	Institutional	Socio-economic
Strengths	<ul style="list-style-type: none"> • Permaculture and organic farming expertise • Source of tested herbs used by PLWA • Trains farmers in production and processing of herbs and other crops • Low input agriculture research • Offers training in crop/livestock interactions 	<ul style="list-style-type: none"> • Offers practical training • Boarding facilities available • Seed and seedlings available throughout the year. 	<ul style="list-style-type: none"> • Provides a market for herbs • Source of seedlings • Provides a wide range of other crops

Weaknesses	<ul style="list-style-type: none"> • Budgets too small for follow up activities • Trainers too few to cope with demand 	<ul style="list-style-type: none"> • Poor funding resulting in lowering conditions at the center • Irrigation potential not fully exploited at the center 	<ul style="list-style-type: none"> • The center is too far from the needy areas
Opportunities	<ul style="list-style-type: none"> • Expertise is available • Availability of tried and proven low cost technologies 	<ul style="list-style-type: none"> • A developed training infrastructure is available • Market availability. 	<ul style="list-style-type: none"> • Demand for permaculture and herbs is there • Shortages and high cost of synthetic inputs
Constraints	<ul style="list-style-type: none"> • Personnel shortages resulting in limited support to farmers 	<ul style="list-style-type: none"> • Lack of cooperation by some NGOs • Lack of adequate resources to support garden set up 	<ul style="list-style-type: none"> •

7 Conclusion

The theme within which Fambidzanai operates is appropriate and sustainable especially now with the cost of living so high that most people cannot afford the cost of agricultural inputs and medication. It is a cheaper way of providing food and nutrition security. Considering their target group, it is necessary to have subsidies otherwise standards will drop so low resulting in the institution's failure to provide the vital training service.

It was also found necessary for support institutions to work in collaboration and not deny farmers access to useful information and support.

CASE STUDY 2. COMMUNITY GARDENSSS GWITIMA GROUP GARDEN. CHIVI DISTRICT

1. Background

Gwitima group garden is situated in ward 18 of Chivi district (natural region 5) about 55km from Masvingo town. The garden is irrigated from a dam that has 45000ML capacity. Its catchment area is 2.8km². This dam was built in 1984 by DDF under the Food for Work Program but could not be completed and CARE in collaboration with the Gwitima community, Rural District Council and DFID rehabilitated it between 1998 and 1999. The key components of the project were:

- Dam rehabilitation
- Irrigation development/establishment of gardens
- Catchment conservation
- Capacity building and establishment of community project management structures
- Agronomy/research and development linkages and
- Output marketing strategy development and food processing.

As the program tried to achieve the stated key components, community empowerment for sustainability and the need to increase food security were of major consideration.

There were 1600 households (from 7 villages) in the catchment area of the dam of which only 104 are beneficiaries in the garden. Of these, 30 are orphans and 20 elderly. The garden is divided into two parts (Eden which is 2.5ha and Canaan, 2.5 ha as well), which are 5km apart. Canaan uses seepage water from Bindamombe dam while Eden uses water from Gwitima dam. Both gardens are fenced by pig-mesh wire and cactus live fence. In terms of distance from the garden, the nearest member is 100m while the furthest is 2km away.

1.1. Institutional Roles

- CARE (provided the fence, fruit trees, cement, transport, outlet pipes, OPV seed and training.
- DDF (provided vetiver grass and the initial dam construction efforts)
- Council (facilitation and monitoring)
- Forestry (provided fruit tree care and development courses -grafting) and
- Communities (labour, financial contributions [\$30.00/person] and provision of all locally available materials).

1.2. Cost of Establishment

In 1998, the cost of constructing Gwitima dam and garden was US\$3498, about Z\$62 964.00 at the prevailing rate then. At today's rate (assuming minimal changes in the US dollar component) it would cost \$ 31 482 000 (at the rate of \$9000.00 to the USD).

2. Garden Operations

2.1. Crop Production and Marketing

Table 1 shows the cropping program for the Gwitima community.

Table 1. Cropping Program for Gwitima Garden

	Month											
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Crop												
Tomatoes,								x	X	x		
Sweet cabbage			X	X	X	x	X	x				
Onions,			X	X	X	x	X	x				
Covo,	X	X	X	X	X	x	X	x	X	x	x	x
Rape			X	X	X	x	X					
Green mealies			X	X	X	x	X					
Maize for grain			X	X	X	x	X	x	X	x	x	
Seed maize			X	X	X	x	X				x	x
Beans		X	X	X	X							
Sweet potato												
Citrus						x	X	x	X	x		
Guavas	X	X	X									
Bananas	X	X	X	X	X	x	X	x	X	x	x	x
Paw paws						x	X	x	X	x	x	x

As shown in the program, most of the crops are available from the end of the first quarter to the second quarter. Production in the other quarters is dependent on the season quality. Over and above exotic vegetables, indigenous vegetables for consumption and sale were reared in the orchard section. These included; *Nhuri yavarunde*, *chirevereve*, *mudyamvuu*, *dzvengetsenge* and *mhuu*. Medicinal properties and body fitness were given as some of the reasons why farmers still gathered wild vegetables when they produced conventional ones. Table 2 shows some of the yields for crops that were grown in the garden.

Table 2. Productivity of some crops

Crop	Yields
Maize	5 t/ha
Rape	22.2t/ha
Bananas	150 bananas/bunch at \$2000/banana =\$300 000.00/tree

The yields indicated high productivity hence the importance of the garden in food and nutrition security provision. Choice of crops and pricing were uniform for all the farmers. Household sales were largely discouraged in order to reduce thefts. Most of their vegetables were sold locally, to vendors from Masvingo, customers from Beitbridge and Gweru while some farmers exported to Botswana.

2.2. Crop Protection

It was noted that the subject of crop protection was not adequately covered during the various training sessions that the community went through. At least for those farmers present at the meeting, none of them had any knowledge about scouting for pests and diseases. They found it very difficult to distinguish pest damage from disease symptoms. There was therefore need to step up training otherwise all the good infrastructural works would be put to waste or underutilized.

2.3. Inputs

The group produced OPV maize seed for own use and sale to others. Most of the other inputs (other seed, fertilizer and chemicals) used in the garden were bought in bulk from Masvingo town (52km from the garden).

2.4. Irrigation

Except for Canaan where they tapped seepage water from Bindamombe dam and channeled it to their fields for lifting by buckets, at Gwitima they channeled water into canals (Figure 1) from which it was lifted by bucket to water the crops. Water from Gwitima dam was shared (garden, livestock and construction), a cause for concern because whenever the levels were low gardening stopped in order to save water for animals.



Figure 1: Water delivery canal. Maize crop (upper left and right) and sweet potato (left bottom)

2.5. Labour

Family members provided the labour required in the garden. Hired labour was also available and payment was usually in commodities because most of those who provided labour were food insecure and preferred food in payment for their services. A bundle of vegetables (worth \$5 000.00 at the time of the study) was enough payment for a day's labour.

2.6. Soil Fertility and Water Conservation.

Mulching and manuring were the major techniques used to maintain and improve soil fertility as well as conserve water. Vetiver grass, sugar cane and bananas were used to maintain soil and reduce erosion along the stream. Sand traps were also constructed and maintained in order to curb soil erosion.

2.7. Training

The farmers reported to have been trained in several courses including:

- Leadership,
- Marketing
- Food processing
- Grafting,
- HIV/AIDS awareness
- Conservation
- Mulching
- Poultry production and
- Savings and credit clubs.

They identified their training needs and in some cases reportedly funded their own training although CARE provided most of it. However, the farmers felt that production and pest and diseases management were not adequately covered.

3. Garden Management

3.1. Committees

Right from the start, the community was assisted and empowered to manage the project through the establishment of various management committees and training. Each committee had 7 members whose positions were Chairperson, Vice Chairperson, Secretary, Vice Secretary, Treasurer and two Committee members. Overall, females dominated office positions in all the committees and the following committees were operational:

- Dam committee (2 men = chairman and secretary, 5 women)
- Irrigation committee (3 men and 4 women)
- Agronomy committee (1men and 6 women)
- Seed bank committee and (2 men and 4 women)
- Community mobilizer. (1 men)

It was the responsibility of these committees to ensure that members observed the requirements of the constitution. In addition to the committees, monthly meetings were held to discuss general and developmental issues related to the garden. Local leadership also assisted in enforcing the rules of the constitution. Members worked in the garden on specified days, entered and left the garden at the same time. To enforce discipline, there were various fines for various categories of offences. If one was late for general work, they were fined \$1000.00, absent from general work, \$5000.00 and \$20 000.00 for fighting.

Elections to change the office bearers were held annually although the bearers did not seem to have changed with some having been in office since the project was set up.

3.2. Membership

Since the beginning, there were 104 members in the garden and this number had remained constant partly because the area under garden was finite and those who left were replaced either by their children, spouses or relatives. To become a member, one had to pay \$30.00 plus labour. Those who wished to resign were free to do so but would get no terminal benefits. Gender dynamics were reported to have changed since the beginning but could not immediately be made available at the time of this study.

3.3. Land Allocation

Both Eden and Canaan were divided into sections within which each household had 0.0075ha and a total net area of 0.06ha between the gardens. Blocking was a way of ensuring effective water and pest and diseases management.

At this particular garden, there was no room to accommodate new members because the garden was fully allocated. The constitution however, allowed for transfers of land through inheritance although such transfers had to be vetted before they could be accepted.

3.4. Financial Resources

The group had a POSB bank account, which was built up by member contributions (\$1000.00/member/month), sales from the fundraising plot, fruits from the orchard section and fines. Because of the previous experiences where there were money shortages in the banks, the members withdrew all their money and invested it in the savings and credit clubs (Fushai initiative) locally. Unfortunately, the monetary worth of the garden could not be established during the time of this study.

In order to safeguard the group's financial resources, any financial transactions had to be approved and authorized by the relevant committees. Inputs procurement, maintenance of irrigation equipment and hired labour (e.g. those hired to maintain the fence and canals) were some of the common activities that were financed from the group account.

3.5. Use of Production Manuals

The farmers received no manuals or guidelines from any of the support institutions. Instead, they bought their own reference materials from the SDMP/ZFU study circles program in which they were members.

5. Health and HIV/AIDS

In the group garden, sanitation was adequately catered for as there were toilets and evidence of them being used, at least for those visited. However, there was no clean drinking water, which posed a health risk. In addition, HIV/AIDS awareness was lacking despite earlier reference to being trained by CARE. It was still being stigmatized and people preferred to collectively deny its presence in their area even though some people could be seen with obvious symptoms. The leaders seemed to have made a resolution that no one was allowed to talk about HIV/AIDS and everyone present seemed to have been schooled accordingly. This conclusion was reached by judging from the way the leaders quickly dismissed the subject and

everyone present followed suit. Aspects of dietary diversification and balance were not understood at all.

6. Impact of Gardening on the Households

Most of those participating in the gardening project were reportedly more food secure than they were before. They were able to send their children to school with some affording even boarding fees. Some had increased their livestock numbers, bought solar lighting systems and radios for their homes. On a social scale most of the members' improved and commanded more respect than ever before. Above all community cohesion improved through the project.

Income levels varied annually depending on the season quality and productivity. At 2004 figures, the average income calculated for all crops produced in the garden was \$260 000 000.00. Production per household per year was \$2 500 000.00 from which home consumption used about \$1 100 000.00 and the remainder was sold.

7. Site Observations

- The garden had a cactus live fence. The cactus produced edible fruits that could be processed into jam although nobody seemed to be interested in them because they were seen rotting on the ground.
- The water source was well managed and reportedly reliable if the season was normal. The quality of the water was good for irrigation.
- Crop quality was fair although maize was hard hit by maize streak virus
- There was evidence of mulching and compost heaps were available.
- Conservation works were in place both in the garden and around the catchment and along the stream to try and protect the water source.



Figure 2: Banana and vetiver grass planted along the stream to protect it from erosion

8. SWOT Analysis

Table 2 shows a SWOT analysis for the Gwitima garden

Table 2. SWOT analysis for the Gwitima garden

	Technical	Institutional	Socio-economic
Strengths	<ul style="list-style-type: none"> • Easy to set demonstrations and introduce new technologies • Lead farmers can be identified and impact better on others • Seed production basics and facilities available • Improved nutritional benefits from inclusion of indigenous vegetables • Ability to identify training needs and pay for such 	<ul style="list-style-type: none"> • Common resources managed to benefit individuals • Acquisition of goods and services can be communal and cheaper • The existence of an organized group with structures. • Support reaches more beneficiaries. • Monitoring is cheaper in groups Organized structures for common expenditures. 	<ul style="list-style-type: none"> • Food and nutrition security improvement • Source of income • Garden income used to finance other farm enterprises • Change towards healthy eating habits • Community cohesion enhanced • Collective obligation towards orphans • Gender participation in committees balanced.
Weaknesses	<ul style="list-style-type: none"> • Participation of others may be overshadowed by the vocal ones • Range of crops needs improvement • Crop protection knowledge poor • Lack of planned crop-livestock interactions. 	<ul style="list-style-type: none"> • Weak stakeholder collaboration • Overstayed leaders seemed negatively too powerful. 	<ul style="list-style-type: none"> • Lack of clean drinking water • Lack of Dietary awareness • Lack of HIV/AIDS awareness
Opportunities	<ul style="list-style-type: none"> • Practical training (Farmer Field School approach) possible. • Strengthening market oriented production 	<ul style="list-style-type: none"> • Existence of management structures • Existence of a constitution that is used in management • Collaboration of stakeholders is 	<ul style="list-style-type: none"> • Potential for supplementing grain requirements • Potential for supplementing seed requirements • A cohesive

	<ul style="list-style-type: none"> Up scaling processing, value addition and storage initiatives 	<p>possible</p> <ul style="list-style-type: none"> Obtaining water rights from Bindamombe dam 	<p>group with structures</p> <ul style="list-style-type: none"> A sustainably protected garden
Constraints	<ul style="list-style-type: none"> Difficult to sell to profitable fresh markets because of distance. Water not always adequate Poor transport infrastructure 	<ul style="list-style-type: none"> Committees do not seem to be willing to leave office Some members do not seem to be interested in taking up office positions 	<ul style="list-style-type: none"> Lack of clean drinking water Change of mind set may take time

9. Conclusion

Stakeholder collaboration especially in terms of farmer training needed improvement. There was need therefore for AREX and other service institutions to move in and support the farmers technically. In the same vein, HIV/AIDS awareness creation was long overdue and needed immediate attention.



CASE STUDY 3. INDIVIDUAL GARDENS MR. ZEPHANIA MASEKO

1. Background

Mr. Z. Maseko, now 78 years of age began his water harvesting and soil conservation mission in 1966 after he was blacklisted for participating in politics. He lost his job with the then Rhodesia Railways (where he had worked as a fireman) yet he had a wife and six children to look after. He retreated to his rural home in Zvishavane, a very dry area in natural region five. The area receives low erratic rainfall characterized by wash offs and soil erosion. In a normal season, the area receives about 400ml of rain. In this region, crop production is a risky business with more chances of failure than success.

Faced with a big family to fend for in the dry unproductive area, Mr. Maseko nearly gave up on himself until one day, sitting by his kitchen he read Genesis Chapter 2 from the Bible. He was immediately inspired and wanted to emulate what he read about Adam. But where was he going to get water? He had no answer, and this thwarted his enthusiasm and inspiration.

Educationally, Mr. Maseko is a Standard 6 qualifier, but talking to him, one gets to grips with realities of a practical researcher or investigator. This is the side of him that pulled him out of poverty. He went on to construct a tank behind his house and coincidentally, during that season the area received only 230ml of rainfall. He planted crops down slope to the tank and in other fields. The result was that the only meaningful harvests came from the field down slope (which was fed by seepage from the earth tank) and elsewhere, nothing.

This realization inspired him even more and since then he never looked back on water harvesting and conservation. He constructed another infiltration pit in 1973 and if this pit filled up three times in a year he would get a year's supply of food for his family. He went on to construct tanks, more infiltration pits (with some as deep as 2m) and planted trees that benefited from water that was directed into pits. He built sand traps to stop soil from being washed off. His homestead is literally 'littered' with conservation works.



Figure 1: Mr. Maseko standing at the base of his second water-harvesting pit

He has a wife (remarried after his first wife died) and 9 children plus 5 grand children. His homestead is about 0.25ha, 0.5ha garden and 4ha of arable land. He has terrible colonial era memories when he was thrown into jail for constructing infiltration pits and planting fruit trees in his garden and arable fields. He was jailed three times before the judge visited his homestead and got convinced Mr. Maseko was doing the right thing. That was the year that he was emancipated from uninformed law enforcement agents.

2. Garden Operations

2.1 Crop Production and Marketing

His main objective in developing the garden was to ensure adequate food and nutrition security and income for his family. Depending on the quality of the seasons in terms of water and frost his general cropping program is shown in Table 1:

Table 1. Mr. Maseko's Cropping Program

Crop	Month											
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
<i>C. Gynandra</i>	X	X										x
Okra	X	X	x	x	X							x
<i>B. Juncea</i>	X	X	x									x
Tomatoes		X	x	x	X	x	x	X	X	X	x	
Rape			x	x	X	x	x	X	X	X	x	
Cabbage			x	x	X	x	x	X				
Cowpea	X	x	x	x	X							

Beans	X	x	x	x	X							
Sugarcane					X	x	x	X	X	X		
Pumpkins	X	x	x	x	X	x	x	X				x
Onions			x	x	X	x	x	X	X			

Mr. Maseko could produce all the crops listed in Table 1 throughout the year as long as he harvested enough water and temperatures did not go too low for the frost sensitive crops. At the time of this survey, Mr. Maseko's homestead was flourishing with fruits and a look around one saw all kinds of exotic and indigenous fruit trees. He exhibited a good fruit appreciation as evidenced by the wide variety and large numbers of indigenous and exotic fruits at his homestead. He reported that if the season was good, he had fruit throughout the year.



Figure 2: Mr. Maseko in his garden. Behind him yams, bananas, sugarcane and a guava tree

Fruit trees identified in his yard: Oranges, pawpaws, guavas, matamba, lemons, n'ii, masau (he said his were the only masau trees in his area), matohwe, naartjes, peaches, avocado, bananas and mango trees. Surplus fruits were sold. Crop diversity is evident at his farm thereby reducing the risk of food and nutrition insecurity.

2.2 Pest and Diseases Control

There was very limited use of chemicals if at all. He used organic chemicals like ash from *mutsviri* to control leaf eaters and aphids. He however, indicated that the chemical was not very efficient because it had very low persistence. Although he still uses it, he reckoned that intercropping with repellent crops and plants was more effective in aphid and red spider mite control.

2.3 Inputs

Mr. Maseko had 16 herd of cattle and manure from his kraal formed a major part of his production system. He mulched and intercropped extensively and practiced organic farming with very limited use of chemicals. Most of his inputs were therefore found locally. Those that he needed to buy off farm were obtained from Zvishavane, some 50+km away.

2.4 Irrigation

His main sources of water were the numerous infiltration pits throughout his garden, homestead and arable fields and small dam in the garden. He depended on harvesting rainwater as it fell and restricted as well as directed its movement. Fruit trees extracted water from the depths of the pits whereas for food crops and vegetables whose roots were shallow buckets were used to deliver the water. Where the pits were upslope, crops benefited from seepage water. In a good season, water availability was reported to be throughout the year.

2.5 Soil Fertility and Maintenance of the Infiltration Pits

He uses cattle manure and any type of organic manures to maintain soil fertility. His infiltration pits need minimal maintenance, which he does about once a year. It involves removal of topsoil that would have accumulated at the bottom and returning it to the field. He requires about 4-man days/year to do that. At the rate of Z\$7500.00/day, he therefore needs about Z\$30 000.00/year for the maintenance of the pits.

2.6 Garden Management

Mr. Maseko is a working manager in his garden. He makes the decisions as to what needs to be done and his wife markets produce and keeps the records. He consults with local AREX officers and other relevant institutions for extension advice.

2.7 Crop Livestock Interactions

Mr. Maseko had cattle and chicken and he used manure from the kraal and fowl run in the garden. He also had fish in his small dams. Although there was some form of interaction between crops and livestock, there was room for improvement.

3. Outreach

As time went on, Mr. Maseko's family became food secure yet his neighbours were starving. As a result he would have several unwanted visitors (thieves) in his garden and fields. Instead of taking the law into his hands or taking them to the police he understood that those were cries from hungry stomachs and he went all out to look for assistance so he could help them.

In his quest to help his neighbours he ended up in the United Kingdom where he presented a paper on the plight of the people in his area. His prayer was answered, he got donations from well wishers and Zvishavane Water Project was born. He, with assistance from AREX then Agritex went on a mission and assisted interested households to set up water harvesting infrastructure and to date about 60 households benefited from that project. He later retired to give way to young people who still had the energy to move around.

4. Health and HIV/AIDS

Mr. Maseko and his family made use of traditional herbs to cure different ailments and those that they used were reportedly very efficient. One herb that they regularly used to cure stomach pains was African wormwood, which was reportedly very efficient. He showed good levels of awareness of the HIV/AIDS pandemic, prevention and management. He and his wife and older children received extensive training in Home Based Care from the Ministry of Health and Child Welfare, Africare, Community and Church Leaders.

Mrs. Maseko also showed fair understanding of a balanced diet. Asked to list what she would put onto Mr. Maseko's dinner plate if she prepared him a balanced meal she gave the following:

Sadza, vegetables mixed with peanut butter, a bit of lettuce and tomato plus a fruit for disseat.

5. Impact of Gardening on the Household

Through his garden and field proceeds, Mr. Maseko managed to secure adequate food and nutrition security for his family from an otherwise very low potential area. His social status improved from owning nothing to a proud owner of 16 head of cattle. Most of his income is used to pay for inputs, and hired labour and to buy food and services.

6. Site Observations

- The garden had a live fence that provided good protection against animals. The water source was well managed and reportedly perennial (Figure 3). The quality of the water was good for irrigation.



Figure 3: One of the small dams in the garden

- Crops, and fruit trees' quality was excellent
- There was evidence of mulching and compost heaps were available.
- Conservation works to protect water source and soil were in place both in the garden and around the homestead.

- Infiltration pits and other water harvesting structures were available and well maintained.

6. SWOT Analysis

Table 2 shows a SWOT analysis for Mr. Maseko's operations.

Table 2. SWOT Analysis for Mr. Maseko's garden

	Technical	Institutional	Socio-economic
Strengths	<ul style="list-style-type: none"> •The farmer is a keen researcher •He is a source of inspiration for others •Water harvesting techniques very well developed. •Excellent knowledge of water and soil conservation 	<ul style="list-style-type: none"> •Decision making less bureaucratic •Ability to source for knowledge 	<ul style="list-style-type: none"> •Turned a low potential area into a high potential area •Commitment to teaching others •Diversified crop production thereby reducing the risk of food and nutrition insecurity
Weaknesses	<ul style="list-style-type: none"> •Knowledge lies in one individual •Uptake of interventions by neighbours slow •Some of the pits were too deep requiring water lifting technologies to water the crops 	<ul style="list-style-type: none"> •The farmer is over researched •Support from institutions was reportedly lacking save for educational visits 	<ul style="list-style-type: none"> •Slow uptake of ideas by neighbours •Hard labour is required in construction of infiltration pits
Opportunities	<ul style="list-style-type: none"> •Provides a lead farmer for others •Low cost of construction and maintenance of pits •Abundant fruit that could be processed •Water harvesting is facilitates diversified production •Fish could be produced on a 	<ul style="list-style-type: none"> •Water availability in an otherwise dry place 	<ul style="list-style-type: none"> •Potential for increased productivity in a low potential area. •Availability of a wide range of fruits

	larger scale		
Constraints	<ul style="list-style-type: none"> •Market is limited to locals and returns are low 	<ul style="list-style-type: none"> •Other farmers fear the labour involved and stay away from water harvesting •Expensive to provide extension services to just one farmer and coverage is limited •He is far from high paying markets 	<ul style="list-style-type: none"> •Mr. Maseko is too old to continue conservation works •Thefts

7. Conclusion

Like others are reported to have said, the author also believes Mr. Z. Maseko deserved honour for what he did in his great life of hard work and bravery. One fears to imagine that if his works are not inherited and preserved, the fruits of his hard labour will go to waste and the whole neighbourhood and indeed the nation (his place is a haven for researchers) will have lost. Somebody has to do something!



Case Study 4. Non-supported individual garden Vambe garden Domboshawa

1 Background

Vambe garden is situated in Chogugudza village about 35 km on the Harare-Domboshawa road. It was established in the late 50s by Mr. Vambe for the purpose of improving the food security status of his family. It is situated in a vlel about 500m from the homestead and covers about 1.5ha although the area put under effective production at the time of this study seemed to be 0.8ha. It is a self-financing garden without any form of external support. Mr. Vambe has come of age, and in 2000 he passed on management of the garden to his 5th daughter, a 41 year old widow. Ms. Vambe is a strong and confident woman who displayed a lot of understanding for the concepts of how to run a garden business. She attained an Ordinary level of education.

2 Garden Operations

Crop Production and Marketing

Table 1 shows Vambe garden's cropping program.

Table 1 Cropping Program for the Vambe Garden

Crop	Month											
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Tomatoes								x	x	x	x	X
Rape	x	x	X	X	X	X	x	x	X	X	x	X
Onions		x	X	X	X	X	x	x				
Covo	x	x	X	X	X	X	x	x	X	X	x	X
<i>B. juncea</i>	x	x	x	x	x	x	x	x	x	X	x	X
Bananas	x	x	X	X	X	X	x	x	X	x	x	X
Pumpkin leaves	x	x	X	X								X

The family produces all the vegetables listed in table 1 throughout the year but have to migrate to upper fields in the months of December, January and February when the garden became too wet. They therefore, have access to vegetables for consumption and market throughout the year though at a higher cost of protection. This additional expenditure is likely to be offset by the income because of low competition on the market.

Since the year 2001 the garden under Ms Vambe's management has served a contract with the OK/Bon Marche supermarkets. They supply vegetables to Bon Marche Eastlea and Borrowdale and Ok First and Second Street and Fife Avenue branches once every week. Interesting to note was the fact that they have served the contract for the past three years implying they have maintained the requisite quality, quantity specifications and above all consistency, which is usually the draw back of most smallholder farmers. Even more interesting was the family's understanding of the importance of maintaining a contract. Ms Vambe reported that in cases where they fail to meet the quantities required, they outsourced from neighboring farmers to ensure that they supplied on time and in the right quantities. Another important aspect

that she mentioned was that of traceability and the importance of keeping records of all operations in the garden as well as sales. She was well aware of the impact of such on food safety.

The yield estimates given by Ms Vambe were very high by any smallholder farmer standards. She estimated rape yield at 20t/ha and 120t/ha for tomatoes. This showed very high standards of production expertise and knowledge. Looking at the crops in the garden, indeed the quality was superior and up to standard.

Their estimated gross income for the year 2004 was \$15 000 000.00. The income was used to pay labour, school fees, buy food and clothing, and reinvestment into the business. They have a bank account with POSB, where they keep the money required for reinvestment in the garden. At the time of this study, that account had about \$2 500 000.00.

Inputs

Most of the inputs were obtained from MASHCO, about 1km away from the garden. However, the cost of the inputs could be so high resulting in a reduction in the area originally planned for production. A week before this interview, 100g of rape seed cost \$16 000.00 and about 100g/ha are needed if the crop is transplanted while 4kg /ha is required if direct seeded. If all other inputs were considered, the cost could frustrate the farmers and more often than not they found themselves having to reduce the proposed area under crop.

Irrigation

Their irrigation water is obtained from a dam that is about 30m away from the garden. The dam was reportedly perennial. Water is siphoned from the dam using hose pipes which are placed on the beds to irrigate until field capacity is achieved after which they change positions until the whole crop is fully irrigated. This freed labour for other activities in the garden.

The dam water is shared between the garden and cattle from the community without any problems. The Vambe family has used the dam alone since 2003. The other four potential users are currently not active in gardening. In terms of irrigation equipment maintenance, the costs were very low. Their father reportedly bought some of the hose pipes currently being used before Ms Vambe was born. They only had to replace 6m (at a cost of \$72 000.00) after it was stolen in 2004. The garden fence was also minimally maintained at a cost of about \$500 000.00/year. Other than that, their maintenance costs were next to nothing.

For household use, there were 3 boreholes within about half a kilometer of each other. The same applies to toilets, they used toilets situated at the homesteads for their convenience whenever they were in the garden.

Labour

Ms Vambe herself, her elder sister and younger brother worked in the garden. At peak operations they hired at least two more labourers at the rate of \$30 000.00/day.

Soil Fertility and Water Conservation

Contours to control water movement in the garden were constructed and maintained at least once a year. Water that spills from the dam was directed through the water way to ensure that it did not wash through the garden and cause soil erosion.

Although the family did not have cattle, they used cattle manure bought from other farmers (the last tone was bought at \$150 000.00). They had about 50 traditional chickens and manure from the fowl run was also used in the garden. They made use of composts and dead leaves from the forests. Because dead leaves took time to cure, they were used in the perennial covo crop. The other short season vegetables were treated with cured manure and composts.

Extension and Other Support Services

Although they reportedly consulted the AREX extension worker, who operates from 1km away, the family had never received formal horticultural training but used experience in their business. They never had any donation from anybody and always operated using own funds. They did not use any reference manuals or guidelines.

3 Knowledge of HIV/Aids

Ms Vambe displayed a great deal of awareness of the scourge, and some knowledge of the need for balanced diet in cases of HIV/AIDS infection. There was room for improvement though, if she could be trained. The only knowledge she relied on currently was what she acquired from school.

4. Impact of Gardening on the Household

Looking back, Ms Vambe said the garden had changed her life for the better. She managed to send her children to boarding schools, paid for the electrification of her home, her father's homestead as well as her sister's and brother's. The entire family's food security status was reportedly improved because of the garden and that the family's time was now profitably spent.

5. Site Observations

Efforts were made to confirm some of the practices reported by farmers and site inspections were carried out. The following observations around the garden were made.

Wire and poles together with a live fence of the euphorbia type fenced the garden.

The area put under effective vegetable production seemed to be just about 0.4ha though Ms Vambe claimed the rest of the garden would eventually be put under vegetables.

The water source was well maintained and reportedly reliable if the season was normal. The quality of the water was good for irrigation.

Crop quality was excellent.

There was evidence of mulching and use of organic fertilizers.

6. SWOT Analysis

An analysis of the Strengths, weaknesses, opportunities and challenges relating to Technical, Institutional and Socio-economic issues about Vambe garden is given in Table 2.

Table 2. SWOT Analysis for Vambe Garden

	Technical	Institutional	Socio-economic
Strengths	<ul style="list-style-type: none"> • Good knowledge of production and marketing techniques • Good knowledge of contract servicing 	<ul style="list-style-type: none"> • Management less bureaucratic • Can be good lead farmers through which technologies can be introduced 	<ul style="list-style-type: none"> • Garden earns real income which is used for household development <p>The family has access to leafy vegetables throughout the year</p>
Weaknesses	<ul style="list-style-type: none"> • Knowledge on production and related issues not current • No relationship with extension agencies 	<ul style="list-style-type: none"> • Difficult for institutions to provide extension at household level 	<ul style="list-style-type: none"> • Range of vegetables and fruits limited for good household nutrition
Opportunities	<ul style="list-style-type: none"> • Marketing acumen is there • Can be simpler to introduce the production of high value crops 	<ul style="list-style-type: none"> • Perennial water source • Simple irrigation technologies suffice • Experience with contract farming 	<ul style="list-style-type: none"> • Woman manager • Garden owned by a single family and less bureaucracy
Constraints	<ul style="list-style-type: none"> • The family is not aware of sources of current knowledge 	<ul style="list-style-type: none"> • Cattle breaking into the garden 	<ul style="list-style-type: none"> • High cost and unavailability of inputs • High cost of unreliable transport

7. CONCLUSION

In the presence of reliable water supplies, good management and a guaranteed market, income generation and food and nutrition provision is achievable in smallholder farming. However, where market gardening is involved, transport remains a challenge for even the most successful farmer, which underlines the importance of value addition and processing of vegetables.

ANNEX 5. Classification of Gardens

Classification	Types of gardens	Brief description	Garden ownership	Garden size range (m ²)	Advantages	Disadvantages
Community	<ul style="list-style-type: none"> Group, Consolidated, Family (belonging to members of the same family) 	<p>Each individual has own allocation within a large garden area.</p> <p>Infrastructure is used collectively</p>	Individual	400 – 80 000m ²	<ul style="list-style-type: none"> Assistance reaches more people, Communal use of resources like dams, Environmental management simpler, Cheaper to monitor, Community cohesion enhanced, Inputs can be acquired in bulk and cheaper, Organized marketing of produce 	<ul style="list-style-type: none"> Management can be less effective, Sometimes people walk too far to go to the garden, They can be expensive to set up, Can suffer vandalism from those who are not members, Too many contributions may frustrate participants, Internal disagreements can have negative effects on development Too much bureaucracy in decision making
Communal	<ul style="list-style-type: none"> Zunderamambo Cooperative 	All work towards a common good and jointly own the garden and produce	Communal	400 – 80 000m ²	<ul style="list-style-type: none"> Provision of food and nutrition security for the disadvantaged, Communal use of resources like dams, Environmental management simpler, Cheaper to monitor, Inputs can be acquired in bulk 	<ul style="list-style-type: none"> Lack of personal incentives and benefits Conflict over workload distribution May contribute to community conflict Management can be less effective, Sometimes people walk too far to go to the garden, They can be

					<ul style="list-style-type: none"> and cheaper, • Organized marketing of produce • Creates employment, • Better way of caring for the disadvantaged in communities 	<ul style="list-style-type: none"> expensive to set up, • Can suffer vandalism from those who are not members, • Too many contributions may frustrate participants, • Internal disagreements can have negative effects on development • Can be too bureaucratic in decision making
Household	<ul style="list-style-type: none"> • Individual, • kitchen 	Belonging to a specific household or individual. It can be in the yard or vle. They can be donor or self-supported	Individual	10m ² – 10 000m ²	<ul style="list-style-type: none"> • Less bureaucratic, • Conveniently located, • Can group for transport and marketing or training, • There is more flexibility, • High levels of management 	<ul style="list-style-type: none"> • Spatial distribution can make it difficult for support institutions as well as transport organization • Expensive to monitor, • Committees may not be that effective, • Fewer beneficiaries reached, • Environmental management can be difficult
Institutional	School, college, church, orphanage, hospital, training institutions	The garden belongs to the institutional authority and there is a staff member in charge of its operations.	Institutional	2500m ² – 40 000m ²	<ul style="list-style-type: none"> • Good for skills training, • Assists the less privileged, • Source of food and extra income for the less privileged and institutions, 	<ul style="list-style-type: none"> • Staff members may not be committed if there are no personal benefits, • The garden may not be prioritized when allocating resources,

Wild	All areas where indigenous vegetables, herbs and fruits grow wild.	Referring to those that emerge spontaneously and are not necessarily managed by anybody but all can harvest	Common property	Unlimited	<ul style="list-style-type: none"> • Free resources, • Sources of micronutrients, • Use may encourage conservation of biodiversity hence environment, 	<ul style="list-style-type: none"> • Overexploitation leads to extinction, • Casualties can occur if wrong plants are harvested
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ANNEX 6. Comparison of Water Sources

Water Source	Agro-ecological Zone	Advantages	Disadvantages
Shallow wells and infiltration pits	NRs I, II, III	<ul style="list-style-type: none"> • Cheap to construct using manual labour • Usually within the vicinity of the garden 	<ul style="list-style-type: none"> • Limited water supply
Rivers/streams	Popular in NRs I, II, III when rivers flow	<ul style="list-style-type: none"> • No construction required • Water is free • Maintenance costs are low 	<ul style="list-style-type: none"> • Most of them were reportedly seasonal • Conservation works difficult to implement because they are common property • Siltation over time
Small dams	NRs IV and V	<ul style="list-style-type: none"> • Low maintenance costs • Best intervention for areas with low underground water • More beneficiaries likely to benefit • Multiple uses 	<ul style="list-style-type: none"> • Need a heavy capital outlay at the beginning • Requires machinery • Resource management difficult because they are usually common property of gardeners and non gardeners

Boreholes and deep wells	NRs III, IV and V	<ul style="list-style-type: none"> • Usually contain more water compared to shallow wells • Water extraction can be manual or mechanised 	<ul style="list-style-type: none"> • Installation of pumping devices can be expensive • Difficulty and cost of obtaining spares for maintenance
Rain water	Throughout the country	<ul style="list-style-type: none"> • Free and provides the source for recharge of all other sources • Facilitates vegetable production in dry lands in summer 	<ul style="list-style-type: none"> • Too much of it results in water logging and increased pest and diseases problems • Erratic falls negatively affect production
Sand abstraction	NRs IV and V	<ul style="list-style-type: none"> • Produces water from silted rivers 	<ul style="list-style-type: none"> • Requires specialised equipment and maintenance • Tedious, costly and slow to obtain water.
Springs	NRs III, IV, V	<ul style="list-style-type: none"> • Cheap source of water • Usually perennial and reliable • Clean drinking water 	<ul style="list-style-type: none"> • Some cannot be mechanized due to local beliefs • Normally reserved for drinking water • Limited flow

ANNEX 7. Advantages and Disadvantages of Different Water Lifting and delivery Technologies

Technology	Advantages	Disadvantages
Bucket	<ul style="list-style-type: none"> • No special skills required • Common household item • No outside power required 	<ul style="list-style-type: none"> • Labour intensive • Can be wasteful of water • Risk of children drowning in

		wells or rivers/streams
Gravity (including siphons)	<ul style="list-style-type: none"> •Low labour requirement •No outside power required •Appropriate in mountainous areas •Low maintenance •Limited skills required 	<ul style="list-style-type: none"> •High water requirement •Distribution of water is not always even especially where flood irrigation is used. •May require canal infrastructure
Manual Pumps (treadle, elephant)	<ul style="list-style-type: none"> •No outside power required •They are simple to operate •Locally produced •Simple maintenance •Compatible with other simple technologies - drip kits and gravity systems 	<ul style="list-style-type: none"> •Labour intensive •Mechanism of operation can be uncomfortable •Cost of purchase in current economic climate can be too high
Windmill driven pumps	<ul style="list-style-type: none"> •Free energy •Simple proven technology •Low maintenance •Maintenance relatively simple •Locally produced 	<ul style="list-style-type: none"> •Insufficient wind in some areas •High initial cost of installation •Shortage and cost of parts in current economic climate
Diesel powered pumps	<ul style="list-style-type: none"> •Reliable and proven technology 	<ul style="list-style-type: none"> •High initial cost of installation •Shortage and cost of fuel and parts in current economic climate •Requires specialist maintenance
Taps and hoses	<ul style="list-style-type: none"> •Labour saving 	<ul style="list-style-type: none"> •Need piped water or a high

		head to support irrigation •Hoses can be expensive •High cost of water in urban areas
Drip kits	•Relatively cheap to acquire •Labour and time saving •Water saving •Simple technology •Simple maintenance •Simple infrastructure requirements to install	•Loading water into the tanks can be laborious. •Shortage/unavailability of spare parts •Lack of information on suitability of different types for smallholder conditions

ANNEX 8. Checklists used in the Review

GARDEN BASED PRODUCTION ACTIVITIES FOR FOOD SECURITY IN ZIMBABWE

Checklist for Implementing NGOs

Full official name of organization.....

Common name.....

Name of respondent..... Position.....

BACKGROUND

1. Main objective of organisation in development?
2. Other development activities being implemented?
3. Priority of garden based activities in terms of the following:

Activity	Top priority	Medium priority	Low Priority
Human resources			
a) Financial Resources			
b) Material Resources			
c) Other			

4. History of support for garden based activities in the country
5. Total number of gardens supported (current, other). Number increased or decreased
6. Type of support to garden activities.
 - a) Technical/extension
 - b) Garden fencing
 - c) Irrigation tools and equipment
 - d) Starter packs (e.g. seed, chemicals, fertilisers)
 - e) Marketing
 - f) Food processing
 - g) Other (specify)
7. Extension and extension methodologies used
 - a) Group extension.....
 - b) Farmer Field School.....
 - c) Junior Farmer Field School.....
 - d) Train and visit.....
 - e) Lead or contact farmer
 - f) Extension by request

g) Other (specify).....

8. Collaboration with other stakeholders in implementing, planning, monitoring and evaluation of projects

Name of Organization	Planning	Monitoring	Evaluation

9. Objective in supporting garden activities

- a) Nutrition for PLWA
- b) Household food and nutrition security
- c) Market gardening
- d) Other (specify)

10. Location of gardens supported

- a) Communal/rural areas
- b) pre year 2000 resettlement areas
- c) new resettlement area
- d) Urban
- e) Combinations
- f) other specify

11. Inventory of the gardens supported.

Organization	Natural region	Province	District	No. of gardens per ward (indicate ward nos.).	Type of support	Garden size	Donor(s)	Type of garden	Number of beneficiaries per ward	Technical implementing partners	Crops produced	Water source/reliability	Irrigation and water delivery technology

12. What is the average size of land holding per farmer? m²

FINANCES

13. Source of funding and annual budget

BENEFICIARIES

14. Beneficiary selection criteria and influence of NGO on such

CROP PRODUCTION

15. Crops promoted and influence of NGO on crop types
16. Production of traditional vegetables and herbs?
17. Production technologies promoted?
 - a) Intercropping.....
 - b) Monocropping
 - c) Rotation.....
 - d) Soil and water conservation.....
 - e) Other (specify).....
18. Dietary diversification messages
19. Potential for garden production for food security?
.....
20. Factors hindering the development of garden activities in Zimbabwe? Solutions
22. Other pertinent issues for discussion

**GARDEN BASED PRODUCTION ACTIVITIES FOR FOOD
SECURITY IN ZIMBABWE
Checklist for Training Institutions**

Official name of institution:.....

Respondent:.....

Position:.....

1. Year training institution was established

GARDEN PRODUCTION

2. Courses offered?

Course Title	Topics Covered	Duration	No. of times offered per year	Pre-requisites for course participants

3. Course content design

a) **Pre-designed by trainer**

b) **On request by participants**

c) **Other**.....

4. Extension support services and methodologies used?

PARTICIPANTS

5. Total participation to date/ annual. Gender.

6. Increase or decrease of intake. Reasons.

7. Methodology for recruitment of participants?

RESOURCES FOR ORGANISATION

8. External support

Name of Donor	Nature of Support (grant/year)

9. Responsibility for garden operations, labour, holiday arrangements

10. Source of water for the garden and reliability

Dam

River

Borehole

Deep well

Municipality

Other (specify).....

11. Water uplifting and delivery

12. Crops produced in the garden. List.

13. Use of manuals and guides during training. Handouts.

14. Source of the manuals

INPUTS

15. Source of inputs?

.....

16. Follow up on graduates

17. Marketing of produce and reliability

18. Annual income from the garden and its uses

19. Collaboration with other institutions

20. Support that you need to improve your efficiency?

21. Institutional strengths and weaknesses?

Any other comments

.....
.....
.....

GARDEN BASED PRODUCTION ACTIVITIES FOR FOOD SECURITY IN ZIMBABWE

Checklist for P/DAEOs

1. Institutions supporting gardens in the area and where they are operating.

Name of organization	District	Ward

2. Collaboration with other stakeholders?

Name of Organization	Planning (yes/no)	Monitoring (yes/no)	Evaluation (yes/no)

4. Garden classifications found in your area?

5. Total land under garden cultivation in the districts

District	Land under garden cultivation (ha)

6. Average size of the gardens?.

7. Average size of individual beneficiaries plots?

8. Sources of water for gardens in your area?

9. Water lifting and irrigation technologies are used?
Potential for garden production in your area? Why

10. Problems encountered by the district in garden related activities?

11. Possible solutions to these problems

GARDEN BASED PRODUCTION ACTIVITIES FOR FOOD SECURITY IN ZIMBABWE

Checklist for Case Study Individual/Household

Province.....

District.....

Village

Name of household.....

Respondent.....

Position in the family.....

Year started.....

Size of garden.....m²

Actual positioning of the garden.....(e.g. vlei, etc)

Distance of the garden from the homestead? (miles, meters, kilometers)

1. Initiator of the garden project?

Household head, Donor, Family, AREX or other

2. Purpose for which the garden set.

3. Family members living with HIV/AIDS. Give their day's diet.

4. Knowledge about a balanced diet?

5. Role of vegetables in nutrition for PLWA?

6. Awareness/training in nutrition and HIV/AIDS

Topic	Resource person/institution
Nutrient retention in food processing	
Food storage	
Hygiene and food handling	
Other (specify)	

7. Garden management responsibilities? Why?

8. Source of garden labour

9. Crops produced in the garden.

Can you give the cropping program that you used in 2004

	J	F	M	A	M	J	J	A	S	O	N	D
Crop												

10. Wild gathering of vegetables. List.

11. Source of inputs and distance from home/garden

Seed

Fertilizer.....

Chemicals.....

12. Yields

Crop	Yields

13. Major problems in garden crop production

Acquisition of inputs.....

Pests and diseases.....

Water availability.....

Production know-how.....

Marketing infrastructure.....

Other (specify).....

14. Use of manuals/production guides and list

15. Source of markets for produce, average income from sales, use of the income.

Impact of income on standard of life

16. Vegetable consumption patterns

Vegetable	Quantity consumed/day

20. Livestock ownership, which ones?

21. Use of manure

Crop	Manure used and how often

22. Source of irrigation water, Reliability

Dam.....

Deep well.....

Shallow well.....

River.....

Stream

Other specify.....

23. Water lifting and delivery technologies

24 Equipment maintenance, frequency and source and availability of spares

.....

25. Water for household use and reliability?

Source

Reliability

Dam.....

.....

Deep well.....

.....

Shallow well.....

.....

River.....

.....

Stream

.....

Other (specify).....

26. Soil and water conservation techniques

27. Use of traditional chemicals in the control of pests and diseases?

Chemical	Pest	Disease	Efficiency

28. Perception about use of traditional chemicals in gardens?

.....

29. Use of traditional chemicals to reverse disease symptoms in human beings?

Chemical	Symptoms	Efficiency

30. Use of traditional chemicals in treating symptoms in human beings?

Symptoms	Chemical

31. Extension services and from who?

Topic	Who provided training	When

32. Areas of weaknesses that you still need support for?

-Training (production, marketing, crop protection), HIV/AIDS awareness,
Finance, Nutrition training/awareness, Other (specify)

SITE OBSERVATIONS

- The existence of live fences.....
- Estimated distance of garden from water source.....m/km
- Distance from homestead.....
- Use of mulching.....
- Intercropping.....
- Existence of fruit trees.....
- Use of animal manure.....
- Other conservation works.....

**GARDEN BASED PRODUCTION ACTIVITIES FOR FOOD
SECURITY IN ZIMBABWE
CHECKLIST FOR GROUP AND COMMUNAL GARDEN**

Province.....

District.....

Village

Name of Garden.....

Year started.....

Size of garden.....m²

Average size of land holding per farmer?.....m²

Actual positioning of the garden.....(e.g. vlei, etc)

Distance of the garden from:

a) nearest member.....

b) furthest member.....

BACKGROUND

1 Who initiated this garden project?

Donor.....

Family.....

Community

Kraal head.....

AREX.....

Other (specify).....

2 Assistance received in setting up garden

Name Organisation	Nature of support	Once off/continuous

3. Objective for setting up garden

a) Nutrition for PLWA

b) Market gardening

c) Household food security

d) Other (specify).....

MEMBERSHIP

4. Number of beneficiaries, increased or decreased since the beginning.

Gender	Original Number	Current Number	Marital status	Reasons for change
Females				
Males				

5. Beneficiary selection criteria
- a) PLWHA
 - b) Widowed females
 - c) Widowed males
 - d) Both widowed males and females
 - e) Elderly
 - f) Single parents (never married or divorced)
 - g) Youth
 - h) Other.....

6. Presence of those infected or affected by HIV/AIDS in project and how many?
- PLWHA.....number.....
- People affected by HIV/AIDS.....number.....

MANAGEMENT

7. Presence of a management committee, its roles, gender?

Position	Responsibilities	Gender	How were they chosen

8. If committee members are voted for, how often are the elections held?
9. Frequency of management committee and general meetings, issues discussed
10. Presence of a constitution and its provisions on the following?
- a) Discipline of members
.....
 - b) Labour for garden activities
.....
 - c) Joining or resigning from the group

.....

d) Transference of membership (e.g. through inheritance)

.....

e) Other

.....

FINANCIAL RESOURCES

11. Generation and allocation of funds for common garden related activities

Activity	Amount
Membership subscriptions	
Crop sales	
Donor grant	
Other (specify)	

12. Presence of a group bank account and where? Amount in account?

13. Security measures to safeguard group money

.....

14. Income sharing and how often?

15. Common activities that require money? Estimated expenditure on each?

- a) Input procurement
- b) Maintain irrigation equipment
- c) Hired skilled labour (e.g. Fence erectors, builders)
- d) Other (specify).....

16. Adequacy of financial resources to cater for garden needs? Shortfalls?

PRODUCTION

17. Source of labour for garden. Reliability?

18. Crops produced in the garden

Please give your cropping program for 2004

	J	F	M	A	M	J	J	A	S	O	N	D
Crop												

19. Any vegetables gathered from the wild? List

20. Reasons for gathering

.....

INPUTS

25. Source of inputs? Distance from home/garden

Seed

Fertilizer.....

Chemicals.....

26. Crop yields achieved?

Crop	Yield

27. Major problems in producing garden crops?

Acquisition of inputs.....

Pests and diseases.....

Water availability.....

Production know-how.....

Marketing infrastructure.....

Other (specify).....

28. Use of manuals/production guides in the garden. List ones used?

SOIL FERTILITY MANAGEMENT

29. Soil fertility maintenance methods?

Manure	Crop
.....
.....
.....
.....

30. Source of manure?.....

MARKETING

31. Major markets for garden produce. Income from the produce.

a) Households in the community

b) Vendors

c) Markets outside the village

d) Other (e.g. Schools, clinics, restaurants)

32. Impact of market gardening on standard of living for members? Indicators.

HEALTH & HIV/AIDS

33. Give an example of a balanced meal for dinner.
.....

34. Role of vegetables in nutrition for PLWHA?
.....

35. Training/awareness concerning nutrition and HIV/AIDS? Facilitators for training

Topic	Resource person/institution
Nutrient retention in food processing	
Food storage	
Hygiene and food handling	
Other (specify)	

IRRIGATION WATER

36. Source of irrigation water/other uses. Conflict of interest.

Dam.....

Deep well.....

Shallow well.....

River.....

Stream

Other specify.....

37. Water source reliability?

All year round.....

February to August.....

February-October

Other (specify).....

38. Water lifting and delivery technologies

Water lifting technology	Delivery technology

39. Equipment maintenance and frequency. Availability of spare components.

PEST AND DISEASE MANAGEMENT

40. Pests and diseases management strategies in the garden? Use of herbs

Chemical (synthetic or traditional/herbal)	Pest/Disease	Efficiency

41. Use of herbs in reversing disease symptoms in human beings?

Chemical	Symptoms	Efficiency

42. Areas of weakness that you think need external support?

- Training (production, marketing, crop protection).....
- HIV/AIDS awareness.....
- Finance management.....
- Nutrition training/awareness.....
- Other (specify).....

SITE OBSERVATIONS

- The existence of live fences.....
- Estimated distance of garden from water source.....m/km
- Use of mulching.....
- Intercropping.....
- Existence of fruit trees.....
- Use of animal manure.....
- Other conservation works.....