Making home gardening a viable livelihood option in rural areas of South Africa: the case of Guquka and Khayalethu in Central Eastern Cape[1]

N. Monde[2], G. Fraser[3], JJ Botha[4] and K Anderson[4]

Abstract

Findings of studies conducted in central Eastern Cape show limited use of arable land by the majority of rural households who have access to it. Several factors have contributed to this low land use intensity. Lack of means to cultivate the land, shortage of labour, drought, land degradation and poor soils were mentioned amongst other factors. These constraints have caused shifts from field cropping to home gardening. Nevertheless, these constraints are also experienced in home gardens. Home gardening in rural areas is characterized by a rain-fed production system. Food security of most rural households is primarily based on the purchase of food with income derived from employment or from claiming against the state. Although home gardening also contributes to household food security, its contribution is very small and the provision of food is cyclical, with periods of abundance being followed by periods of hunger. Periods of hunger more or less coincide with the dry season, and primarily affect the poor households, because they lack the income to replace food from own production with purchased food. In an attempt to improve the contribution of home gardens to rural livelihoods, a water harvesting technology was introduced in two villages of central Eastern Cape. Under the new tillage system, the yields of crops grown increased by 40 to 70%, enabling rural households to benefit more from their gardens. The new technique introduced in the study area has the potential to reduce total runoff to zero and transpiration considerably, resulting in increased yields due to increased plant available water.

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1. Introduction

Rural areas of South Africa are marred by problems of poverty and food insecurity. About 80% of households in the study area earned incomes that were below the poverty line (Monde *et al*, 1997; Monde, 2003). People rely on external economic activities, especially state grants for a means of living, which contribute more than 90% to household income (Van Averbeke, *et al*, 1998; Fraser *et al*, 2003). In terms of rand value, internal sources make insignificant contributions (less than 10%) to household income. Amongst the internal economic activities is farming, especially crop production. However, recent work conducted in rural areas of central Eastern Cape have shown limited use of arable land by the majority of rural households who have access to it (Mbuti, 2000; Bennett, 2002). During the past two decades a large number of people have shifted from field cropping to home gardening. A number of constraints experienced in field cropping have been identified as the main reasons for this shift. Among these constraints are drought, lack of tenure security, lack of financial capital, poor soils and land degradation. Nevertheless, farming appears to be the most important local economic activity judging by the number of households who are engaged in this activity even though its contribution to household income is less than 5%.

The main food acquisition strategy for rural households is by purchasing food from urban markets rather than producing own food. Generally, rural areas are thought of as places where a surplus of food is produced for urban centres. However, in the study area, and in other communal areas of South Africa, this is not the case, and it has not been for a considerable period of time. Although home gardening is a growing trend in rural areas, its contribution to livelihoods is still unknown. In spite of every household having access to a garden, own production of food does not contribute significantly to food security in rural areas. Just like field cropping, home gardening is faced with a number of constraints. The most important constraints in home gardens are limited access to irrigation water, land degradation and poor soils, as well as lack financial and human capitals. These constraints limit the amount of production obtained. In addition to this, own production of food takes place during one cropping season (wet season), and due to lack of proper storage facilities, benefits obtained during the wet season, are not transferable to drier seasons.

Despite these constraints, studies conducted elsewhere in South Africa showed the importance of home gardens in securing the food needs of the poor. It is believed that cultivation of home gardens is a potential way of increasing households' access to food that is adequate both in terms of quantity and quality. Indeed numerous attempts in South Africa have been made to implement gardening programmes towards this goal. However, these attempts often fail to improve food security of the poor. The main reason for this is that previously most food security initiatives have been considered independently of the environment. Today the importance of sustainable agricultural development is being recognized. Food security and the environment are being seen as essentially complementary, based on the interdependence between food security and a healthy natural resource base (Moorehead and Wolmer, 2001). In an attempt to improve the contribution of home gardens to livelihoods and increase food security at household level, a water harvesting project was introduced in Central Eastern Cape, South Africa. The initiative was a collaborative effort between the Agricultural Research Council (ARC) and University of Fort Hare (UFH). The project received funding from the Water Research Commission (WRC). The aim of this

paper is to demonstrate how home gardening in the study area was harnessed with the aim of ensuring that it contributes meaningfully to the lives of rural people without negative effects to the environment.

2. Methodology

2.1. Description of sites

The target areas of the study are Guquka and Khayaletu villages, which are situated in the central part of the Eastern Cape Province, South Africa about 120km west of East London (see map 1). Guquka and Khayaletu are located some 30 km north east of Alice. The residential land at Guquka supports about 190 households and the village has a total population of 750. At Khayaletu, there are about 213 households with a total population of 1250. The villages lie just below the escarpment of the Amatola Mountains with the upper Tyhume River flowing past them. The Tyhume River acts as a border between the two villages. Climatically, the area in which these villages lie can be described as sub-humid. The mean annual rainfall ranges between 700 and 800 mm.

2.2. Methods

In April 2004, a water-harvesting project was introduced in the study areas. The focus of the project was on home gardens whereby an In-field Rain Water Harvesting (IRWH) technique was introduced and adopted by local people. The project started off with two households (one in each village) that were used as demonstrations. By the end of 2004, 22 households (12 in Guquka and 10 in Khayaletu) adopted the technique. By June 2006, there were 58 households who joined the project. In June 2005, the socio-economic impact of the technique was measured. A garden study was conducted amongst 60 households, 30 from each village. The respondents consisted of both project members and non-members. The investigation was on home gardening generally, and questions about the impact of the technique were asked amongst the project members.

3. Biophysical characteristics of the study area

The biophysical characteristics of the study areas are dynamic and impose limitations to rural livelihoods. Topography and landscape together with past and current agricultural practices have had negative environmental and health implications in the study area. The study areas are located at a high altitude of more than 700m. The high altitude provide for a relatively short growing season and frequent frost during winter months. Although the annual rainfall is high, the intensity is also high. In addition, the wet season is very short (October through March). Winter is generally dry with only about 7% of the annual rainfall is received during winter compared to about 70% in summer. Soils have variable depths with fine sandy clay loam or clay loam textures of relatively slow permeability. The distribution of soils in the study area is closely related to topography and parent material (Verdoodt *et al*, 2000). The main parent material consists of a variation of sedimentary rocks, including shales, mudstones and sandstones, but in places, dolerite, a basic dyke rock, is found at the surface (Verdoodt *et al*, 2000). Topographically, the study area is located on two river terraces, separated from each other by a steep slope. On the lower terrace, found at the bottom of the valley, are poorly drained Katspruit and Kroonstad type soils occurred where micro-topography prevents rapid drainage. Shallow

Mispah and Glenrosa type soils are dominant on the steep slope separating the two terraces, but Westleigh and Longlands type soils, often subject to gully erosion, are also found. The second terrace, which is sloping, supports well-drained Oakleaf soils on the ridges and imperfectly drained Oakleaf soils in depressions. Oakleaf and Glenrosa soil types are less suited for crop production.

Low rainfall and steep slopes are major factors limiting yields of crops. Run-off is a major cause of soil water losses. Soil conservation is a priority in these areas, because of their persistent susceptibility to erosion. Chemical analysis of soils showed cultivated soils to have low organic carbon contents, ranging from 0.37 to 1.36%, and low levels of base saturation, ranging from 52 to 99% (Verdoodt, *et al*, 2000).

4. Importance of home gardens in rural areas

Home gardens are food plots within the boundaries of residential sites. Garden sizes vary considerably from household to household and between villages depending on the size of residential sites. On average, the garden size was 311m^2 in Guquka ranging from 150m^2 to 1500m^2, whereas Khayaletu households had an average size of 175m^2 ranging from 50m^2 to 720m^2. Generally, Guquka households have bigger gardens than Khayaletu. But unlike Khayaletu, the residential sites in Guquka are not equal. Those who became residents before 1960s, have access to larger residential sites and hence larger garden areas. After 1960, the betterment planning (BP) policy was introduced in South Africa with the aim of combating soil erosion and land degradation. The BP had a negative effect on agriculture resulting in smaller arable land allocations as well as reducing the residential sites. As a result, those who became residents after 1960s had access to smaller residential sites, and hence smaller gardens. The Khayaletu village was developed recently during the 1950s and was a repository for farm labourers who were evicted from white-owned farms in the Hogsback-Cathcart area. The Khayalethu residents were settled on the part of rangeland that belonged to Guquka and had smaller residential sites than Guquka, and as a result, the gardens are even smaller. The crops grown in home gardens include grains, pulses, cucurbits, tubers and vegetables. Staples (maize and potatoes) tend to occupy a larger area (half of garden area) than any other crops.

Rural households obtain food needed by their family members from home gardens. One of the staple products of a rural household diet is maize. When still green, maize is consumed as a vegetable (green maize). When dry, it is mainly consumed as maize meal and samp (crushed maize). These are the main ingredients of a rural household diet. Households in the study area processed the maize obtained from gardens locally into meal and samp (see plate1).

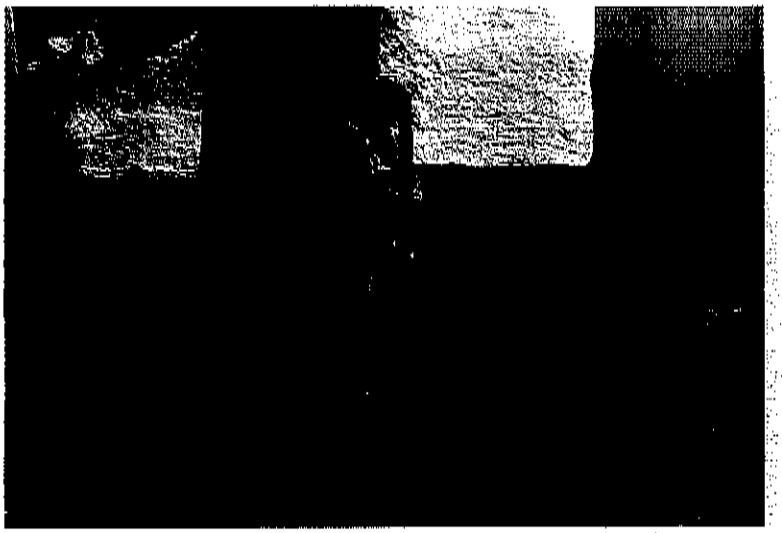

Plate 1: Woman processing maize into samp at home

Produce obtained from gardens is not solely for human consumption. Some of the produce is fed to livestock kept around homesteads. Maize is a good example in this regard. The animals that benefit from the garden produce include chickens, pigs, sheep and goats.

Another reason for rural households to engage in home gardening is to earn income. A portion of garden produce is sold locally to neighbours and friends. Money realised from the sale of products is either used to buy other food products or attend to other pressing needs such as children's school fees. This shows that gardening in rural areas is much more important than just for food security reasons.

Gardening also enables households to have access to other food products that could not be potentially produced in the area. These products include sugar, rice and flour and are also the main ingredients of a rural diet. These products are obtained mainly through purchasing them from supermarkets in urban areas. However, it is not unusual for some food products to be finished a week or two before the next purchase. Often rural people do not have cash to immediately replace products that have run out of stock. It is at these times that garden produce becomes important. People exchange garden produce for these products. And for that reason, gardening in rural areas can be seen as one of the coping strategies of rural people to deal with food shortages. Unfortunately this only takes place during one season (wet season). In other seasons, households hardly get anything from their gardens and hence more vulnerable to food insecurity, especially during dry seasons.

Lastly, home gardening enables people to have access to social capital. Through home gardening, rural people establish a relationship network. A certain percentage of the food produced is donated to friends, relatives and neighbours. The food donated acts as an insurance for the donating household to feel free to ask for favours or help when in need. This could be in terms of getting help to accomplish certain tasks other than gardening. Households on the receiving end feel obliged to return the favour or donate the same or different food items when requested. That way, relationships between households become stronger as there is always a will

to accomplish certain tasks together. In future people always feel comfortable to ask for any kind of help even without having to donate something.

5. Improving production of home gardens

5.1. Soil water conservation practices

The climatic conditions in these areas put high demand on soil-water management. The risk of crop failure due to droughts and dry spells is increased by erratic and high intensity rainfall. The soil cannot absorb the amount of water, which falls in a very short time, and as a result, rainfall often causes large amounts of surface run-off. These climatic factors therefore call for soil-water conservation practices that will reduce runoff and increase soil-water content in order to improve crop yields significantly. At Guquka, a number of farmers took the initiative and constructed dams inside the garden areas, which were used as catchments for runoff (see plate 2) and providing water for irrigation. However, for reasons associated to culture, lack of expertise and safety the rest of households in the village would not adopt this practice.

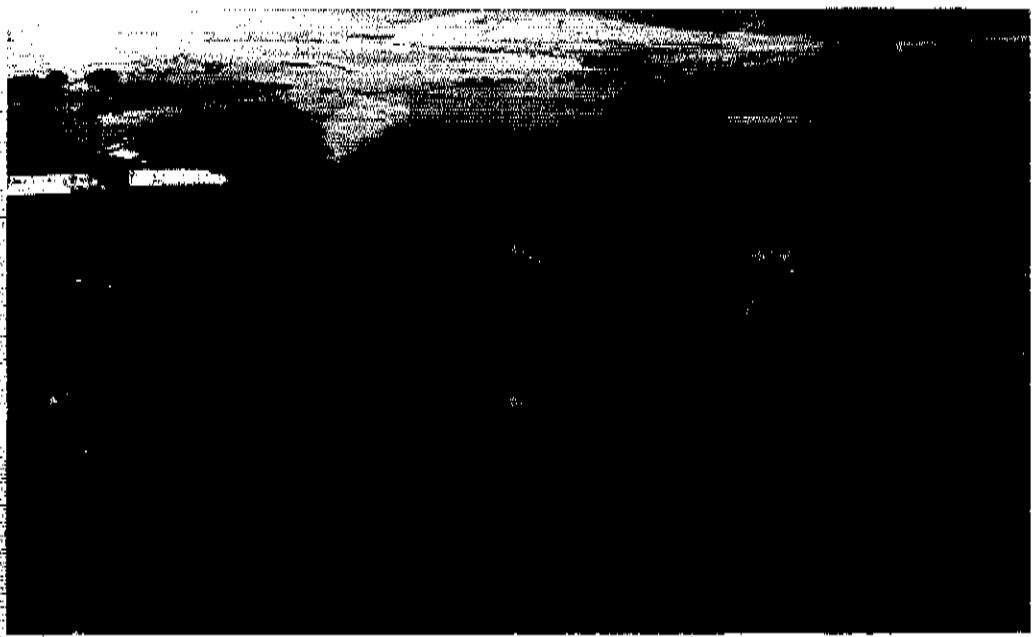

Plate 2: A dam constructed inside the garden at Guquka

When people would not adopt this type of water harvesting, other water harvesting techniques were introduced in the study areas. According to Duveskog (2001), water harvesting is a term describing methods of collecting and concentrating various forms of runoff. The in-field rainwater harvesting (IRWH) technique was introduced and adopted in home gardens. The IRWH combines the advantages of water harvesting, no-till, basin tillage and mulching on high drought risk clay soils. This innovative water conservation technique has the potential to reduce total runoff to zero and transpiration considerably, resulting in increased yields due to increased plant available water. The IRWH technique introduced in these areas consists of promoting rainfall runoff on a 2m wide strip between alternate crop rows, and storing the runoff water in the basins (see Figure 1). Water collected this way can infiltrate deep into the soil below the surface

layer from which evaporation takes place. After the basins have been constructed conservation tillage is applied to the land as a whole.

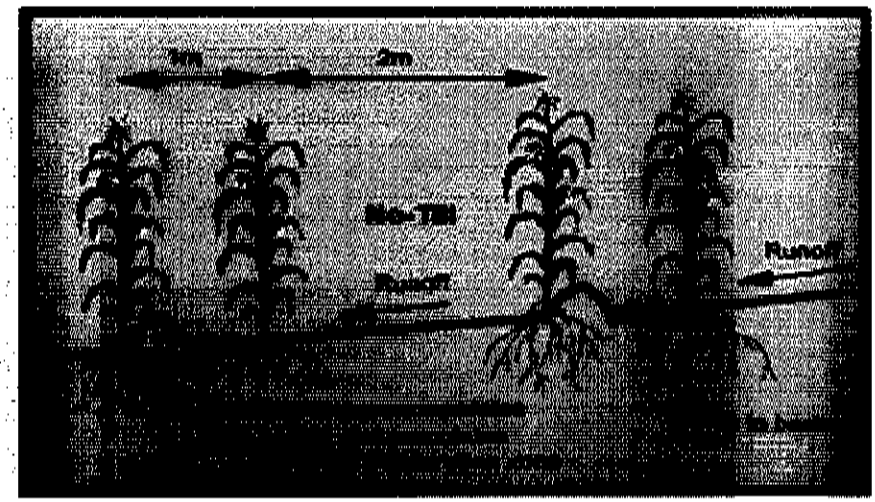

Figure1: A diagrammatic representation of the in-field water harvesting technique

Conservation tillage refers to the practice where soil manipulation is reduced to a minimum. The practice conserves soil structure, increases soil moisture availability, and reduces runoff and soil erosion. Before this new tillage system was introduced in the study area, households practiced a conventional tillage system. Conventional tillage has a negative effect on the soil by disturbing the structure of the soil and compacting it. In the long run the soil fauna is destroyed as a result of disturbance and turning over of soil, which is then exposed to drastic atmospheric and climatic conditions (Duveskog, 2001). With the conservation tillage system, the land is prepared without the use of a conventional mouldboard plough. Instead, equipment such as spades and/or hand hoes are used to open soils to a minimum extent, only to make the insertion of seed possible as well as to break hard pans. Plate 3 shows how the technique was applied. At the time of the transfer of the technique, it was time to plant maize and local people wanted to plant maize in their gardens. So, maize was the first crop to be tried under the new system. The demonstration plots did well in all respect in terms of plant population, height of maize stands and quality of cobs (see Plate 4).

Plate 3: A group of women learning how to make basins

Plate 4: Gardeners showing off their maize planted under the new tillage system

However, during winter, plants showed symptoms of stress in spite of the IRWH technique applied. People were then encouraged to harvest water from the roofs for the purposes of irrigation. The main problem with this technique was the lack of water storage containers amongst households. The project initiators requested funding from government. The funds obtained were enough to purchase only 14 rainwater tanks of 2500 litres each. Each village received seven tanks of which one was installed at the school. At that time, the project was already expanded to two primary schools, one in each village. The remaining six tanks were

installed in six households, and project members who did not receive the tanks had access to water collected in the tanks.

5.2. Empowering of local communities

At the start of the project, intensive training was conducted. The training began with the local service provider, extension agents of the Eastern Cape Department of Agriculture on the technique and on various agronomic practices. The aim of involving extension officers in the project was to make sure that the project would be sustainable in the long run. When development is introduced in rural areas, there is often a mistake of not building the capacity at local level. While this involves empowering the beneficiaries of the project, it also means empowering and making all stakeholders part of the development. These people are likely to be available to local people even when the project initiators have made their exit. So, involving and building the capacity of extension officers in the process was a powerful move by the development initiators. Following the training of extension officers, the training of local people took place. Most of the training took place in the field and was participatory in nature. This gave respondents an opportunity to make informed decisions about farming practices through discovery-based learning. The focus of training was on field observations and hands-on activities. Respondents also received training on general crop management practices such as soil fertility, crop rotation and disease and pest control

In addition, training involved a learning environment that helped the beneficiaries to build their capacity and leadership skills. The emphasis was on empowering people to implement their own decisions in their own fields. Each village was encouraged to form a water harvesting committee whose main responsibilities was to look after the needs of the project members such as to convene regular meetings. The committee members were trained on management, leadership, communication and conflict resolutions through a workshop approach. The formation of these committees was absolutely necessary as the local structures known as Residents Associations were not active. There were also no farmers' association looking after the interests of local producers. All interventions promoted previously seemed to lack an element of capacity building at local level. As soon as the initiators make their exit, the targeted community goes back to where it was before the intervention and sometimes even worse. Building capacity at local level was to avoid this from happening.

One of the challenges of the IRWH technology was the fact that the technique is hands-on. As already mentioned, labour is a limiting resource in the study area. It was observed that people in the villages resorted to exchange labour to carry out non-farming activities. Exchange labour consisted of labour resources from two or more households that are combined in order to accomplish certain tasks. The project members were then encouraged to do the same for garden activities. Project members began to form informal working groups, with the aim of working collectively on one garden after another until each member's garden had been attended to. However, in practice, the level of commitment of many group members has proven to be weak, such that these arrangements have faltered.

6. Impact of IRWH technique

The IRWH technique had a positive impact on the yields of all crops grown. Table 1 shows the main crops grown at Guquka and Khayaletu, the average yields obtained as well areas allocated to these crops. The table compares yield figures obtained under conventional and IRWH tillage systems. As demonstrated in the table, yields increased considerable under the IRWH technique.

Table 1: Average yields of main crops obtained and areas planted during 2004/05 cropping season both under conventional and IRWH at Guquka and Khayaletu

	Guquka				Khayaletu			
	Conventional tillage		IRWH		*Conventional tillage*		IRWH	
Main crop	**Average yield (kg)**	**Average area (m2)**	**Average yield (kg)**	**Average area (m2)**	**Average yield (kg)**	**Average area (m2)**	**Average yield (kg)**	**Average area (m2)**
Maize	21	96	43	96	18	78	34	78
Potatoes	22	54	0	0	27	62	0	0
Beans	11	23	18	30	10	21	10	21
Carrot	1	4	8	22	1	6	6	18
Cabbage	5	20	13	36	4.5	20	9	27
Spinach	3	15	15	28	2	12	11	20

Table 2 gives an indication of average yields as well as incomes realised from an area of one square metre when IRWH was applied. These figures were compared against optimum levels of yield expected from the area under irrigation. The optimum figures were obtained from Khosa (2003). It was difficult to get optimum levels for dryland conditions as such figures usually depend on the amount of rainfall and types of soils in that particular area. The information presented in Table 2 also shows the prices per kilogram of a particular crop. It is important to note that these reflect local prices and not market prices. These were average prices at which a product was sold at local level. This information enabled the calculation of income received by households from each crop as demonstrated in the table, showing the economic benefits derived from home gardens. Although incomes were still low, these figures doubled those obtained when the conventional tillage system was applied.

Table 2: Average yields obtained from an area of one square meter at Guquka and Khayayletu under IRWH

	Guquka	Khayaletu	G/K	G/K	Guquka	Khayaletu
Crop	**Yield kg/m^2**	**Yield kg/m^2**	**Optimum kg/m^2**	**Price R/kg**	**Income/m^2**	**Income/m^2**
Maize	0.4	0.4	1.5	1.50	0.60	0.60
Potato*	0.4	0.4	1.8	1.80	0.72	0.72
D.beans	0.6	0.5	7	1.40	0.84	0.70
Carrot	0.4	0.3	2.9	1.50	0.60	0.45
Cabbage	0.4	0.3	10	1.50	0.60	0.45
Spinach	0.5	0.6	6	1.00	0.50	0.60

*Figures for potatoes were not planted under IRWH

Apart from increasing yields and improving agricultural incomes, IRWH technology reduced tillage operation costs. Under the conventional tillage system, people hired tractors to cultivate their gardens. After switching to the new tillage system, tractor traction was done away with.

7. Conclusion

It is important for any agricultural development initiative to take note of reasons why rural households engage in gardening. The results show that it is more than just to obtain food for the family. People have expectations: they want feed for their animals; they want to earn money in order to satisfy other pressing need like children's education; and they want to maintain their social networks. To realize these expectations depends not only on new technologies transferred but also on building capacity at local level. Yields obtained from home gardens increased considerable under IRWH tillage system compared to those obtained under conventional system. The transfer of skills from experts to beneficiaries of the project was a powerful move. Most development initiatives in the area have failed mainly because project initiators made a mistake of not building capacity of local people. IRWH project was very strong in this regard. Also, training was participatory in nature encouraging learners to own the development initiative. Training did not focus on project members only. The service providers in the area were also trained. Another positive impact of IRWH was that it reduced tillage operation costs. Households hired tractors during the initial ploughing only before the new technique was applied. No tractor was used for subsequent tillage operations.

However, there are two major concerns with the new technique. Firstly, it is hands-on, demanding high labour input. Contrary to the common belief that labour is abundant in rural areas, there is shortage of human capital. Presently, the youth does not show any interest in agriculture. The lack of participation by young people in agricultural activities is a serious concern. The challenge is to encourage young people to become involved in farming. Or probably agricultural solutions developed for rural areas must be labour saving. The second

concern is lack of rainfall during winter period. There is little or no water to be harvested during this time. For people who have no access to potable water, it is not likely to derive the same benefits derived during a wet season.

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Outline of the presentation

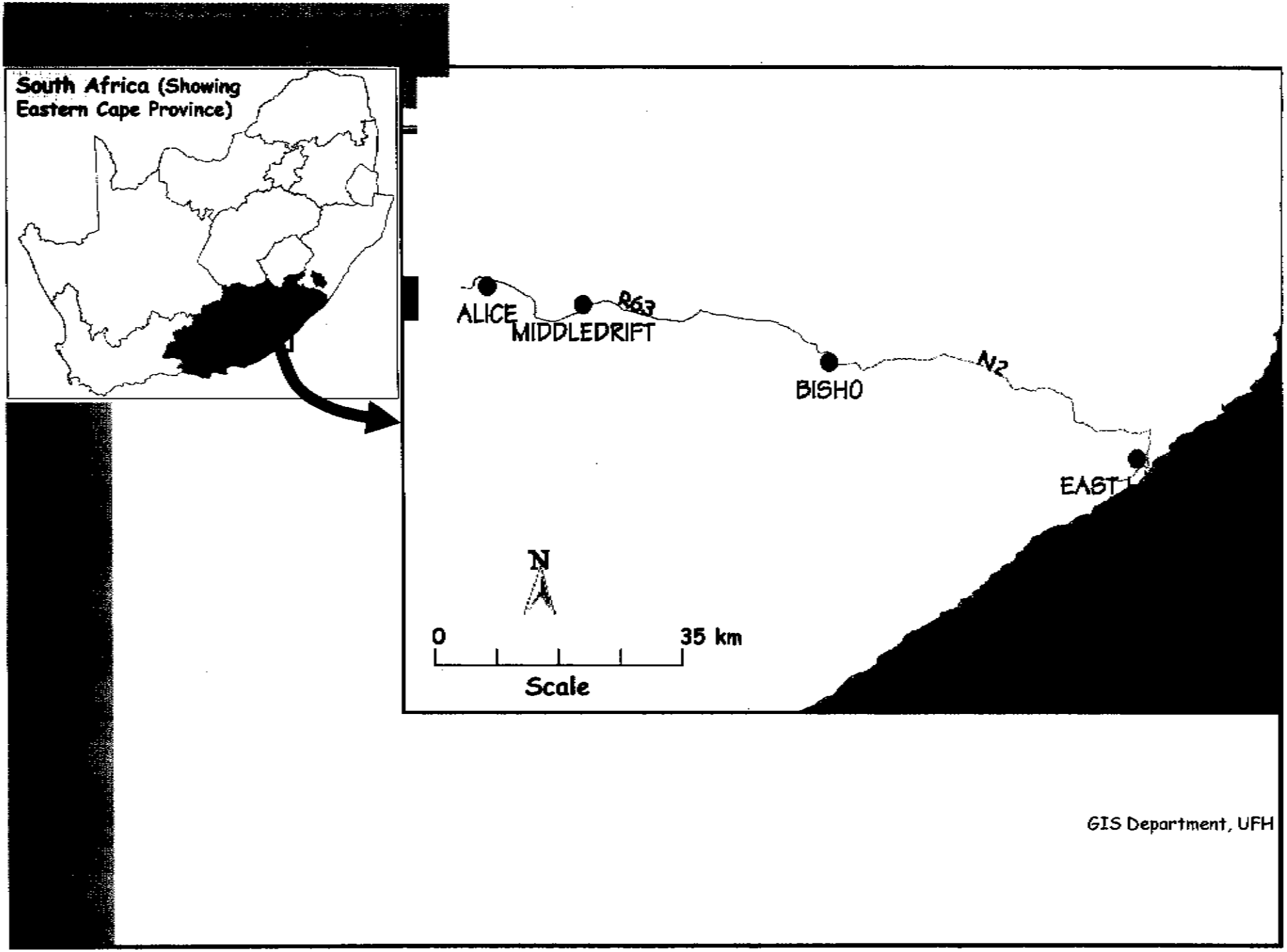
- Introduction
- Site description
- Methodology
- Nature and importance of gardens in rural areas
- Soil water conservation technique
- Capacity building
- Socio-economic impact of technique
- Conclusion

Introduction

- High levels of poverty and food insecurity
- External economic activities more important
- Food security based on Inheritance and transfers
- Main food acquisition strategy – purchased food
- Own production of food contributes little to FS
- Growing trend – gardening activity
- Garden production very low
- Aim – explain how the productivity of home gardens was improved in the study area

Site description

- Guquka and Khayaletu villages
- Central Eastern Cape, South Africa
- Guquka – 190 hh, 750 pp
- Khayaletu – 213 hh, 1250 pp
- Tyhume River – 2-5km from homesteads


South Africa (Showing Eastern Cape Province)
ALICE
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BISHO
N2
EAST
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Scale
GIS Department, UFH

Methodology

- Water harvesting project – April 2004
- Technology - IRWH in home gardens
- Community mobilisation
- Demonstrations in gardens
- Households adopted the technique
- Socio-economic impact IRWH analysed

Biophysical characteristics of the study area

- Sub-humid area
- High rainfall 700 – 800mm/a
- 70% in summer, only 7% in winter
- High altitude of more than 700m
- Variable soil depths, fine sandy clay loam texture, slow permeability
- Topography, poor soils and low rainfall impose limitations to agriculture

Nature and importance of home gardens

- Home gardens - food plots within residential sites
- Average garden sizes 311m^2 (Guquka), 175m^2 (Khayaletu)
- Rain-fed production system
- Main constraints water, poor soils and human capital
- Relies mainly on family labour – mainly women
- Cultivation practices – conventional
- Little land and soil management
- Limited support services
- Benefits derived – food, feed, income & access to social capital

Plate 1: Woman processing maize into samp (*umngqusho*) at home

- Staples mainly grown
- Maize on larger areas
- Benefits not transferable to drier seasons

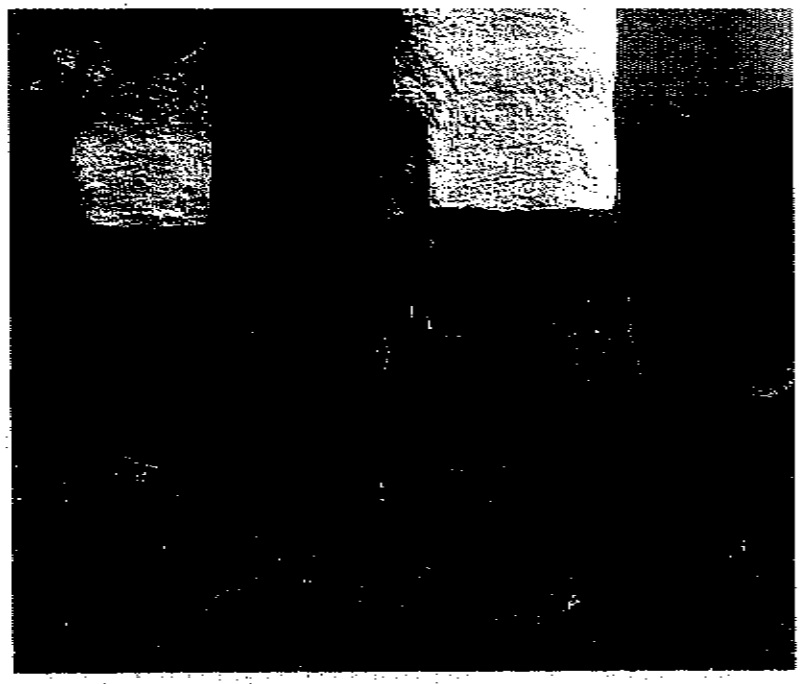
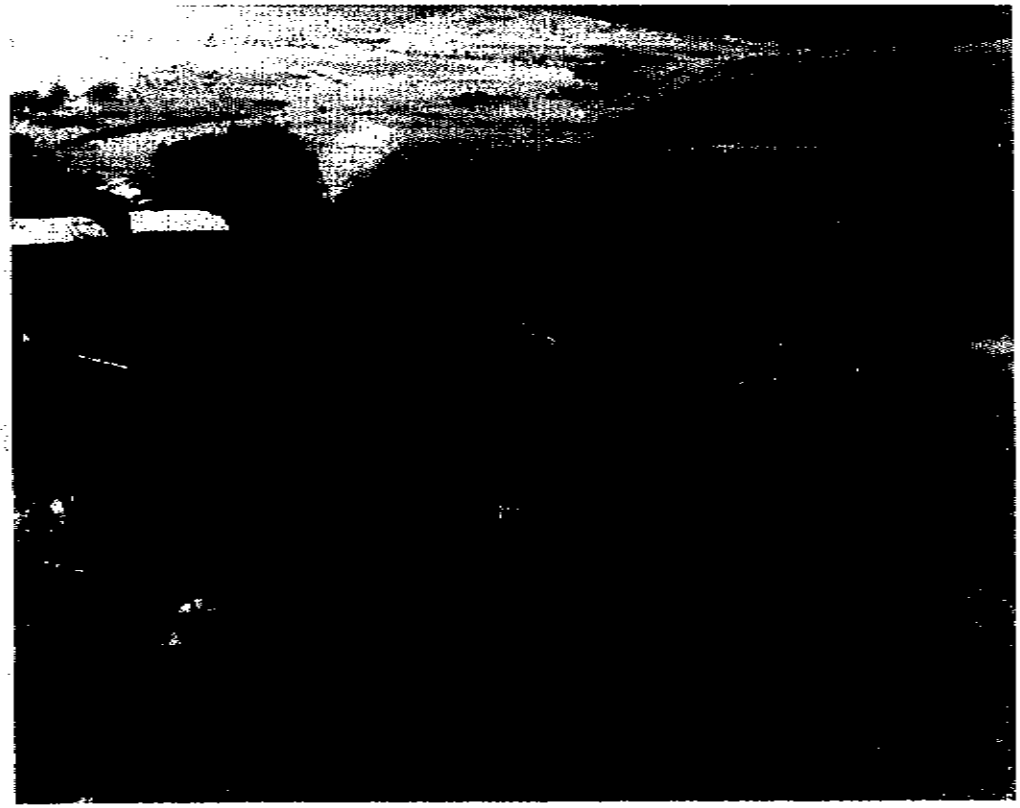


Plate 2: A dam constructed inside the garden at Guquka



Improving productivity in home gardens – soil water conservation

- Figure 1: A diagrammatic representation of the in-field water harvesting technique
- IRWH combines water harvesting, no-till, basin tillage & mulching
- Runoff on a 2m wide strip
- Runoff water stored in the basins
- Water collected infiltrate deep in the soil

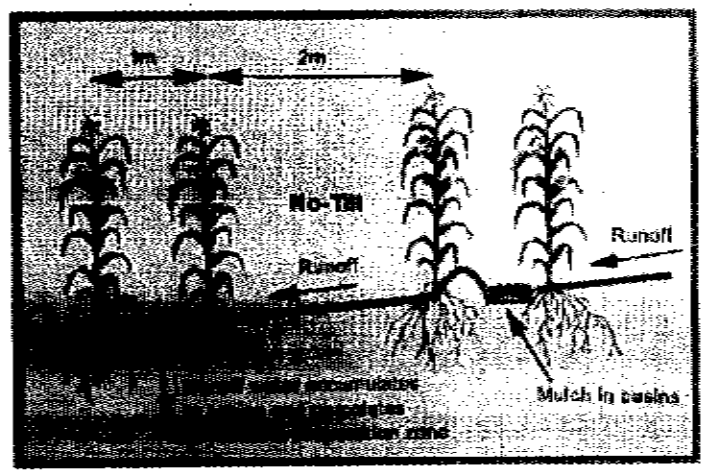


Plate 3: A group of women learning how to make basins

Building capacity at local level

- Training of service provider to ensure sustainability
- Technical and facilitating skills
- Training of local people on the new technique
- Training participatory in nature
- Leadership and management skills

Impact of IRWH technique

- Plate 4: Gardeners showing off their maize planted under the new tillage system
- Improved yields
- Improved incomes
- Food diversity

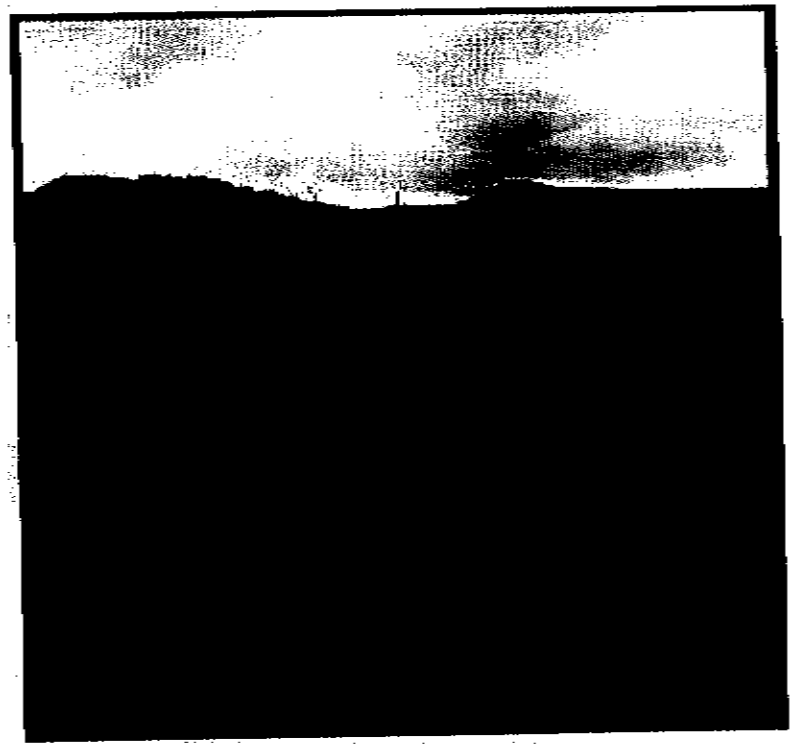


Table 1: comparison of yields obtained from gardens under conventional and IRWH tillage systems

	Guquka				Khayaletu			
	Conventional tillage		IRWH		Conventional tillage		IRWH	
Main crop	Average yield (kg)	Average area (m2)	Average yield (kg)	Average area (m2)	Average yield (kg)	Average area (m2)	Average yield (kg)	Average area (m2)
Maize	21	96	43	96	18	78	34	78
Potatoes	22	54	0	0	27	62	0	0
Beans	11	23	18	30	10	21	10	21
Carrot	1	4	8	22	1	6	6	18
Cabbage	5	20	13	36	4.5	20	9	27
Spinach	3	15	15	28	2	12	11	20

Table 2: Average yields and Incomes earned from an area of one square meter under IRWH

	Guquka	Khayaletu	G/K	G/K	Guquka	Khayaletu
Crop	Yield/m^2	Yield/m^2	Optimum kg/m^2	Price R/kg	Income/m^2	Income/m^2
Maize	0.4	0.4	1.5	1.50	0.60	0.60
Potato*	0.4	0.4	1.8	1.80	0.72	0.72
D.beans	0.6	0.5	7	1.40	0.84	0.70
Carrot	0.4	0.3	2.9	1.50	0.60	0.45
Cabbage	0.4	0.3	10	1.50	0.60	0.45
Spinach	0.5	0.6	6	1.00	0.50	0.60

Socio-economic impact cont....

- Improved access to water
- However, no rain in winter
- Reduced run-off
- Better land and soil management
- Reduction on tillage expenditure
- High demand on human capital
- Fewer plants per area
- Transfer of skills to beneficiaries
- Benefits accrued to larger community
- People learn to juggle with their resources

Conclusion

- IRWH positive impact on production
- Transfer of skills to beneficiaries
- Marked reduction on tillage operation costs
- IRWH hands-on technique
- Biggest challenge improve access to water in winter
- Concern – lack of interest amongst the youth