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A cost benefit analysis of a technology bundle aimed at improving the resilience of urban households in Rocklands, Mitchells Plain

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CSSR Working Paper No. 332
October 2013

Centre for Social Science Research
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UCT KNOWLEDGE CO-OP

Published by the Centre for Social Science Research
University of Cape Town
2013

http://www.cssr.uct.ac.za

This Working Paper can be downloaded from:

http://cssr.uct.ac.za/pub/wp/332/

ISBN 978-1-77011-281-0

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Acknowledgements:

We would like to acknowledge UCT Knowledge Co-op's facilitation of this research. We are particularly indebted to Barbara Schmid for her on-going and practical support of this project.

A cost benefit analysis of a technology bundle aimed at improving the resilience of urban households in Rocklands, Mitchells Plain

Abstract

This paper documents and evaluates the early progress with a project which aims to increase the resilience of poor urban households with a complete technology package consisting of a permaculture food garden and multiple renewable-energy retrofits. The project is PBO facilitated and incorporates substantial training. Beneficiary households are objectively poor, but not destitute. After six months there were still some glitches with the retrofitting, but the gardens were all thriving and were yielding some produce and substantial pride for their owners. Retrofitting accounts for 39% of project costs, the gardens for 27%, and overheads (including training) for the remaining 34%. We have estimated the unit cost of expansion to be R6 435 for the basic model and R16 381 for an unsubsidised advanced model (in 2013 prices). This initiative has been expensive, perhaps unnecessarily so, but is also successful against great odds, not least of which is the exceptionally difficult growing conditions which characterise the Cape Flats. We identified appropriate support, flexible design and on-going monitoring as important issues going forward, but we nonetheless think that the project is one of the most successful of its kind and that it could be replicated on a larger scale at modest additional cost.

1. Introduction

Resilience and vulnerability are two sides of the same coin; a system is said to be resilient when it can weather external shocks. For the rural poor who grow their own food, climate change is an important source a source of vulnerability, while for the urban poor who have to buy their food in the market, climate change might be less important than ESKOM's 72% tariff increase in 2006/07 (Harrison, 2013) or the 80% spike in world food prices of 2008 (Verpoorten *et al.*, 2013).

The South African Government has responded to these and other recent shocks with a renewed focus on urban agriculture as a way of making the urban poor

more food secure, but has been criticised for a lack of tangible benefits, the high costs and the institutional fragility of many of their own food garden initiatives (Ruysenaar, 2013). The question is whether or not the public benefit sector can do better than the government in this regard. Moreover, Frankenberger (2003) rightly points out that while food is important, it is not always the only necessary element of a sustainable livelihood; people in low-income areas also need access to education, the ability to meet their social obligations and, we might add, the ability to foot their energy bills. For this reason a programme which combines food gardening with other elements of sustainable living is a particularly promising concept. The Homestead Gardens project evaluated here is sponsored by a public benefit organisation called the Sustainable Energy for Environment and Development Programme (SEED) which operates from an Urban Abundance Centre on the grounds of Rocklands Primary School (see Figure 1). The objectives of this organisation are to raise environmental awareness and encourage sustainable living and, perhaps most importantly, to change people's relationships with the food they eat.

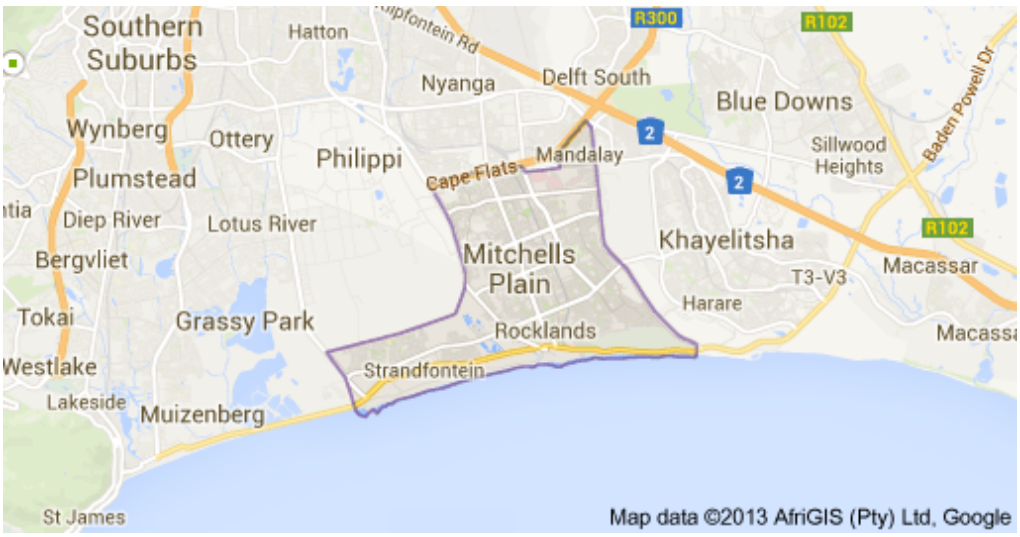

Figure 1: Rocklands, Mitchells Plain

Section 2 describes the cost benefit methodology and our data collection process. Section 3 presents the results under the subheadings beneficiary selection and training, garden implementation and retrofitting. Section 4 presents the project's financial costs and a summary of beneficiaries' perceived benefits. Section 5 critiques the project and makes concrete recommendations for its improvement. The paper ends with brief conclusions.

2. Methods

This analysis was commissioned by SEED via the University of Cape Town's Knowledge Co-op to document and evaluate the Homestead Gardens project.

2.1 Cost benefit analysis

A cost benefit analysis expresses all costs and benefits associated with a project in commensurate financial terms from which a discounted net benefit can be calculated. To be viable a project's benefits should justify its costs, and where resources are scarce, the project(s) with the highest discounted net benefit should be selected.

This is easier said than done because development projects often yield intangible benefits that are difficult to value in monetary terms. For example, the key benefits of the Homestead Gardens project were expected to be electricity savings (easily measured if records are kept and easily valued at market prices), water savings (easily measured if records are kept but not easily valued due to uncertain opportunity cost), a health boost from the fresh vegetables (only measurable as the opportunity cost of public health care and therefore beyond the project) and greater general environmental awareness (not easily measured and very hard to value in monetary terms).

We quickly discovered that we were naïve to expect households to record savings as not even government sponsored communal food gardens keep financial records (Ruysenaar, 2013). In addition the project was still too new for beneficiaries to be able to assess the extent to which it had changed their lives. Many of the gardens were still only producing their first vegetable crops at the time of our visit and winter had not yet set in to reveal the full benefits of the rainwater tanks. Furthermore, not enough time had elapsed to measure savings by the solar geysers or solar cookers. A low dropout rate will be the real test of the project's benefits for participating households and it will only be revealed over the course of the next few years. Consequently the findings, although founded on a cost benefit framework, are exploratory and should be followed up by further monitoring and evaluation as the project matures and possibly expands to other sites.

2.2 Data collection

We visited Rocklands on four occasions during March 2013, when the

Homestead Gardens project was about six months old. On the first visit we were met by the Centre Director, who gave us a tour of the facilities of SEED's Urban Abundance Centre at Rocklands Primary School and a brief introduction to the organisation's work in the area. On our second visit we met with the Homestead Gardens Project Manager, who provided contact details for the beneficiaries to be interviewed and background to the Homestead Gardens project. We discussed with him project objectives, beneficiary recruitment, training and implementation, as well as some of the financial, social and environmental challenges encountered during the project. On the third and fourth visits we conducted interviews with as many of the participants as we could arrange to meet, all in all six of the eleven beneficiaries (55%). During a final visit in early October 2013 we met with the Centre Director and the Homestead Garden Project Manager to discuss results and clear up outstanding questions. On this visit we were accompanied by a representative of the Knowledge Co-op.

Our interview process consisted of setting up appointments and doing home visits during working hours. On average, we spent about an hour with each household. Interviews were conducted in English as informal conversations. Our questions dealt with who lived in the household, how satisfied people were with their circumstances, how people has discovered the Homestead Gardens project, what they liked and did not like about the project, what they would have done differently, and what benefits they have received from their gardens to date. We also documented aspirations for their gardens going forward and took photographs of many of their plots. Since the original purpose of the visits was to explore opportunities for retrofitting in a working class neighbourhood, we asked a number of additional questions about people's experience with retrofitting and their knowledge of it, the results of which are not presented in detail in this paper. Notes were taken, but no recordings were made.

3. Results and Discussion

Mitchells Plain was established in 1973 under Apartheid's Group Areas Act as designated area for 'Coloured' families forcibly removed from other parts of Cape Town. In post-Apartheid South Africa, Mitchells Plain continues to be a low income, predominantly Coloured area, with high levels of unemployment and high incidences of violence and drug abuse, perpetuated by active local gangs.

The housing stock in the immediate vicinity of Rocklands Primary School consists of various vintages of single-storied or duplex brick and mortar houses. See the bottom right-hand corner of Figure 3 below. The oldest houses, which probably date from the early 1970s, were originally rented out by the city

council. Title deeds were transferred to the occupants through Reconstruction and Development Grants during the mid-1990s. New houses and cluster developments continue to be built. Most houses in the area are modest in size with no ceilings and bare cement floors, which makes them hot in summer and cold in winter. The houses usually have very small front and backyards, which are often entirely covered by a cement slab. There is little evidence of backyard dwellers. Most homes have improved security and many have been added on to. Car ownership is common, but gardens are scarce and often quite rudimentary. All but one of the residents we interviewed had been living in their current home for at least thirty years and they describe their situation as "happy" and "comfortable".

Although water and electricity infrastructure is better maintained and more modern in Mitchells Plain than in other Cape Town townships, and despite the availability of a means-tested free basic allocation of water and electricity, poor households in the area are still vulnerable to being disconnected from water and electricity systems for falling behind on rates payments (Smith and Hanson, 2003). One of our respondents remarked that the uncertainty water and electricity supplies made it worthwhile to investigate retrofitting options.

It can be argued that it is in communities like this, where the basic shell for the necessary infrastructure already exists but access to resources is always precarious, that projects aimed at more sustainable living can have the most significant impact.

3.1 Beneficiary selection and profiles

The Homestead Gardens project was open to everyone in the community. It was advertised in local newspapers and radio, on pamphlets distributed door to door and by word of mouth. Although some of the people who signed up for the project arrived with prior gardening experience and/or existing gardens, the project specifically welcomed individuals with no prior experience. All potential beneficiaries had to attend a compulsory six-day training course offered free of charge over a two-week period. The course covered the principles and practices of permaculture, composting, water and electricity conservation, the principles of recycling and collecting materials for recycling, as well as the medicinal and nutritional value of specific plants. The course no doubt served as a useful way of screening beneficiaries for their commitment to sustainable living but at the same time also helped to establish their current employment status and time available to maintain the garden that they were going to receive.

Table 1: Selected details of a sample of beneficiaries of SEED's Homestead Gardens project in Rocklands, Mitchell's Plain

Household number	**Main gardener**	**Household size**	**Breadwinners at time of interview**	**Initial project information**	**Pre-existing garden**	**Model**
1	Female	4	1	Community newspaper	Flowers	Limited Ambassador
2	Female	7	2	Pamphlet	Flowers	Standard
3	Male single parent	2	0	Noticed school garden	None	Full Ambassador
4	Elderly female	3	1	Community newspaper	None	Standard
5	Divorced male	1	1 part time	Neighbours, pamphlet	Vegetables, fruits, herbs	Standard
6	Female	2	1	Noticed school garden	None	Standard

The course started out with 23 participants of whom 15 (65%) completed it. Of those who completed the course, eleven households went on to plant gardens (48% of the initial recruits and 73% of those who completed the course) and of these, between 6 and 8 households were committed to maintaining their gardens at the time of the interviews. Some of the reasons given for dropping out of the program were problematic home circumstances, a lack of support from other household members, work commitments and a lack of interest in the food growing aspects of the project. For communal food gardens Ruysenaar (2013) identified vandalism, unsuitable growing conditions, a lack of resources and training and refurbishment programs as some additional barriers to production. Of the six project beneficiaries we interviewed, two were men and four were women (see Table 1 for additional information). Other group members were not available to be interviewed at the time of our visit mostly due to being at work. We cannot comment on any additional characteristics of the representativeness of this sample.

None of the beneficiary households were completely destitute; we know that three households (1, 3 and 4) are government grant recipients, and that there is typically one employed person per household. Only household 3 had no breadwinner at the time of our study, but the person we interviewed has subsequently found part-time work as a driver for a firm in town. In household 5, which consisted of a single person whose children live with his ex-wife, the beneficiary had part-time work at the time of our visit. In household 4, which consisted of two older sisters living with the one woman's grandson, the task of gardening was reluctantly taken over by the other sister when the person who attended the course found work. People's claims that they were living comfortably were confirmed by our direct observations of their living arrangements. For example, although we cannot confirm the presence of children in household 6, the middle-aged woman appeared to be a stay at home mother by choice and, from this, we assumed that she was married to a husband with a relatively well-paid job. Overall, we were struck by the small household sizes and general lack of children in the beneficiary households.

3.2 Garden design and implementation

SEED established a permaculture garden of at least 10,000m^2 at the organisation's Urban Abundance Centre located on the premises of Rocklands Primary School. It was not evident whether the pupils are allowed to play in the garden at all, but in the permaculture tradition this garden currently serves

multiple other purposes including that of an outdoor classroom, demonstration plot for the community and mini-experiment station to test permaculture techniques under local growing conditions. It also beautifies the area, serves as an advertisement of the school, of SEED's work and of permaculture techniques. For example, as indicated in Table 1, one third of our respondents were attracted to the project purely on the basis of what they saw taking place at the school. Establishing and maintaining such a large and luscious garden was no small feat, as it is notoriously difficult to grow anything on the Cape Flats on account of the area's sandy soils, low summer rainfall and strong south-easterly wind which blow all summer long in Cape Town. However, the fact that the Cape Flats used to be the main market garden area serving Cape Town (RSA Bureau of Census and Statistics, 1963) shows that these problems can be overcome with the right growing techniques and it is evident from the Resource Abundance Centre's garden that permaculture can do this.

In the permaculture system soil health is considered to be the foundation of the system. Soil fertility is addressed through a combination of heavy and continuous composting and the planting of dynamic accumulator plants such as comfrey, yarrow, nettles, vetch, lupines, mustard, fenugreek, clovers, cowpeas and sun hemp which can survive in unfertile soils. Thom (2012) identified composting as one of the main constraints to small-scale market gardening in the Cape Flats; compost is not expensive or difficult to make but it is labour and space intensive and needs a constant and large flow of green materials and preferably animal manure to meet the needs of a large gardening enterprise. For this purpose the Urban Abundance Centre grows as much green manure as it can, but since the needs seem to be greater than the Centre's capacity to produce compost, the organisation is currently investigating a trench bed method which will allow them to compost only once every five years. The preliminary evidence suggests that this method will be successful, but its longer term benefits and appropriateness for homestead gardens must still be assessed.

Water management is equally important in permaculture. Not only do vegetable crops need adequate moisture during hot windy summers to grow well, but the water needs to be efficiently applied in the sandy soils. Composting builds the soil's organic matter content which helps with water retention; mulching reduces evapotranspiration and keeps the root zone cool. Additionally, the design of planting beds can reduce run-off. Ultimately, however, the question is where the water comes from and how it is applied. While municipal supplies are commonly used for irrigation, it is not a sustainable solution (Thom, 2012; Ruysenaar, 2013). At the Resource Abundance Centre rainwater harvesting provides the main source of water and drip irrigation is used to reduce run-off

and improve water use efficiency. In the homestead gardens irrigation is usually done with a watering can or small sprinkler system, and water provision includes grey water recycling (Standard Model) and rainwater harvesting (Ambassador Model). The grey water harvesting system is quite simple; kitchen and/or bathroom water is fed into a miniature wetland where it is purified. In Figure 2 the blue pipe feeds bathroom water into a small papyrus bed behind the existing banana plants.

Wind management has been implemented at the Urban Abundance Centre by establishing a dense shelter belt in a new section of the garden before any vegetables were planted. The backbone of the shelter belt consists of fast growing indigenous shrubs, but it also includes thorny species to serve as security barrier, fruit bearing species and species which attract birds and pollinators. In the homestead gardens wind management is less of an issue because most of the small yards already have cement boundary walls which affords some protection against the wind. Where space allowed, trees and shrubs were planted which in time will give added protection, and where this was not possible, windbreaks made from shade cloth were installed.

Figure 2: Grey water recycling system with papyrus plants for water filtration with pre-existing banana trees in the foreground

“Food forests” have been established in the mature section of the garden at the Urban Abundance Centre which means that plants with similar requirements are grown together. In the vegetable section root crops are grown together as are

cucurbits and a third group consisting of tomatoes, eggplant, sweet peppers and chillies. By rotating these combinations over time, pest build-up is prevented, which makes it possible to grow crops organically, which in turn makes the vegetables healthier.

The beneficiaries went from house to house to help each other to install the gardens. The size and type of garden were determined by available space; where possible planting was done in open ground, while containers or raised beds were installed on cement slabs. Given the variety of layouts, it is difficult to estimate the average size of the homestead garden accurately. For example, we saw a front yard of about $20m^2$ with vegetable beds planted around the outside edge, a container garden installed in an area of $16m^2$ and a strip garden of 1.5 by 10 meters filled the entire space between a semi-detached duplex and its boundary wall. The latter extends into another $30m^2$ area for a total garden size of roughly $50m^2$. As Figure 3 shows, a wide variety of planting containers were used, including purpose built wooden boxes, bought in by SEED for R230 a piece for the large boxes and R170 a piece for the smaller boxes. The containers were lined with shade cloth and filled with a mixture of soil and compost, which was delivered at a rate of roughly one third of a bakkie-load (+/- $2m^3$) per garden. A heavy layer of wheat straw mulch was applied as soon as the seedlings were planted. SEED provided the compost, mulch, containers, basic gardening equipment (watering cans, spades, planting bags, shade cloth) and all the plants and seedlings. The organisation also paid for skilled labour to install the grey water systems, rainwater tanks, windbreaks and raised beds.

Although the majority of gardens were thriving, it was evident that the most enthusiastic gardeners spent more time in their gardens and thus reaped more rewards than those who were less satisfied with the project. Surprisingly, prior gardening experience did not provide a unanimous advantage. We encountered a wide variety of crops grown including butternut, maize, eggplant, broccoli, basil, sweet melons (spanspek), spinach, tomatoes, carrots, onions, string beans and baby marrows. While the scale of the gardening will almost certainly not make participating households self-sufficient in fresh produce, the homestead gardens easily met SEED's main aims of providing for a health boost and greater dietary variety, assisting households in connecting with the process of growing food, as well as making households more aware of nature and natural cycles.

Figure 3: A selection of crops grown in homestead gardens, Rocklands, Mitchells Plain, March 2013

To become sustainable, these gardens will have to continue to be cared for. We estimated that the gardens' maintenance labour requirement would be quite modest and, therefore, that it is more important for SEED to find a way of maintaining interest than of selecting people with a low opportunity cost of their time. In most cases, the person we interviewed took responsibility for the garden and did the work themselves. In one case where a grandchild was involved, we got the impression that the work was meant more for his education than as of reassigning labour to him. As already alluded to above, the availability of compost and seedlings will be a major determinant of future success. While home visits and free garden supplies are meant to be phased out after twelve months, beneficiaries can continue to earn these by volunteering on subsequent waves of the project. By October 2013, only four of the beneficiaries still had regular contact with the Centre (17% of the original recruits, 27% of those who completed the training and 36% of those who received gardens). However, this dropout rate is not entirely attributable to a lack of interest or responsibility. In one case, the husband of a beneficiary was diagnosed with cancer and in other case, one of the beneficiaries decided to stop gardening in order to enrol for adult education to become a nurse. In a third case, a garden continued to thrive despite very limited contact with the Centre.

3.3 Retrofitting

The Homestead Gardens project tested a cheaper and a more expensive retrofitting package, with the one more than ten times more expensive than the other. The Standard package consisted of the garden, a worm bin (with red wriggler worms), a system which drains grey water from the bathroom and / or kitchen plus a Wonderbag™ hotbox in which food can be cooked cheaply using residual heat. Recipients of the Ambassador model received a solar geyser, a solar cooker and a 500 litre rainwater tank in addition to the garden, worm bin, grey water system and hotbox. With one exception, everyone we interviewed was satisfied with their grey water recycling system. People were also satisfied with their rainwater tanks. One of the Ambassador gardeners told us that rain just prior to our visit yielded enough water for three days of free irrigation, which the person considered to be quite gratifying. There is some concern however, that 500 litre tanks may be too small to make a garden completely independent of its municipal source as it would rapidly fill up in winter but just as rapidly empty out as soon as the rain stops. Feedback on the hot box was mixed; in one instance we discovered the item still in its original wrapping, while other people indicated that they used theirs regularly. One of the people who received a solar cooker admitted to not having used it yet either as there were "no funds to buy the materials for it".

Of the add-ons, the solar geyser is the most expensive item and was the most problematic to install. The plan was for SEED to put up the R14 000 that would finance a solar geyser installation, and that the homeowner would repay this fee from the government rebate offered for such installation. This plan did not work as only private individuals qualify for the rebate which meant that expenses made in the organisation's name could not be recouped. The solar geyser selected for the project is not the most basic model; a more expensive model with a larger water tank and the ability to be connected to grid electricity was selected to ensure more reliable hot water. Though household 3 has not needed to switch to grid electricity in the first six months since March it is unclear whether the additional expense on the solar geyser is justified. If the solar geyser were to be omitted from the Ambassador model, or if a way could be found to qualify for the government rebate, the cost of the Ambassador model would decrease by 75% to R4 649, which is roughly three times more expensive than the Standard package.

4. Project costs and benefits

4.1 Financial costs

The unit costs of additional homestead gardens are summarised in Table 2. It was compiled from the project budget by dividing each item pertaining to both models by eleven and items pertaining only to the Ambassador model by two. Since only one solar geyser was installed, its cost is assigned to the Ambassador model in full. Allowing about R1 per litre for the two water tanks and dividing the remaining water systems costs by eleven, produced an estimate of R859 each for the grey water system. Installing the gardens accounted for 27% of costs, training for 26%, retrofitting for 39% and design and development costs for the remaining 8% of the total. The total cost of an additional Standard and unsubsidized Ambassador Installation is R6 435 and R23 327 respectively. The breakdown of costs in the Standard model is as follows: retrofitting accounts for 26%, the garden for 38% and training for 36%. In the Ambassador model retrofitting accounts for 79% of unit costs, and the garden and training for about 10% each.

One way of assessing these figures is to compare them with Ruysenaar's (2013) figure for food gardens in Gauteng; if one allocates the full training cost to food gardening, total expenditure is R4 787 per beneficiary (net of once off development costs), which is only 20% higher than Ruysenaar's (2013) figure. Alternatively, one could express the individual budget line items as a percentage of the Ambassador model's total cost, in which case the five main items are the solar geyser (60%), the solar cooker (11%), the water tank and grey water system (6%), facilitation fees (5%), and catering (4%).

The percentage breakdown of the Ambassador model quickly reveals the issue with the affordability of the solar geyser in particular and the retrofitting programme in general. To put it in perspective, the entire gardening outlay accounts for the same percentage of total costs as the solar cooker. The question of whether the upgrade is desirable reduces to whether or not a 500 litre rainwater tank is large enough to make a material difference to irrigation bills during summer, how the hotbox performs relative to the solar cooker on a year round basis once people get used to it, and whether SEED can link up with a free or subsidized government solar geyser retrofitting programme. The question regarding the optimal water tank size thus needs further research.

Table 2: Unit costs of further rollout the Homestead Garden project in 2013 prices

	% of Budget	Standard	Ambassador
Garden and retrofit design[1]	4%		
Development of training manual[1]	4%		
Retrofitting			
Labour		655	655
Water tanks, grey water system		859	1 359
Solar Cookers			2 500
Wonder bag hot boxes		135	135
Solar geysers			13 892
	39%	1 649	18 541
Garden			
Labour		818	818
Trellising and creepers		200	200
Composting system		295	295
Planting containers (pallet boxes)		399	399
Permanent plants		581	581
Seedlings		163	163
	27%	2 456	2 456
Training			
Accommodation		91	91
Catering		890	890
Co-facilitation		491	491
Facilitation		709	709
Reproducing training materials		59	59
Travel		91	91
	26%	2 331	2 331
Total	100%	6 435	23 327

[1] R709 per member of the first cohort, but as once off costs they will not be part of further roll-out.

Solar cookers ought to work well in summer but they have a large upfront cost, whereas the hot box ought to work well all year round and costs a fraction of the solar cooker price. Collaboration on solar geyser installation makes sense as

both parties stand to benefit. With free solar geysers SEED could reduce the cost of the Ambassador model to R9 435 which is only about 50% higher than the cost of the standard model. With SEED's on-going presence in the community the government would be assured local legitimacy and an orderly process with minimum rent seeking. In addition, one has to keep in mind that the retrofitting costs are all capital expenditures which will continue to produce benefits and real money savings for a number of years, while the gardens will require repeat expenditures to remain productive and will yield benefits which are likely to make a smaller impact on the household's budget.

In order to cost the exercise fully and justly, it is important to keep collecting data on costs and benefits as they emerge and to allocate them correctly. We see a real danger in incorrectly accounting for the on-going support to the first cohort of gardeners, and of not accurately separating the work of the Centre from the work of the programme. For example, assuming that the catering cost listed here is strictly for wave 1, strictly for project beneficiaries and strictly for the six days of initial training, one has to point out that the expenditure of almost R900 per person is excessive. Reducing training costs by a third will bring the cost of the Homestead Gardens project in line with the estimate for Gauteng food gardens; we think it can be done easily mainly be reducing catering costs through local sourcing, but also by increasing the number of trainees. On the other hand if the catering line item includes all catering, such as that for the bi-weekly open sessions, the figure may be perfectly reasonable. To be adjudged as such, additional information must be given- we think that the best way of doing this is to assign some of the catering to a general outreach function at the Centre.

The principle of needing correct accounting to have an accurate and fair assessment of the project extends beyond catering alone and is seriously complicated by the multi-generational nature of the project. The salary of the project manager which is no doubt the single largest expense of the project is not shown in full in the budget, probably because it is not funded entirely by this budget. It must be shown in full and assigned proportionally based on his time to the right cohorts of trainees in order to give a fair reflection of costs; failing to do so will incorrectly inflate the final cost benefit ratio, assuming that we can value the benefits accurately. This principle extends to the production of "free" resources, such as seedlings grown at the Centre. These resources are not free; their cost is the sum total of the inputs into their production. This means that if compost is given to a beneficiary in lieu of time volunteered, the cost of the compost must be recorded as a further expenditure towards that beneficiary's cohort. While one would expect a dramatic decrease in project unit costs over time, ascertaining how to account for the project's multigenerational nature is

beyond the current analysis and should be done elsewhere as a matter of urgency. Without it, SEED loses the ability to monitor efficiency gains and thus risks running projects with larger budgets less efficiently without realising it.

4.2 Perceived benefits and project weaknesses

Respondents were generally quite positive about their experience with the Homestead Gardening project. They were intent on displaying their gardens to their neighbours, teaching them about the gardening process and distributing surplus produce to neighbours and community soup kitchens. Most participants indicated that their neighbours took an interest in the gardens and thought that their neighbours would benefit from similar gardens. Beneficiaries have a sense of fulfilment and pride in their vegetables, which suggests that they are developing a new relationship with their food. Improved dietary variation and better tasting food were noted, but as *Abalimi Bezekhaya* (Farmers of Home) explains, one does not necessarily expect improvements in food security or food self-sufficiency in the survival phase of the farmer development chain[1]. More than one person remarked that the gardens showed that their community "could be productive". Another person had the ambition of expanding and developing her garden until "it looked like Kirstenbosch" (botanical garden). A third person saw gardening as a practical way of keeping her grandchildren off the streets and teaching them practical skills with which they could earn a living later on, while a fourth recognised that his garden added value to his property.

Despite these very positive personal experiences with gardening and the high hopes for the way in which it could transform a community, a lack of interest and general laziness were widely recognised as serious stumbling blocks to the project in the community.

Two respondents, who, incidentally, both had prior gardening experience, had some criticism towards the organisation. The first critical voice focussed on the process of beneficiary selection; this man had wanted the water tank for his already substantial garden and was quite disappointed when the two Ambassador models were given to other households. It was noticeable that despite its large size, the section of his garden provided by SEED was not well cared for; he also rejected the healthy eating message by saying that he currently does not cook from his garden, but that he would like to do so later when he has more time. When we were there his focus was on installing wooden flooring

[1] www.harvestofhope.co.za

using scavenged timber. The second critical voice belonged to a woman who was obliged to do the gardening when her sister found a job. Although she described the plants she was given as "messy and useless" and complained of the lack of space left over for the dog, her primary complaint seemed to be that the project did not sufficiently take her wishes into account but instead imposed a garden design and plant mix on her. Incidentally, this person's garden seemed to be one of the less productive gardens we came across during interviews.

5. Critique and recommendations for further work

On one level the Homestead Garden Project must be considered a great success; it established permaculture principles and practices in a township community known for its harsh growing conditions, and through that brought better health, a better quality of life and improved social cohesion to the project beneficiaries. On another level one has to ask tough questions about the project's replication potential and cost effectiveness. We consider the three key outstanding questions to be: 1) The further quantification of benefits in the light of Ruysenaar's (2013) assertion that food gardens deliver neither dietary variety, nor health benefits, nor food security. 2) The tracking of participation over time. 3) The identification of the critical factors for gardening success.

The second question is related to the tension between concentrating a lot of resources on a few individuals in order to ensure that their gardens are a success and that their homes are less dependent on municipal resources versus spreading resources more widely in order to reach as many people as possible, and thereby improving the chances of some gardens succeeding. Additionally, there is the related tension of fostering independence versus providing continued support. SEED is clearly aware of these tensions and, as explained above, should be able to adequately deal with the issues given the opportunities they have created for beneficiaries to remain involved after the first twelve months of the project. We think that by volunteering to remain involved in the project, previous cohorts should have secure access to compost and plants. This will help to solve the abovementioned problems in a local context because individuals will increase their stakes in the problem and thus actively seek to find local resolutions. However, at this point we do not know if these terms are acceptable to people; the high dropout rate suggests that they are perhaps not. Furthermore, it is just as important to study those who dropped out of the programme as those who remain in it.

One possible alteration to the Homestead Gardens model is to begin with having households grow (more) flowers in order to address the stigmatisation of food growing that is prevalent particularly in the Coloured community. This point in itself is worthy of a study. There is a lot of evidence that SEED is flexible in design and we think that it is important for the organisation to continue to value this flexibility and continue to listen to its beneficiaries, for example by including more familiar foods on the planting list and comparing the evidence of consumer preferences for certain produce in vegetable box schemes (Thom and Conradie, 2013). Furthermore, it is important to record the fluctuations in output as the seasons change. It would be beneficial to document how people respond to reductions in their produce and also to develop a better understanding of the effects that gardens have on people's lives once the initial excitement wears off. Finally, there was at least one person who tolerated the gardening in order to get access to the home improvements, which suggests that there may be a need for a separate programme focussed on energy efficiency which does not involve gardening at all. The advantage of separating the two initiatives would be that many more gardens could be rolled out cheaply, but of course such a programme would need its own evaluation. There is also potentially space for a more comprehensive financial analysis of the gardens' impacts on participants through a study of water bills, and variations in grocery spending over time.

6. Conclusions

SEED's Homestead Garden initiative in Rocklands Mitchells Plain potentially makes an important contribution to South Africa's urban food garden space. Six months after its inception the project is successful; participants are still quite positive and teething problems are being addressed. SEED will have to come to terms with issues of ownership, resource constraints, design and scalability, and monitoring project costs. If it wishes to continue with retrofitting of solar geysers it must work out a way to fund these. A detailed engineering study is necessary to document the water yield of a 500 litre rainwater tank versus the existing grey water systems and a valuation study is needed to inform the choice between a hot box and a solar cooker.

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