TOWARDS PRODUCTIVE WATER USE AND HOUSEHOLD FOOD SECURITY IN SOUTH AFRICA[1]

VERS L'UTILISATION PRODUCTIVE DE L'EAU ET LA SÉCURITÉ ALIMENTAIRE EN AFRIQUE DU SUD

By

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ABSTRACT

In South Africa approximately 1.3 million households are active in different forms of supplementary food production on at most 3.3 million ha of rain-fed and irrigated agricultural land. For 83% of households the size of the plot of land varies from less than 0.5 ha to 1 ha and 56.5% of households are headed by women. These households rely on multiple sources of income, with rain-fed and irrigated farming contributing respectively 10 and 30% to rural livelihoods. Various surveys indicate that 52% of all households experience hunger and 59% of households are food insecure. With generally low levels of formal education, the challenge for increased future food production is investment in human capital and empowerment through knowledge that enables decisions and actions. The participatory action research method was therefore followed to produce guidelines and resource material for training and skills development. Priority attention was given to productive water use for homestead food gardening and revitalisation of smallholder irrigation schemes. Material has been designed on required techniques for rainwater harvesting, soil cultivation and crop production that will impact on dietary needs and improve food security of poor households. The rough guide provides action-oriented references for implementation according to a holistic development approach, working towards profitable farming enterprises and social upliftment on existing irrigation schemes and surrounding areas. Now a national initiative has to begin for knowledge dissemination and training of trainers, facilitators and farmers. In order to achieve success, support of senior managers at provincial and local government level is essential.

RÉSUMÉ ET CONCLUSIONS

En Afrique du Sud, environ 1,3 millions de foyers, soit 9, 5% de la population totale, sont actifs, sous diverses formes, dans le domaine de la production alimentaire supplémentaire sur, tout au plus, 3,3 millions d'hectares de jardins domestiques, et de terres agricoles irriguées ou non. Pour 83% des foyers, la taille du terrain varie de moins de 0,5 ha à 1 ha, et 56,5% des foyers sont dirigés par des femmes. Ces foyers dépendent de multiples sources de revenus, et l'agriculture non irriguée ou irriguée constitue en moyenne et respectivement 10 et 30% des activités économiques rurales. Diverses études indiquent qu'avec un revenu mensuel de moins de R1200, 59% des foyers connaissent l'insécurité alimentaire. Le défi

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pour une production alimentaire accrue dans le futur repose sur l'investissement dans le capital humain et la responsabilisation (« *empowerment* ») par les connaissances nécessaires à la prise de décisions et d'initiatives.

Cette responsabilisation est requise de manière urgente en raison de l'insécurité alimentaire généralisée et de la sous-alimentation dans certaines zones rurales. On estime actuellement que 17,5% des foyers seraient en mesure de produire des aliments dans leurs propres jardins. Dans un contexte de faibles niveaux formels d'éducation, il est prioritaire de fournir des formations, des compétences pratiques, concrètes et informelles. Une méthode de recherche par action participative a été suivie afin d'élaborer des documents et ressources de formations ainsi que des directives pour la production alimentaire domestique et l'agriculture irriguée pour les petites exploitations. Les ressources ont été conçues sur la base des techniques requises pour l'exploitation non irriguée, la culture des sols et la production agricole dans les jardins domestiques, qui auront un impact sur les besoins diététiques et l'amélioration de la sécurité alimentaire dans les petits foyers. Le guide produit comprend des références pratiques pour la mise en œuvre, dans le cadre d'une approche complète concernant le développement, ceci dans le but de rendre les entreprises agricoles rentables et d'améliorer les conditions sociales dans les exploitations irriguées et leurs zones avoisinantes. D'autres recherches sont actuellement menées pour élaborer un ensemble de ressources éducatives sur l'application de l'exploitation agricole non irriguée et les pratiques de conservation. Encourager l'entreprenariat, surtout parmi les petits agriculteurs, pour créer des entreprises agricoles rentables, reste un immense défi. Cette initiative contribuera à créer de l'emploi, et à une distribution plus importante et plus égale des revenus.

Les ressources de formation disponibles pour la production domestique alimentaire et les directives pour la revitalisation des petites exploitations agricoles ont été portées à l'attention des responsables au sein des divers services publics ainsi qu'à des professeurs dans les instituts de formation agricole, par le biais d'initiatives de dissémination du savoir. Nous avons pu confirmer au cours de ce processus qu'un besoin existe dans le secteur de la formation et de l'éducation agricoles en ce qui concerne des ressources d'apprentissage dont l'orientation est fondamentalement pratique. Ce niveau pratique est en effet le niveau général auquel les formations destinées aux petits agriculteurs doivent être menées. Des actions similaires seront entreprises pour l'application des ressources de formation concernant l'agriculture « de jardin ». Jusqu'à présent, le contenu des ressources de formation et des guides a été bien perçu par les établissements de formation et le personnel travaillant dans les collectivités territoriales chargées de l'agriculture. Avec la coopération et l'assistance d'établissements de formation agricole, d'organisations non-gouvernementales et d'organisations communautaires dans tout le pays, une initiative nationale est désormais nécessaire pour former les formateurs, les animateurs, les agriculteurs et les membres individuels de foyers, en particulier les femmes. Le soutien des responsables aux niveaux local et provincial est essentiel pour une mise en œuvre réussie de ce programme de formation.

1. INTRODUCTION

In spite of concerted efforts for transformation, a dualistic or bi-modal production structure is still found in South African agriculture. This consists mainly of commercial farmers producing for local and export markets while subsistence farmers are predominantly producing for household consumption. Social and economic change can be accomplished by a process of empowerment and a process of

integration of black subsistence and white commercial farmers (Backeberg, 2003: 165-167).

The strategic goal of the agriculture sector plan is therefore to generate equitable access and participation in globally competitive, profitable and sustainable farming activities (Department of Agriculture, 2001). Service delivery and implementation of programmes by all partners is to be guided by amongst others the following premises: Fair reward for innovation and risk taking; security of tenure for present and future farmers; market forces which are directing business activity and resource allocation. The expected outcomes include increased investment and wealth creation in agriculture and rural areas; reduced poverty and inequalities in land and enterprise ownership; improved national and household food security. One of the core strategies involve sustainable natural resource management, which also impacts on water systems. Of central importance is increased crop and livestock productivity, while farmer participation is a key success factor.

The purpose of this paper is to briefly describe the extent of the problem of food insecurity; discuss the method of participatory action research to achieve empowerment; and record the results obtained with research on training material for water use and food production.

2. HOMESTEAD GARDENING AND SMALLHOLDER FARMING

In the decade or so following the transition to democracy with the 1994 elections, village agriculture extension and advisory assistance has targeted group projects, rather than individual or household initiatives. This approach was adopted to enable government programmes to reach more people simultaneously on irrigation schemes and land reform projects. Over the last number of years, however, development practitioners in South Africa have recognized the importance of household food security and especially the impact of under-nourishment among children, adults, and the household on wider society. Focus has started to shift to the potential role of the homestead yard in food production for improved family nutrition, while government authorities are increasingly realising that lack of water has prevented many people from growing crops on their premises (Stimie *et al.*, 2010: 1)

2.1 Access to land for food production

Members of households in the category of small-scale agriculture participate in some type and varying intensity of food production activity. As shown in Table 1, for 82.8% of the approximately 1.3 million households, the size of the plots of land varies from less than 0.5 ha to 1 ha. For an additional 10.7% of households the plot sizes are between 1 and 5 ha. About 56.5% of households are headed by women. Regarding land access on the ground, another study (Hart, 2009: 17) reports that 4.5 million black people in South Africa participate or are in some way dependent on agriculture. For many this is a low-input, low-output activity and includes livestock production.

Table 1: Size and distribution of plots of land for households in small-scale agriculture, 2006

Plot size	Number of households (weighted)	%
<0.5 ha	831 871	64.5
0.5 – 1 ha	235 454	18.3
1 – 5 ha	138 196	10.7
5 – 10 ha	38 146	3.0
10 – 20 ha	11 940	0.9
20+ ha	34 546	2.7
Unknown	17 556	-
TOTAL	**1 307 710**	**100**

Source: Vink & van Rooyen, 2009: 13

Smallholder crop production is mainly located in the former homelands on 18.0% of total potential arable fields of nearly 17 million ha and 6.0% of irrigated land of 1.6 million ha. In spite of the relative small total area, food production on small plots has declined over the last 10 years. Fewer households now have access to plots of land less than 1 ha. Gardening or farming is typically undertaken to supplement household food needs. The main sources of income for rural livelihoods are social grants and pensions (50.4%); wages and salaries (22.9%); remittances from family members in urban areas (18.6%); and sales from farm products (3.7%) (Vink and Van Rooyen, 2009: 13-14). More detailed analysis (studies between 1996 and 2003) show that farming contributes 6-12% of household income on rain-fed or dry land settlements and 21-60% of income on irrigation schemes (Van Averbeke, 2008: 92 & 117).

2.2 Level of household food security

In a comprehensive review of food security in South Africa, Hart (2009: 7, 12, 22-23) finds that a world-wide shift in thinking has occurred over the last four decades, with emphasis now on individuals in households within a livelihood perspective and inclusion of subjective perceptions apart from objective indicators. Rural livelihoods consist of material income and food security as well as intangible well-being, social, religious and cultural status (Turner, 2004: 45). Household food security exists "when all people at all times have access to sufficient, safe and nutritious food to meet their dietary needs and food preferences for a healthy and active life" (FAO, 2001). Data and information from various recent surveys evaluated by Hart (2009) indicate that significantly high levels of food insecurity are found: 52% of an estimated 13.7 million households experience hunger and a further 33% are at risk. With a poverty line of monthly household income at less than R800.00, 41% of households are currently food insecure. At a more realistic monthly household income at less than R1 200.00, the number of food insecure households increases to 59%.

2.3 Target groups and approaches to improve food security

For the purpose of improving household food security, small-scale production can generally be grouped in two broad farmer typologies (Vink and Van Rooyen, 2009: 30-35): (1) Farming on small plots as part of agricultural development projects such as irrigation schemes; and (2) homestead or backyard gardening by mainly women and the elderly. In practice these farmer typologies are more diverse and require further explanation (see section 4 below). There is agreement, however, that

households in these two categories are the most important target for food security programmes. Attention must therefore be given to what the content of these programmes should be.

According to the FAO (2006) a "twin-track approach" is required to ensure food security. This incorporates (1) rural development and productivity enhancement, together with (2) direct and immediate access to food. The Human Sciences Research Council (HSRC, 2007) recommends that food security programmes should be implemented as part of an integrated anti-poverty strategy of government. This means that employment, health, education, agriculture, social support and related policies, strategies and programmes should all be included. The Department of Agriculture is tasked with maintaining national food requirements and eradicating inequalities among the majority of households (Hart, 2009: 13, 27-30). It has taken the lead to coordinate the food security strategy and organise the Integrated Food Security and Nutrition Programme Task Team. Different forums and committees operate at provincial and local government level with responsibilities to amongst others identify food security areas with vulnerable households and propose projects for funding. Investigations by Hart (2009: 31-34) reveal that national government departments experience "resource and capacity constraints that prevent them from performing their responsibilities effectively." Of concern is that apparently no dedicated funds are allocated for food security projects at any level of government. Therefore, while government policies on food security are clearly in line with international trends, they "are severely constrained at the level of meaningful implementation".

3. PEOPLE CENTERED AGRICULTURAL DEVELOPMENT

All food security programmes have to confront an inherent tension: Providing immediate relief to members of households and placing the recipients of aid on a sustainable development path. There appears to be a tendency to give preference to monetary grants or physical inputs, while investments in human capital or the people themselves are neglected. Already 30 years ago in his Economics Nobel Prize lecture, Prof TW Schultz (1979) highlighted the important link between investment in health and education for improved quality and skills of the human agent, in order to make productive use of land (i.e. soil and water) for growing food crops. The challenge is thus to empower people who are hungry and under-nourished to produce or acquire sufficient food which meets dietary needs. Attention must be given to existing and required knowledge and skills of the large number of people with small plots to take correct decisions and actions for household food consumption.

3.1 Formal education levels of adults

Social investment in health and education is not a luxury but a prerequisite for growth with equity, particularly in rural economies (Green, 2009: 40 & 42). "Education is crucial in breaking the cycle of poverty. It is a right in itself, and it equips individuals to lead full lives, understand the world, and ultimately gain the self-confidence to make them heard. Good-quality education is emancipatory, a path to greater freedom and choice, and opens the door to improved health, earning opportunities and material well-being. On average, each additional year of formal schooling increases a worker's wages by 5-10 per cent, and the skills gained can transform the quality of life for generations to come."

"Statistics on levels of educational attainment are currently the best available indicators of the level of skills in the labour force (Statistics South Africa, 2007: vii & viii). These are important determinants of an economy's capacity to compete successfully in world markets and to make efficient use of rapid technological advances; they are also a factor determining the employability of workers."

In this regard the statistics for South Africa in 2006 are briefly as follows: Out of a total population of 47.391 million, a third or 15.83 million of all ages attended educational organisations. Of these 9.85% are pre-school; 83.9% school; 5.5% university and college; 0.52% adult education; and 0.23% other. For the population aged 15 years and above, 3.985 million or 12.5% of a total population of 31.948 million cannot read or write of which 95% are black. Of the illiterate, 77% are in the age group 40 years and older and 59% is female of all ages. The highest level of education attained for persons 20 years and above includes 10.7% with no education; 14.5% with some primary education; 6.3% with primary; 35.3% with some secondary; 23.9% with completed secondary education and 9.2% with tertiary diplomas or degrees (Statistics South Africa, 2007: 3-10). It is therefore reasonable to assume that the majority of the adult household members living in rural villages and involved in agriculture are in the category with low or no schooling. Of more concern is that a very low percentage of adults are acquiring further formal or informal education.

3.2 Participatory action research method

The above-mentioned environment in which research is undertaken determines the knowledge which must be created for exploiting opportunities and solving problems (cf. Backeberg & Sanewe, 2006: 281-290). The long-term goal of the WRC research and development strategy on Water Utilisation in Agriculture is therefore to increase household food security and to improve the livelihoods of people (Water Research Commission, 2009: 37-39). The direction and driving force for research activities and outputs is amongst others guided by the strategic focus to improve the knowledge of the management processes exercised by people who are using water for poverty reduction and wealth creation in agriculture. "These members of households in rural communities, consisting mainly of women, children and the elderly, are also disadvantaged or marginalized for various social, economic and political reasons. A wide-ranging programme is required to support the sustainable development of rangeland livestock, rain-fed and irrigated crop production. Efficient use of water through a combination of agricultural activities can contribute to improving living conditions. Empowerment of rural people can be promoted further through participatory action research which improves knowledge, farming skills and leadership capabilities." Funding and research expertise is allocated to a portfolio of research projects within a programme under the heading "Sustainable water-based agricultural activities in rural communities". A strategic decision in the WRC business plan is to initiate research on approaches, guidelines and resource material for trainers, facilitators and household members in rural villages active in farming or interested to use water for food production.

The method of participatory action research is most appropriate since people, specifically farmers, benefit while the research is ongoing. Selener (1997: 9-10, 17-18 &157-158) states that … "The farmer participatory research approach emphasizes

the participation of farmers in the generation, testing and evaluation of technology to increase or promote sustainable agricultural production. This process is usually conducted in the farmers' fields through collaborative efforts between agricultural scientists and farmers… Participatory research combines three principal activities: research, education and action. It is a research method in which people are actively involved in conducting a systematic assessment of a social phenomenon by identifying a specific problem for the purpose of solving it. It is an educational process because researcher and participants together analyze and learn about the causes of and possible solutions to the problem addressed. It is an action-oriented activity since findings are implemented in the form of practical solutions. All three processes are conducted in a participatory way between outside researcher and participants… Participatory research is not value-free or ideologically neutral. Its practitioners emphasize the importance of working for a shift in the balance of power in favour of disadvantaged groups in society through overtly promoting the liberation of exploited and marginalized groups from society's oppressive and dominating structures… The focus of farmer participatory research is the development of agricultural technology to increase productivity. Practitioners emphasize the participation of farmers in the process of technology generation. They concentrate on the identification, development or adaptation and use of technologies specifically tailored to meet the needs of small, resource-poor farmers…" This approach and method was followed in the WRC initiated research projects on development of guidelines and training material.

4. WATER USE FOR FOOD PRODUCTION

For productive water use, access to land must at least be accompanied by land and water use security as well as knowledge and practical skills for farming. Given the historic inequalities based on racially discriminating legislation, a process of land and water allocation reform is under way in South Africa. In order to promote access to a larger area of land, reform involves land restitution and land redistribution, while land tenure reform is intended to ensure security of use for currently available communal land. After two cycles of policy making on land reform between 1990 and 2004, just over 3% of agricultural land has been transferred to previously disadvantaged black farmers. One of the countervailing forces is arguably the aim to enable access to more land without compromising the productivity of land, especially in small-scale farming (Hall, 2010: 175-190). Nonetheless, recent reports (Pressly, 2010: 11) provided statistics that 90% of the land reform projects on "5.9 million ha of redistributed farming land had failed". It was also "acknowledged that the government's plan to transfer 30% of farming land of 82 million ha to black farmers by 2014 would not be reached". Similarly, the target is that 30% of allocable water use entitlements should be awarded to black people. This increases progressively to 60% by 2024 of which half should be allocated to women (Department of Water Affairs and Forestry, 2008: 4). So far very little progress has been made to meet these targets, with slow implementation of the process of water allocation reform by compulsory water licensing.

4.1 Rationale for research on guidelines and training material

The obstacles experienced by natural resource reforms emphasise the urgency to invest in human resources, due to the current reality of rural poverty and food insecurity. Attention should obviously be given to people already on the ground who

currently have access to backyard gardens, communal croplands and irrigation plots. The sense of urgency is heightened by evidence of under-utilised rain-fed croplands (Backeberg, 2010: 299-317) and poor management practices causing low water productivity on irrigated land (Machete *et al*., 2004: 50-77; Fanadzo *et al*., 2010: 27-36). Because of the large number of people requiring training and skills development, households in rural areas have been categorized according to different agricultural activities (see Table 2).

Table 2: Number of households and area of land for different categories of agricultural activities indicating training needs

Item	Homestead yards	Grazing/livestock watering	Dryland fields	Irrigated fields
Number of households (hh) in former homelands with access to agricultural resources	2 400 000 hh	1 700 000 hh	1 700 000 hh	56 000 hh
Total hectares potentially under control of these households	200 000 ha	12 000 000 ha	2 000 000 ha*	100 000 ha

Source: Botha & De Lange, 2005: viii

***Note:** The area under-utilised, high potential land mainly in the former homelands is also stated as 3 000 000 ha (Department of Minerals and Energy, 2007: 9).

"This table gives a useful perspective on the range of farmer training needs for which training material needs to be developed. In practice, each training programme should be preceded by a thorough training needs assessment to confirm and prioritise the specific needs of that target group" (Botha & De Lange, 2005). The biggest impact will clearly be achieved through food production in homestead gardens. Various studies have also shown that fenced gardens adjacent to homesteads in rural villages are the most widely practiced and viable livelihood strategy (Minkley, 2003: xxvii). In this case backyards are not a backward but a progressive movement on a potential development path. This approach recognizes the hierarchical nature of farmer goals and decision-making (Bromley, 1982: 37). This hierarchy starts with food production to assure survival, then moving to levels of safety, followed by a surplus to acquire cash for consumption and savings, where after profit maximisation and speculation with risk taking in farming can proceed. Therefore "it is necessary to understand the farmers' goals and hence, that training needs differ between the food insecure household, subsistence and emerging farmers, and commercial, profitable small-scale farmers" (Botha & De Lange, 2005). The changing learner objectives and corresponding training requirements on this growth path are summarized in Table 3.

Table 3: Changing learner objectives in relation to position of households and farmers on selected development path

Position on growth path	Learner objective	Learning outcome
Food-insecure household	Food security	Food security through own production
Subsistence- & emerging farmer	Income generation and self-development	Profitable small-scale farmer
Profitable commercial small-scale farmer	Improved profit, simplified management and economic growth	Efficient and knowledgeable commercial farmer

Source: Botha & De Lange, 2005: ix

The first practical step to achieve household food security can begin at the homestead garden. For those with aspirations and entrepreneurial spirit, gradual expansion can take place thereafter. At the same time the needs and requirements of farmers on small plots have to be attended to. Priority attention for research and development of training and resource material was consequently given to productive water use for homestead food gardening and rainwater harvesting on croplands as well as guidelines for revitalisation of smallholder irrigation schemes.

4.2 Training material for homestead food gardening

Regarding home-gardening projects, three aspects are most important: First, the main purpose is to increase household food supply and dietary quality; second, women in households perform a key role for increasing knowledge, changing attitudes and improving practices related to good nutrition, in particular health, care and dietary intake (Wenhold & Faber, 2008: 51); third, in addition to provision of water to homesteads for domestic use, people can access "the multiple-use water ladder" as influenced by technologies and available water quantities for alternative productive water uses (Van Koppen *et al*., 2009: S77). Cautions raised by Altman *et al*. (2009: 355-356), that home production does not necessarily imply improved food security, should also be noted. Apart from being an additional livelihood strategy, it may indicate deep poverty and a survival strategy, or a residual activity that is practiced when convenient.

Early in 2004 the WRC therefore solicited a research project on "Participatory development of training material for agricultural water use in homestead farming systems for improved livelihoods". The overall objective of the project was to improve food security through homestead gardening, by developing and evaluating the appropriateness and acceptability of training material for water use management, training the trainers and training of household members in selected areas (Stimie *et al*., 2010). This project was also informed by the potential of a range of water access options, or 'multiple-use-systems' (MUS), over and above the conventional bulk supply and piped distribution systems – especially rainwater harvesting in its various forms. Particular attention was given to the development of "Resource Material for Facilitators and Food Gardeners" with matching illustrations, photos, graphs and tables. In addition, the specific infrastructure and techniques required to harvest and conserve rainwater, cultivate soils and produce crops that will impact on the essential dietary needs of people living with limited means and opportunities are explained and illustrated.

Homestead soil and water use techniques introduced as part of the learning/training process include the following:

- Deep trenching for concentrating water and nutrients in the plant root zone;
- Run-on ditches for in-garden rainwater harvesting;
- Tower gardens for saving labour and using grey water;
- Drip-kits for saving time and water;
- Underground rainwater storage tanks;
- Measurement of soil water for decision making in irrigation; and
- Diversified, low external input agricultural practices.

The process or 'participatory development' of the material entailed two main aspects: (1) Drawing widely on the material and know-how of practitioners in the field of household food security, homestead gardening, training of household members, rainwater harvesting and homestead water management, thereby achieving an effective combination of existing expertise and available material; and (2) field testing and refinement of the collated material with both food secure and insecure households in rural villages.

4.3 Guidelines for revitalisation of smallholder irrigation schemes

During 2000 the WRC published research findings which show that despite large investments, the performance of smallholder irrigation schemes in South Africa was well below expectations. Due to budget constraints, provincial governments had withdrawn support and in provinces such as Limpopo, KwaZulu-Natal and Eastern Cape this had led to almost complete collapse of irrigation schemes (Bembridge, 2000). In the course of a project on the evaluation of irrigation techniques applied by small-scale farmers (Crosby *et al*., 2000), the need for greater information, knowledge and practical training in technical irrigation aspects was highlighted by individuals at all levels. It was clear that this training should be practical, on-the-job type training, rather than theoretical exercises. The approach of "development through needs-based training" led to the formulation of guidelines (De Lange *et al*., 2000) based on the argument that community members and outsiders involved in irrigation development need to be much better informed of their own and other participant's roles to increase the chances of success. However, each development project is unique and it would not be possible to develop a comprehensive training manual to cover all situations. Rather, the approach with these guidelines is to supply checklists and lists of typical questions that role players need answered. These can be used by trainers in the development of appropriate training courses and by facilitators in the design of development processes.

As part of a follow-up study (Botha & De Lange, 2005), the WRC guidelines were tested and expanded as a means of increasing meaningful training and capacity building in the small-scale irrigation sector. Smallholder farmers currently have limited access to training. Furthermore, the available formal training is focused almost exclusively on scaled-down versions of high-cost, high-risk commercial production practices, which are especially inappropriate for resource-poor households. Much of the current training also requires trainees to be away from their homes for periods ranging from three weeks to several months. This is impossible for many, especially so for the women responsible for food-insecure households. Attention was therefore given to the development of a training package that can be given to prospective trainers or facilitators to use in the field when presenting training to farmers.

Feedback from government officials in different provincial departments indicate that no consistent approaches are followed for technical and financial feasibility studies of smallholder irrigation development. In 2003 the WRC therefore funded a solicited project to develop guidelines for the revitalisation of smallholder irrigation schemes in South Africa (Denison & Manona, 2007). A national database of 317 schemes located mainly in Limpopo, KwaZulu-Natal and Eastern Cape Province and covering approximately 50 000 ha was compiled. While most of these schemes have collapsed

or are under-utilised they continue to draw substantial funding from the government for social and economic upliftment, often with limited success. The guidelines document best local and international practice and are intended for government decision-makers, technical and extension staff, consultants, development practitioners and irrigation scheme leadership.

The "Rough Guide" (Volume 1) is a quick reference guide that covers policy implications and revitalisation objectives, as well as recommended principles, approaches and methodologies for scheme diagnosis, participative planning, feasibility evaluation and formulation of farmer support programmes. It provides action oriented references for implementation according to a holistic development approach, working towards profitable farming enterprises and social upliftment on irrigation schemes and surrounding areas. The "Concepts and Cases" (Volume 2) contains the theoretical rationale for the guidelines. Eight farmer support approaches are documented, providing lessons of best practice as well as alternatives for programme design, and new approaches are presented. These are a tailored consultative planning approach, a land-leasing strategy for irrigation schemes and the formulation of four basic farming styles to guide planning.

The farming styles or farmer typologies are (1) the business farmer (commercially oriented farmers on larger plots); (2) the smallholder (lower risk farming with diversified livelihoods on smaller plots); (3) the equity labourer (commercial partnerships or joint ventures); and (4) the food producer (intensive gardens with rainwater harvesting). A variation of these farming styles are analysed and described as food farmers, profit-makers and employers, based on demographic characteristics, income of households and production related variables (Van Averbeke, 2008: 110-122; Van Averbeke & Mohamed, 2006: 136-157).

Finally the issue of size of the land plot has been mentioned several times and the question arises how consolidation (or sub-division) can occur. According to a report published by the FAO (2009: 28-29) "international experience indicates that although poor, small-scale landholders need to be free to transact land amongst themselves, and that land sales markets are much less effective in bringing about land exchanges than leasing or sharecropping". It is also stated that on settlement schemes in South Africa, the size of the land holding does not tend to change. Rather, members of households seek livelihood opportunities outside farming. Further research should be done to understand the degree to which land tenure arrangements and trust relationships between plot holders have prevented active land rentals or share-cropping from taking place.

5. CONCLUSION

Empowerment with knowledge for decision and actions is urgently required because the available evidence in South Africa indicates widespread household food insecurity and under-nourishment in rural areas. About 9.5% of all households have access to agricultural land on predominantly small plots of less than 1 ha. An estimated 17.5% of households can potentially produce food in homestead backyard gardens. With generally low formal education levels, the priority is to provide informal, practical, hands-on training and skills improvement. By following participatory research methods, this type of training resource material and guidelines has been developed for homestead food gardening and smallholder irrigation farming.

Further research is currently being done for developing a comprehensive learning package for education on the application of rainwater harvesting and conservation practices (Water Research Commission, 2008: 44-45). The even bigger challenge is to encourage entrepreneurship (Chilwane, 2010: 2), particularly amongst all smallholder farmers, that will progressively lead to profitable farming enterprises. This will contribute to employment opportunities, increased and more equal income distribution.

The available training material and guidelines for revitalisation of smallholder farming has been purposefully brought to the attention of officials in government departments and lecturers at agricultural colleges through knowledge dissemination actions (Botha, 2009; Denison, 2010). In this process it was confirmed that a gap exists within the agricultural education and training sector for learning material that is practically useful. That is the general level at which smallholder farmer training needs to be conducted. Similar actions will be undertaken for application of the training material relevant to homestead food gardening. So far the content of the training material and guides was well received by college and extension staff of provincial departments. With the co-operation and assistance of agricultural colleges, non-government organisations and community based organisations across the country, a national initiative is now required for training the trainers, facilitators, farmers and individual household members, in particular women. The support of senior managers at provincial and local government level is essential for successful implementation of this training programme.

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