

IMPROVING RURAL LIVELIHOODS WITH RAINWATER HARVESTING AND CONSERVATION ON COMMUNAL CROPLANDS IN SOUTH AFRICA: OPPORTUNITIES AND OBSTACLES¹

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Abstract

In some villages in the Eastern Cape and Free State province, levels of food security have increased by means of maize and vegetable production in homestead backyard gardens. In the last mentioned case this has been achieved through the technology and practice of infield rainwater harvesting (IRWH) and conservation. This technique has been developed over fifteen years of on-station and on-farm research. Through technology exchange the application expanded to more than 1 000 households in 42 rural villages around Thaba Nchu. Large areas of communal lands surrounding these villages have been abandoned and not cultivated for the last 25 years or more. There are clearly opportunities for up-scaling from household food gardens to croplands. Innovative procedures have been developed and tested to identify suitable soils for rainwater harvesting. Expectations are that exploitation of this land can enable households to produce surpluses above own consumption, but various obstacles have to be overcome. Low levels of education are found amongst community members and widespread poverty exists. Investment in schooling and improvement of health is required while placing people at the centre of the development process. A pilot project to document a land register of holdings on the croplands has also confirmed the near collapse of the land tenure system. After consultation a participatory process started to explicitly define the land holding and enable exclusive use of land for cultivation. Formal groups have been established to ensure enforcement of rules and facilitate transfer of use rights by means of share-cropping between those who are interested and not interested to farm. Successful up-scaling of IRWH will require demonstration plots to change unrealistic perceptions regarding prospects of conventional tillage. New farmers, who are mostly women, must also receive skills training and have aspirations to improve livelihoods through more productive farming activities.

1. Introduction

Life in rural areas of South Africa is complex and characterised by many inconsistencies. One analysis of different “tribes” (Burgess, 2002: 48-49) states that 42,7% of the population, or some 19 million people, are rural survivalists with traditional agrarian lifestyles. These are mainly black South Africans who very often still adhere to tribal customs. Without specifying statistical details, it is clear that the majority (at least 15 million individuals) live under conditions of poverty with food insecurity, low income and education, lack of acceptable housing and adequate services. Material income for rural livelihoods is mostly obtained from diverse sources of remittances from family members in urban areas, wages, pensions and social grants (Van Averbek, 2008: 92). Similarly, different farming styles are found but farming contributes only 6 to 12% of income for livelihoods. In spite of suffering from sometimes extreme poverty and under-nourishment, land resources in communal areas are, however, largely under-utilised. This is evident from e.g. long abandoned cultivated land and land lying fallow around villages near the towns of Butterworth and Kentani in Eastern Cape province (Robertson, 2009: 38) and Thaba Nchu in Free State province (Backeberg, 2009: 31). The economic potential of 16 million ha of communal land still needs to be unlocked and prevent rural areas from becoming poverty traps (Hofstätter, 2009: 31). The purpose of this paper is therefore to attempt to explain some of these challenging realities of land use; the existing opportunities for food production; the various obstacles which must be overcome; and the implications for alternative future courses of development.

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2. Land and rainwater harvesting technology

There is a general tendency of low level or no field crop cultivation activity by members of poor rural households. Apart from livestock husbandry, the most important exception is homestead food gardens as a land based source of livelihoods. According to Minkley (2003: xxvii) “the more intensive inter-cropping of maize and other food crops in fenced gardens adjacent to homesteads is the most widely practiced and viable... livelihood strategy across households and regions – in response to declining resources and increasing risks”. For case studies in the coastal areas of Eastern Cape it was also found “that homestead gardens as part of multiple livelihood strategies are highly varied and differentiated, from the desperate survival and subsistence cases to the more effective surplus, storage and exchange examples”. The same pattern of backyard food gardens is observed in rural villages at inland areas of the Free State. In this case food production in homestead gardens has been achieved through the technique and practice of infield rainwater harvesting and conservation (IRWH&C).

2.1 Research on infield rainwater harvesting and conservation

Rainwater harvesting and conservation is essentially a technique to collect, channel and store surface water run-off for household consumption, livestock watering and food production. Water-harvesting methods can be classified as macro-catchment methods such as small farm dams; and micro-catchment, on-farm methods such as contour ridges and run-off strips (Oweis *et al.*, 2004: 3&10-16). The technique of IRWH&C falls within the last-mentioned category and consists of a 2m run-off strip with a 1m conservation basin. This innovation is the result of investment in research and development over a period of 15 years. Research started with modelling the water balance on benchmark ecotopes, i.e. a unique combination of climate, topography and soil (Hensley *et al.*, 1997) and there-after research on optimising rainfall use efficiency (Hensley *et al.*, 2000). Work was done at the Glen research station of the Department of Agriculture and in participation with selected households in villages around the town of Thaba Nchu. In this area the long-term average annual rainfall varies between 543 to 588mm, with average annual evaporation of 2 317mm; the terrain for arable land has a slope of 1 to 3%; and soils have a relative high clay content from 17 to 42% with crusting characteristics. “The high evaporative demand and relatively low rainfall, make this a semi-arid climate, with worst conditions for crop production generally occurring during December, January and February. Rainfall during these months is generally very erratic with much of it in the form of high intensity rainfall events. March rainfall is the highest and also the most reliable, with the additional advantage during this month of by far the lowest evaporative demand of the summer growing season months. This feature can be used to advantage by planting crops with a short growing season early in January. Examples are sunflower and the new quick-growing maize cultivars. Low temperatures are experienced during the winter, coupled with very little rain. In this sort of climate there is generally no shortage of radiation” (Hensley *et al.*, 2000: 12). The natural environment determines the technical problem of low and variable crop production with conventional tillage of the soil. “The reason for the low crop production potential is marginal and erratic rainfall, exacerbated by high run-off and evaporation losses. The hypothesis was that a production technique combining the water conservation benefits of water harvesting, no-till, basin tillage, mulching and long-fallow would make sustainable crop production possible at a reasonable level for selected crops. Field experiments were conducted over three growing seasons on four ecotopes with maize, sunflower, sorghum and wheat to test the hypothesis. They consisted of statistically designed experiments on two ecotopes at Glen and semi-statistical demonstration trials on two ecotopes on farmer’s lands near Thaba Nchu. Detailed soil water content measurements were made on all four ecotopes, and runoff measurements were also made with automatic runoff measuring devices on the Glen ecotopes. These measurements made it possible to quantify the water balance and determine precipitation use efficiency. Maize and sunflower were found to be the best crops. Simulation models of these two crops, calibrated against measured results, were used together with long-term climate data to test the long-term validity of the short-term results from the field experiments. The results of both sets of tests showed that the water harvesting and basin tillage (WHB) part of the hypothesis cannot be

rejected. Indications are that in the long-term, average yield increases compared to conventional total soil tillage (TST), of around 50% can be expected from maize and sunflower using the technique on the ecotopes tested. Although long-fallow has proved its value for very dry seasons, long-term yield predictions indicate that this strategy will be uneconomical. Mulch in the basins has been shown to be beneficial under certain circumstances. Additional research is needed for clarification in this connection. The overall result is confidence in the conclusion that the WHB technique is significantly better than conventional tillage on these ecotopes for maize and sunflower” (Hensley *et al.*, 2000: i). Further research was done to compare different combinations of mulching techniques, primarily aimed at reducing evaporation from the soil surface (Botha *et al.*, 2003). It was found that organic mulch in the basins with stones in the run-off strips led to the lowest evaporation. Compared to conventional tillage there is a 70% probability that yields can increase from 1 to 1,8 ton per ha and a 50% probability that yields can increase from 1,3 to 2,3 ton per ha with rainwater harvesting (Van Rensburg, 2009). IRWH clearly improves conservation of soil and water and reduces the risk of crop failure.

2.2 Development and application in homestead food gardens

This research phase was then followed by a technology transfer project with development work initially planned in six rural villages around the towns of Thaba Nchu and Botshabelo over a two-year period. The project had two main aims: (1) to exchange technology as effectively as possible with the owners of small areas of land, and Department of Agriculture officials (especially those of the extension service); and (2) to assist and support the farmers and extension officers with the application of the IRWH technique (Botha *et al.*, 2007).

The technology exchange process expanded rapidly, resulting in many more households and communities than initially anticipated implementing the IRWH technique. The need arose to employ a proper exit strategy that ensured continued implementation of the technique by interested communities, when the research team completed the project. Hence, the project period was extended, funding increased and a third aim was added, namely (3) to develop guidelines for use by farmers and trainers practicing IRWH and to develop an exit strategy. Observations of the expansion of the IRWH technique indicated that during the first growing season (2001/02) six households using backyard food gardens in four communities applied the technique. By 2002/03 this had increased to 108 households in six communities, and in 2003/04 the number had increased further to 400 households in 37 communities. Before planting time for the 2004/05 season, the number had increased to more than 1 033 households in 42 communities and one trust farm. Apart from the increasing number of households undertaking food gardens, the crop choice expanded from maize as a staple food to a diversity of vegetables.

A number of capacity building actions were conducted during the project with extension officers, youth workers and households in the form of training courses and workshop. Household members were encouraged to work in groups in order to minimize mistakes in basin construction and planting and to form working committees in every community. The committees/groups consisted initially of a few members, approximately 10 per community in the four communities selected at the beginning of the IRWH project. These individuals were tasked with participation on the demonstration plots that were set up in their communities, and organised the villagers in all the activities and meetings that took place. These groups grew as more households and communities practiced the technique and led to the establishment of community-based water harvesting interest groups in 42 communities around Thaba Nchu and Botshabelo. As the number of households and communities using IRWH techniques increased, a decision was taken by representatives from each group and community to form a municipal-based water harvesting interest group. This body was later named the Tswelopele Small Farmers Cooperative (TSFC). Amongst the organisations that were co-opted into the structure were the municipality, the tribal authority and the local agriculture office.

Communication methods used to disseminate knowledge regarding IRWH technology were a combination of individual, group and mass approaches. Mass approaches used to disseminate IRWH information were local radio stations, television stations, videos, songs, pamphlets, training manuals, newsletters and posters. Group approaches used consisted of on-station and on-farm demonstration plots, focus group discussions, workshops, short courses, farmers' information days, training sessions and festivals. The individual method included activities such as visits (office or farm), letters, telephone calls and informal contacts. These various communication channels were used at different stages of the technology exchange process. Manuals were developed as a result of this process and created a good platform for the compilation of training guidelines. The guidelines were tested and evaluated by the researchers, technical assistants, farmers and extension officers. Suggestions and improvements to the guidelines were included in the final extension manual. It follows that a process is under way to gain social acceptance of IRWH&C in homestead food gardens, as measured by the indicators of "enhanced levels of mobilisation, capacity building, empowerment, human well-being, self-reliance and community participation" (Kundhlande *et al.*, 2004: 74).

3. Land and investment in people

In this central region of South Africa a large area of 750 000 ha, sometimes termed the "resettlement area", has been identified for new farmers. There is a big population in the scattered villages and the two towns of Thaba Nchu and Botshabelo. As explained above, the area has low potential for crop production because of relatively low and erratic rainfall and dominantly clay soils on which the rainfall use efficiency is low because of high losses due to run-off and evaporation from the soil surface (Botha *et al.*, 2003: 3).

3.1 Identifying soils suitable for rainwater harvesting

The success recorded with rainwater harvesting for crop production presents the opportunity of up-scaling IRWH&C from household food gardens to communal croplands. Several issues have to be considered before embarking on this development path: It is obviously essential that IRWH&C is only applied on soils which have suitable characteristics (Hensley *et al.*, 2007). This need calls for specialist and cost effective intensive soil surveys – eventually over very large areas of South Africa. Traditionally, intensive soil surveys (scales around 1:10 000 and larger) were conducted using a relatively expensive grid pattern. By employing modern techniques, in association with predictive mapping based on comprehensive pedological knowledge and experience, a more effective survey technique for identifying land suitable for IRWH was developed and the procedure has been documented. The land type survey (scale 1:250 000), with results available for the whole of South Africa, provides a useful framework within which to conduct intensive soil surveys. The first step in this process is the subdivision of the land type into soil scapes on 1:50 000 maps. The following are the main advanced, modern and innovative techniques that are employed: A geographical positioning system (GPS) instrument which uses satellites to instantly provide the coordinate of any position; a computer programme "3dMapper" (Terrain Analytics, 2004) to facilitate predictive mapping; a simple steel penetrometer to make rapid determinations of soil depth; a simplified soil profile description form; and the selection of a carefully chosen threshold value for the depth to which observations need to be made to evaluate the suitability of soils for IRWH. This procedure was applied in three villages at Thaba Nchu and the areas classified as good and moderate soil are summarised in Table 1.

This analysis shows that nearly threefold more land is suitable for IRWH&C than is currently considered arable. The fact that some of this potential soil is grazing-land raises complications which will have to be addressed (see next section). Nonetheless, purely from a technical perspective the expectation is that exploitation of this land can enable households to produce enough staple grain crops for own consumption and also earn cash income with sale of surpluses. The question is: why has the land not been cultivated in the past and are people really interested to expand production to these croplands?

Table 1: Area soil suitable for IRWH&C in three villages near Thaba Nchu, Free State province

Village	Land use (ha) ¹			Soil suitability (ha) ²	
	Residential	Grazing	Arable	Good*	Moderate*
Gladstone	60	2 972	378	1 177	254
Feloane	30	1 208	80	62	30
Potsane	30	830	110	121	18
Total	120	5 010	568	1 360	302

Source: 1 Kundhlande *et al.*, 2004: 7

2 Hensley *et al.*, 2007: 44-50

*Note : Good – Effective rooting depth > 900mm

Moderate – Effective rooting depth 700 – 900mm

3.2 Understanding the capabilities of people using soil and rainwater

Case studies in the Eastern Cape found that dry-land field-based arable production is not a preferred livelihood strategy of poor people (Minkley, 2003: xxvii), even though there is relatively high potential soil and rainwater available (Robertsen, 2009: 41). The composition of households, dominated by young children and old people, appears to be an impediment. Contrasting findings are recorded for the Free State with relative low potential soil and rainfall in the arable areas described above. Based on quantitative and qualitative assessments (Blignaut and Sibande, 2008: 6-9) in 12 out of 42 selected villages around Thaba Nchu, interviews indicated keen interest to up-scale from homestead gardens to croplands. Interestingly, although IRWH is the frame of reference for food gardens, conventional ploughing is considered to be the correct farming practice in the croplands. Respondents acknowledged, however, that IRWH could be practiced on the arable land (and this aspect will also be further interpreted in the next section). It is therefore reasonable to expect that a range of obstacles will have to be overcome when up-scaling from gardening to farming.

Since agriculture and farming is an activity of people (Spedding, 1988: 1-5), attention must first be given to the capabilities of people. With reference to the selected villages in two wards of the local municipality, the demographic profile with data for 2001 is as follows (Blignaut and Sibande, 2008: 43-51): 45 to 62% of the people are under the age of 20; 15% have no schooling; 39% and 43% have some or have completed primary and secondary schooling respectively; 3% have post-school qualifications; the majority of households have no formal income and the second largest income category is R4 801 – R9 600 per year; 47 to 54% of households are not economically active, 28 to 29% are unemployed and 18 to 24% have formal employment. Essentially therefore the population is mostly young with low education levels, very low basic income and high levels of unemployment. Due to failures by the older generation, the youth are not actively involved and view farming as a last option for economic survival. Nonetheless, people have few alternatives to escape from the poverty trap, are highly vulnerable and the technology of IRWH&C can potentially do much to mitigate this vulnerability of households to food insecurity.

According to the sustainable livelihoods framework, “people pursue a range of livelihood strategies in order to achieve livelihood outcomes, both material and intangible”. These consist of different sources of income and food security together with social well-being, cultural and religious status (Turner, 2004: 45). As argued by Maxwell (2001: 17) “recent research favours the view that access to food by individuals in a household is pervasively linked to the control they have over household resources and the access they have to household income”. This recognises the complex linkages between e.g. the individual, household, group and community. Therefore “food security is access by all people at all times to enough food for an active, healthy life” (World Bank, 1986: 1).

3.2.1 Income requirements for reducing poverty

Projections are available of the minimum area land required to improve livelihoods and food security of households in a case study of three different villages near Thaba Nchu. These were done as part of assessments to determine the social acceptability and financial feasibility of IRWH&C by following various techniques of participatory rural appraisal and farming systems analysis (Kundhlande *et al.*, 2004: 88-153). Most households in these villages have more female than male members. For a household of 5 individuals (2,96 adult equivalents) the off-farm income is estimated at R6 767 per year and the expenditure on food R3 334 per year (at 2001 prices). Based on the adult poverty line income of R353 per month, the household income requirement is R12 539 per year. To meet the nutritional requirement with a balanced diet of carbohydrates, protein, fats and oils the income requirement is R10 131 per year. It should be noted that only maize at 0,6 ton grain per year is produced on the farm for household consumption while all other food items are purchased to meet household needs. Income and expenditure as well as nutritional status have been criticised as inadequate measures of socio-economic well-being and indicators of current household food security, because they do not accurately capture family and community networks for sharing resources (Hart, 2009: 22-24). When people are in desperate need, the degree of sharing is of course rather limited. The percentage spent on food is 27 to 33%, which is in agreement with the present national average of 33% for the lowest 30% income category (Jooste and Tema, 2009: 14-15). These annual budgets are also comparable to the statistically recorded annual income of R11 377 (at 2000 prices) for agricultural households in the Free State province. The majority of these are black farm worker households earning wages from formal employment (Pauw, 2007: 206). The projected contribution of farm income to livelihoods is clearly considerably higher than what is typical in rural areas (cf. Van Averbeke, 2008). In order to earn the difference between off-farm income and these two levels of income requirements from farming with IRWH&C practices, an area of respectively 3,21 ha and 1,87 ha land has to be available (see Table 2).

Table 2: Gross margins for crops and area land cultivated for income and nutrition requirements of households in villages at Thaba Nchu, Free State province

Production method	Gross margins			Land area	
	Crop type			Income requirement	Nutritional requirement
	Maize	Sunflower	Dry beans		
	R/ha	R/ha	R/ha	ha	ha
Soil tillage	466	31	658	14,49	8,45
*Water harvesting	2 191	1 372	1 656	3,21	1,87

Source: Kundhlande *et al.*, 2004: 107, 115, 122, 152

*Note : Yields and gross margins for mulching technique with lowest evaporation
 €1= R8 in 2001

With gross margin analysis, IRWH&C is certainly financially feasible. The cropping pattern in the summer rainfall season is projected to be 40% maize, 30% sunflower and 30% dry beans. For conventional tillage the area required is just more than fourfold higher than for rainwater harvesting.

These calculations are, however, based on research station results. If experimental yields are reduced by 50% for the purpose of more practical long-term yield expectations, the area land required increases to a probably more realistic minimum of 6,4 ha and 3,7 ha respectively. After all, with an entrepreneurial spirit farmers should have the prospects to earn more than comparable wages of a labourer to justify the risks being taken. The fact is though that with exception of a few individual farmers in some villages,

cropland has not been cultivated for at least 10 years (Kundhlande *et al.*, 2004: 75-84) and based on anecdotal evidence it is likely to be more than 25 years. One of the key assets in agriculture which can change this is human capital. The more important requirement is to assess the total capability residing in individuals based on their knowledge and skills. The productivity of people is increased through interaction while leadership and organisational ability are important in making natural assets such as land more valuable (Pretty and Buck, 2002: 25).

3.2.2 People requirements for improved livelihoods

As stated by Schultz (1979: 2-3&5) the decisive factor to improve the well-being of poor people is not space and cropland but improvements in the quality of the population. It is not the productivity of the soil but the existing incentives and opportunities to augment production from land through investments that include improvements in human skills. These investments to enhance economic prospects include child care, health (nutrition, clothing, housing and medical services), schooling, home and work experience, obtaining knowledge and skills for farming. Land resources are therefore all too often overrated while the quality of human resources is underrated. Although farmers differ in their ability to take decisions and actions, they provide labour and entrepreneurship, i.e. taking risks for resource allocation and crop production.

In the South African context radical transformation of the economy is necessary in order to improve the quality of lives of people on a broad basis (Scerri, 2009). “For poverty to be eradicated there has to be an investment in human capital, not just an investment in skills and training, but also an investment in the knowledge economy”. Knowledge is a resource that can expand economic activity because knowledge empowers people to act. Empowerment starts with education, improvement of family units in communities, practical training and making human capital the core of any development process.

4. Land and incentives of secure institutions

Individual and collective decisions and actions are taken within an institutional framework. As is the case for water resources (Saleth, 2006: 4-5), institutions are the rules that influence the set of actions, provide incentives and determine the outcome of apportionment, transfer, development, use and management of land resources. Development theory and practice (as argued in the above section) has often analysed food security in terms of food availability and poverty in terms of income deprivation. The work of Sen (1981) has emphasized individual entitlements, capabilities, freedom and rights (Overseas Development Institute, 2001: 1-2). The individual’s entitlements are the overall controls exercised over e.g. resources by virtue of existing rights and corresponding obligations. The focus should not be on the lack of food availability but on the failure of entitlements to the means of survival. Of particular relevance are entitlements to land resources (inheritance or transfer entitlements); labour (a person’s own power and skill entitlements); output produced (production-based entitlements) and trading of goods or services (trade-based entitlements) (Drimie and Mini, 2003: 5-6). With secure entitlements, individually and collectively people have the opportunity and freedom to choose the life they prefer, but also must accept responsibility for these choices. This approach to food security and poverty is thus on entitlements of individuals and groups as well as empowerment and participation to obtain access to resources and services. The question is now whether this school of thought can explain why the cultivation of cropland in communal areas was discontinued and what should be done to encourage households to again work the land?

4.1 Institutional change and tenure reform on communal land

North (1990) postulates that institutions are amongst others path dependant since their present status and future directions are determined by earlier history. They are also embedded in the cultural, social, political and economic environment, which means that institutions change continuously in a gradual and

incremental way. Institutional change that affects the entitlement to land is of significant importance. The current state of land use in villages at Thaba Nchu is namely the result of a history of conflicts over legitimate rights and economic means to earn livelihoods. The changes in land ownership due to political forces, the impact on the lives of people and the harsh economic and social consequences of dispossession following the 1913 Land Act have been painstakingly analysed and vividly described (Murray, 1992; Plaatje, 2007: 102-115). Together with racially discriminating legislation that followed in 1936 and 1950, it effectively prevented black South Africans from owning and operating farms. This has led to deeply entrenched racial and class divisions and to an “impoverishment of the spirit” of the black rural population (Diale, 2009: 9). If it is accepted that for many black South Africans “land provides a sense of being, a sense of belonging and emotional and physiological security”, it has far reaching implications. Land is not only an economic resource which is of value because of what can potentially be “grazing or growing on it” (Diale, 2009). Attention must evidently also be given to social capital, which yields a flow of mutually beneficial collective action, contributing to the cohesiveness of people. It incorporates social assets such as norms, values and attitudes that determine the inclination of people to cooperate, based on relations of trust and mutual acceptance of generally valid rules (Pretty and Buck, 2002: 25).

Since 1994 a process of land reform is under way in South Africa which involves land restitution, land redistribution and land tenure reform (Hall, 2007: 87 & 95-98). Tenure reform aims to redress the discrimination in terms of the nature of land rights in the former homelands where people hold land communally. Reform is needed to clarify who has rights to what land, the nature and contents of these rights, how they are to be allocated and administrated, recorded and adjudicated. Communal tenure reform, however, is the least evolved of all types of land reform, and implementation of tenure reform was planned to start only in 2006. In this regard two issues must be mentioned: First, the Communal Land Rights Act, No 11 of 2004 was promulgated with the intent to secure tenure rights for people living on communal land. The Act is on hold because it is subject to a legal challenge with the argument that the Act is unconstitutional and “would render the rights of rural people even less secure than at present” (Cousins, 2008: 4). Second, according to Cousins (2008: 5, 6&8) “the term ‘communal tenure’ has always been contentious in the African context because it seems to imply collective ownership and use of all land and natural resources. Most indigenous property systems include clearly defined individual or family rights to some types of land (for example, residential areas and fields for cropping) as well as common property resources (such as grazing or woodlands) that are shared with others. On the other hand, these systems almost all involve rights of access and use on the basis of accepted group membership, and a degree of group control or supervision over how those rights are exercised”. In South Africa, “for many rural people, rights still take the form of a permit – usually a ‘Permission to Occupy’ or PTO certificate – to which a number of restrictive conditions are attached”... “The key legacy of the past, then, is the lack of legal recognition and hence the insecurity of land rights in communal areas. This heightens the vulnerability of people who are already very poor, and of women in particular, and constrains efforts to address their poverty through rural development programmes. An agreed objective of tenure reform in these areas, is thus to secure land tenure rights in both law and practice in ways that will promote economic development and enhance the livelihoods of rights-holders. There is little consensus, however, on how best to go about this”.

4.2 Entitlement for access and productive use of croplands

The contention is therefore that croplands in communal areas will only be accessed sustainably with secure land tenure arrangements. Land tenure includes a bundle of rights namely the right to use, the right to retain the income earned from the land and the right to exchange some or all of these rights (Huggins and Clover, 2005: 8-11). So far no official action has been taken to institute reform and promote tenure security of land in villages around Thaba Nchu. A pilot project was initiated by the Water Research Commission to develop a land register for the three villages at Thaba Nchu in which soil surveys for IRWH&C had been completed (Manona and Baiphethi, 2008: 4-14). The study was

done in phases and in consultation with all relevant officials and community representatives. In this process it was determined that the legal entitlement to use land was in the form of a PTO. For both residential stands and arable plots a PTO is typically issued to the male head of the household. Apportionment of a PTO requires recognition of community membership by the Barolong tribal authority, demarcation of the site, recording in the land register and issuing of the permit. The number of households with residential stands have increased over the years and not all have arable allotments. The *de facto* situation in Thaba Nchu is that holders of PTOs believe that these rights to land are secure but as mentioned before, according to the *de jure* situation the legal status of PTOs is doubtful. The qualitative assessment by Blignaut and Sibande (2008: 7-9) also found that the majority of village residents are of the opinion that they have access to land with secure tenure. This is contradicted by statements that crop theft and fear of damage by cattle are real contentious issues, because croplands are not fenced off. Croplands are generally neglected and used as open access land for grazing by cattle. The PTO certainly cannot be legally transferred by means of lease, sale, mortgage or bequeath. Again contradictory statements were recorded a few years earlier in the survey reported by Kundhlande *et al.* (2004: 90-93). For those households that had access to cropland, 60 and 71,4% said they could respectively sell and lease the rights to land.

The management of PTOs is through land administration and this provides the mechanisms for allocating, maintaining, regulating and enforcing the rights and obligations concerning land (Manona and Baiphethi, 2008: 15-18). The organisational structures that performed this function up to 1992 was the development corporation Agricor together with the Department of Agriculture while the Magistrate had a coordinating role. After 1994 it is not clear what the authority of the Department of Land Affairs is regarding administration of the relevant legislation. Parallel to the governance exercised by the Moroka chieftaincy and tribal council, the villages are under the jurisdiction of the Mangaung local municipality which interacts with the household members through a ward committee system. Currently there is confusion with respect to responsibilities for different elements of land administration between the traditional authority and government departments at local, provincial and national level. The result is that no valid PTOs have been issued and no official position has been taken on the legality of existing PTOs.

4.2.1 Land register and local organisation for secure entitlements to arable plots

For the cropland no beacons are present which indicate physical boundaries and all fences have been broken down. In compiling the land register, an innovative survey method was followed which rapidly plots points at one metre intervals using a GPS (Manona and Baiphethi, 2008: 19-22). The arable allotments with good and moderate soils were surveyed with active participation of the holders of a PTO walking around the perimeter of the field and being checked by a neighbouring plot holder. In this process no conflicts over boundaries were recorded. This data was processed and land holdings were linked to the name of a PTO with a unique number and size. Following this method land registers for each of the three villages were produced and overlaid on an aerial photograph with soil survey information. For the villages of Potsane and Gladstone most plot sizes are between 2 to 4 ha while for Feloane most plot sizes are between 1 to 2 ha. With few exceptions where disputes were recorded over PTOs, the land register of location and size of plots were accepted by households in villages.

During the final phase of consultation the concept of a village or local land committee was proposed and accepted (Manona and Baiphethi, 2008: 23-27 & 38-43). This formal group will consist of the village headman, representatives of the ward committee and elected community members. A set of rules were formulated to put in place an informal framework for locally based land administration in the three villages. This will support clarification of existing rights to support expansion of IRWH&C to the arable fields, but the limitation is that the administrative framework is presently not legally recognised. The agreed functions of this local organisation are maintaining and updating the land registers; facilitating land exchange agreements; investigating, adjudicating and resolving land use conflicts; controlling land

use changes, such as cultivating grazing-land; and overseeing the further development of rules. Steps will also have to be taken for control of livestock management; fencing of arable fields; and protection against crop damage and theft by specifying and enforcing punishment in case of transgressions.

4.2.2 Expectations for future use of croplands

The holders of PTOs of arable plots were approached with a semi-structured questionnaire to establish the perceptions and degree of interest to extend cultivation to croplands and the preferred terms of possible land exchange agreements (Manona and Baipthethi, 2008: 28-37). It was found that 73,4% of respondents are interested and 26,6% are not. The interest to cultivate croplands is, however, associated with conventional soil tillage and not IRWH&C. This again emphasizes the need for demonstration plots and participative evaluation of rainwater harvesting techniques and practices on the cultivated fields. The most important obstacle which was identified is the lack of fencing followed by labour shortages (although there is widespread unemployment). Skills shortages were the least of all concerns. In contrast Blignaut and Sibande (2008: 6-9) found that people have limited skills and will appreciate demonstration plots. Ploughing of land with tractors is preferred, and not draught animals, although few have access to a tractor or mechanised services (It should also be noted that during the homeland era various farmer support services were provided by the development corporation which generated a sense of dependence). Furthermore, it is noteworthy that 68% of respondents are in support of land exchange agreements, mostly because the household members are unable to cultivate fields. The most preferred arrangement for temporary land use exchange is share-cropping and only a small minority prefer lease or sale agreements. Those opposed to such agreements are interested to use the land themselves.

Given the diversity and sometimes contradictory or at least inconsistent expectations regarding land use, it is important to remember that if people have secure rights they are empowered and have the ability to control key aspects of their lives (Green 2009: 23-30). The underlying purpose of a rights-based approach to development is to turn around the cycle of poverty, disempowerment and conflict. With secure rights people have the decision-making power and are active participants in the process to obtain access and make productive use of land. Secure property rights require that the rights are explicit, exclusive, enforceable and transferable (Tietenberg, 1992: 45-47). The perception by holders of PTOs to arable plots in villages at Thaba Nchu are that these rights to access and use land for crop production are secure. The evidence presented here shows that plots are not clearly defined; the potential income will not accrue to the holder of the plot due to theft or damage by livestock; there is no legal recourse by plot holders to prevent encroachment; and the rights to use the plot cannot be voluntarily exchanged within the generally accepted choice set. The entitlements to use land are therefore in reality not secure. The observation of unutilised land amid poverty and unemployment is thus also caused by institutional failures, in particular failure of land, labour, production and trade entitlements.

5. Conclusion

Crop production on the arable fields around villages at Thaba Nchu has probably come to an end for a combination of reasons. Soil cultivation with conventional ploughing results in low and variable yields of staple grain crops with the risk of harvest failure in any season. People on the ground are either young and not interested to work the land or they are older women who are poor with limited cash to meet household needs. Over time most support services have terminated and when available are relatively costly. Even if efforts are made to invest available energy and financial resources in crop cultivation, the chances of success are low due to a near collapse of the prevailing land tenure systems. Under these conditions the technical innovation of infield rainwater harvesting and conservation (IRWH&C), which increases the productivity of soil and rainwater, has created opportunities which can change this trend. What alternatives exist for future land use and development?

The current sizes of land holdings are too small and have to be consolidated two- or threefold to justify investments for increasing household income above the poverty line. Temporary or permanent land transfer agreements have to be negotiated, certainly between those individuals who are interested and not interested to farm. Since 32% of plot holders have firm intentions to farm, this option is a real opportunity. Legally it is not possible with the entitlement of a permission to occupy (PTO), which gives access to the use of land. Institutional innovations are therefore essential with reference to the widely accepted principles for lasting common property institutions (Oström, 1990) and the directions for tenure reform in the communal areas of South Africa (Claassens and Cousins, 2008). Finalising the legislative process and clarifying the different individual and group entitlements to land will, however, be a time consuming exercise. Like most development processes, land reform is above all about the relationships between people and resources and addressing the needs of people (Diale, 2009).

The reality of wide-spread poverty with all related manifestations affecting the daily lives of people, creates a sense of urgency in the case of Thaba Nchu. The fact that share-cropping is the preferred method of land exchange indicates that interim change is possible. Perceptions expressed by people regarding future land use options, have to be addressed systemically. Further research is required to demonstrate the application of IRWH&C at a field scale. This research must be measured against the criterion of useful outputs for decision and action in practice (Backeberg, 2004: 358-362). Research projects have been initiated on the social and economic acceptability of RWH&C (Water Research Commission, 2007: 43-44) as well as productive use of rangeland and cropland in communal areas (Water Research Commission, 2008: 44). Both projects investigate how institutional arrangements can be improved. While institutional change is necessary, it is not sufficient. Those farmers, especially women, who have entrepreneurial spirit and aspirations to improve livelihoods through more productive farming activities must receive skills training. The available guide for farmer trainers and facilitators (Botha and De Lange, 2005) should be implemented for practical skills development of interested farmers and revitalisation of rain-fed farming on croplands. This can be achieved with support and cooperation between universities, science councils and government departments in order for service delivery to make a difference to the lives of the people residing in this area.

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