

INSTITUTIONAL SUPPORT SYSTEMS FOR SMALL-SCALE FARMERS AT NEW FOREST IRRIGATION SCHEME IN MPUMALANGA, SOUTH AFRICA: CONSTRAINTS AND OPPORTUNITIES.

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ABSTRACT

This paper discusses institutional support systems available to New Forest irrigation farmers focusing on agricultural extension services and the irrigation cooperative. The current operations of agricultural extension and irrigation cooperative do not meet the expectations of New Forest irrigation farmers, as they feel neglected. For extension to be effective, it should be able to mobilize the social capital of communities. This implies the coordination and grouping of farmers with similar circumstances to enable them to either benefit from synergies, or to make it easier for training and sharing of information. The irrigation cooperative needs to address cooperative governance issues, facilitation of farmer collective action, enforcing rules and regulations of engagement, and linking the irrigators more effectively with input and output markets.

Keywords: Extension, Cooperative, Smallholder irrigation, Mpumalanga, South Africa.

1. INTRODUCTION

The paper is based on a case study research process carried out at New Forest Irrigation scheme in Mpumalanga Province of South Africa during 2013 to 2014. The research aim was to explore the role of institutional support mechanisms (agricultural extension and irrigation cooperative) in enabling production and livelihoods at small-scale irrigation schemes (Davies 2008:16; Ortmann & King, 2007a:220).

The New Forest irrigation scheme comprises approximately 1000 ha in area. Estimates are that approximately 160 ha are being utilized and not all irrigators are actively farming. The irrigation scheme draws water by gravity from the Orinocco dam, supplied by the perennial Mutlumvhi River, and has nine storage dams, of which eight are currently operational. The initial purpose of developing this scheme in the 1960s was to ensure that households resettled in the villages could make a living (food and basic income) through farming. The crops grown at the scheme include maize, cabbage, tomato, Swiss chard, groundnuts, sugar beans, sweet potato, Bambara groundnuts and cassava. These crops are sold mostly through informal market channels such as bakkie traders, hawkers, and through neighbours. The management structure of New Forest irrigation scheme consists of a cooperative led by the cooperative committee. The role of the cooperative is to provide services and technical assistance to farmers, such as tractor services, advice, extension and marketing support.

Part of the study set out to answer the following questions:

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- What organisational arrangements are in place at the irrigation scheme in relation to managing common resources such as irrigation water, access to inputs and marketing of crops?
- What agricultural support systems and mechanisms are in place to enable smallholder farmers to improve their productivity, how effective are these, and how can they be improved?

Agricultural extension services are essential for farmers, as they serve to link them with authorities (the Department of Agriculture, and other stakeholders), resources, and information, and provide them with the capacity development needed to improve their productivity (Davies 2008:16). Irrigation cooperatives provide an institutional arm for farmers to be organised and work as a unified group. This entails sharing of common resources, such as land, water and tillage services. It also facilitates planning which similar crops to grow in order to benefit from economies of scale through bulk inputs purchase and group marketing.

This paper is a presentation of case study findings from New Forest irrigation smallholder farmers. It focuses on institutional support challenges and opportunities available through extension and the irrigation cooperative. The information used in this study was obtained from in-depth life history interviews with 11 irrigators randomly selected across the irrigation scheme, in-depth interviews with extension officers, and a focus group discussion with the irrigation cooperative.

2. CONTEXTUAL BACKGROUND

Although the government of South Africa has invested quite significantly in smallholder irrigation to improve the livelihoods and incomes of smallholder farmers and reduce poverty, it is failing to meet expectations. It is beset by a whole range of common challenges that include technical, management, training, unsupportive agricultural policy, and financing problems (van Averbeke, Denison & Mnkeni, 2011:799; van Averbeke, 2012:421; Fanadzo, 2012:1957). Gomo (2012:ii) asserts that the performance of smallholder irrigation schemes is below the expectations of stakeholders, and that it is a multi-dimensional problem that needs to be assessed from multiple viewpoints.

In order to address the above challenges and boost smallholder agricultural production, provide training, information and linkages of farmers to input and output markets governments have provided institutional support systems in the form of agricultural extension and agricultural cooperatives (Msuya, Annor-Frempong, Magheni, Agunga, Igodan, Ladele, Huhela, Tselasele, Atilomo, Chowa, Zwane, Miro, Bukeyn, Kima, Meliko & Ndiaye, 2017:60; Rivera, Qamar & Van Crowder, 2001:9; Ortmann & King, 2007a:220).

2.1 Agricultural extension and advisory services

The department of Agriculture, Forestry and Fisheries (DAFF) define extension as ‘*an amorphous umbrella term to describe all activities that combine information and advisory services needed and demanded by farmers*’ (DAFF, 2011:1). For extension to be effective in supporting smallholder farmers, it should be able to mobilise the social capital of communities (Rivera *et al.*, 2001:9; Ferris, Robbins, Best, Seville, Buxton, Shriver & Wei, 2014:36). This implies the coordination and grouping of farmers with similar circumstances to enable them either to benefit from synergy or make it easier for training and sharing of

information. In an irrigation scheme, farmers need to be mobilised to work as a unified system from sourcing inputs to marketing their produce.

Agricultural extension in South Africa can be traced as far back as 1925 when it was set up by the then Minister of Agriculture to be managed centrally by a team leader and six extension staff for the whole country (Koch & Terblanche, 2013:107). The institutional support mechanisms were clearly focused on dissemination of information by service-oriented extensionists to commercial farmers (Williams, Mayson, de Satge, Epstein & Semwayo, 2008:5). The ‘dualistic’ nature of agriculture was developed by the minority government of the day to support commercial farmers on one hand, and regulate agricultural production and land-use management in the former reserves and homeland areas (*ibid*). The extension services were thus dualised to cater for these different groups.

The extension services in the former ‘homelands’ largely undermined rural production and land-based livelihoods (Williams *et al.*, 2008:6). The extension services for smallholder farmers have been problematic due to issues such as lack of meaningful contact with farmers, outdated extension methods, low numbers of staff and low aptitudes of extension staff. Williams *et al.*, (2008:8) argue that from the 1990s the provision of farmers’ support services was overtaken by the new institutional priorities of merging all the different homeland departments of agriculture with the extension services that had been supporting the commercial farmers.

2.2 Cooperative development in South Africa: orientation and limitations

The International Cooperative Alliance (ICA, 2014) defines a cooperative as an ‘*autonomous association of persons united voluntarily to meet their common economic, social, and cultural needs and aspirations through a jointly owned and democratically controlled enterprise*’. In South Africa cooperatives are promoted across different sectors, including agriculture, the consumer’s sector, financial services and worker cooperatives.

Agricultural cooperatives have enabled their members to access inputs in bulk (seed, fertilizer, pesticides, and credit), provide services; tillage services, produce bulk up, transportation, and linkages with the markets (Ortmann & King, 2007a:220). They are thus classified into farm supply cooperatives, service cooperatives, and marketing cooperatives, depending on their functionality (Murphy & Willet, 1993:11-13; Ortmann & King, 2007b:43). These objectives form the basis for the formation of agricultural cooperatives. Sumner, McMurtry & Renglich (2014:48) suggest that cooperative food systems emphasize working together for mutual benefits based on democratically chosen goals.

The development of cooperatives in South Africa was similar to the development of agricultural extension services. Historically, the cooperatives were established to serve the agricultural interests of commercial farmers to access resources, output markets and to provide them with a legal and operational framework (Ortmann & King, 2006:5; DAFF, 2012:2). These agricultural cooperatives had access to finance through the Land Bank and a monopoly in key agricultural sectors and control of the marketing boards (Philip, 2003:17). Although the minority government later developed cooperatives for smallholder farmers, these were neither as empowered nor resourced as the cooperatives for the commercial farmers (DTI, 2012:31). It was later, during the majority government period that cooperatives began to be advanced to empower the smallholder community (Philip, 2003:17). The initial thrust of cooperatives was to serve the agricultural industry, but this role was later broadened

to cater for other sectors such as consumer, workers, financial services, burial society and service cooperatives (Ortmann & King, 2007b:46).

While agriculture had been provided with adequate support during the minority government period when most cooperatives were focused on agriculture, this support is now spread thinly across the other sectors too. It is thus no surprise why most agricultural cooperatives (including irrigation cooperatives) are suffering due to limited and piece-meal support from the government. The main challenges of cooperatives have been noted to include lack of skills for their roles and cooperative governance, while some have been created for opportunistic reasons (DAFF, 2012:7). The empirical data from New Forest irrigation scheme below will serve to highlight some of the challenges faced by cooperatives and extension services.

3. METHODOLOGY

A qualitative case study research design of New Forest irrigation scheme was done to understand the institutional support systems available to the irrigators. The study was carried out between 2013 and 2014 at New Forest Irrigation Scheme located in Bushbuckridge Local Municipality of Mpumalanga Province in South Africa.

Empirical information was solicited through an intensive data collection approach (Swanborn, 2010:2). This included life history interviews of 11 irrigation farmers that were purposively sampled, in-depth interviews with extension staff, and a group interview with the New Forest irrigation committee representatives of the irrigation cooperative. The life history interviews were purposively conducted to be representative of the villages at the scheme and also reveal the dynamics of the support systems received by farmers. The questionnaires were used to collect information on extension services (role, access, extent of access, level of satisfaction, and services provided) and the irrigation cooperative (role, structure, and access, services provided and level of satisfaction).

Data analysis involved re-organising the data into manageable themes, patterns, trends and relationships (Mouton, 2001:108). Mouton further contends that the aim of data analysis is to understand the various constitutive elements of one's data through an inspection of the relationships between concepts, constructs or variables. Qualitative data recorded in interview transcripts and on voice recorders were analysed through constructing thematic tree diagrams and engaging in comparison of themes (Elliot & Associates, 2005:11; Boyce & Neale, 2006:7). The data was analysed for themes, trends, and frequently cited and strong opinions. As proposed by I-Tech (2008:5), the range and diversity of participant experiences, perceptions and expressions were also considered in my analysis. In life history analysis, the themes and issues that emerge from the data were arranged into a framework that illustrates the relationship between the different variables and the participants' understanding of history, identity and present situation (Francis & Le Roux, 2012:19).

4. FINDINGS AND DISCUSSIONS

4.1 Agricultural extension services at the scheme

4.1.1 Extension support and training

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DAFF has dedicated two extension staff to the scheme to support the New Forest irrigation farmers. One extension staff member is based at the DAFF offices in Thulamashashi, while the other has been hired by the cooperative, paid by DAFF, and is based at the New Forest cooperative offices.

According to the extension staff, their role is to provide technical assistance to the irrigation farmers. This includes agronomic aspects (what to plant, how to plant, fertilizer application, and pest control), training and market linkages.

In-depth life history interviews with the 11 farmers revealed that besides one participant, all the other farmers have never received training from the extension staff. From the farmers' perspective, the extension officers have not really been of help to them. The farmers maintained that the extension officers visit their fields in order to record crops they have planted and areas planted so that they are seen to be working. This information is also used for estimating the tillage work for the tractors, which include ploughing, ridging and disking.

2 of the 11 farmers contend that they used to receive training in the past from the previous extension officers. During the 1960s extension staff used to visit their fields and provide advice on farming skills. This is very different from today when they only see the extension staff during the scheduled meetings at the cooperative. There is no formal training program/schedule in place at the scheme for the irrigators.

This is against a backdrop of at least 20 extension staff that supported just the two schemes of New Forest and Dingley Dale before the withdrawal of this level of government support under the homeland system (BLM, 2010:46). The ratio of extension staff to the number of farmers served is key to the type of service and the effectiveness of the extension support provided. The high ratio of extension staff to farmers in the past ensured that a diversity of technical skills were available to farmers, such as crop production, pests and diseases, irrigation scheduling, marketing and economics.

4.1.2 Market support

The majority of farmers sell their crops through local informal markets such as bakkie traders, hawkers, and to neighbours. Such efforts are individually based as there is no support either from the extension or the irrigation cooperative. Extension officers cited problems with securing formal markets for the farmers owing to stiffer competition from commercial farmers that are consistent in providing the required quality and quantity of produce. Farmers produce crops that they think would be able to be bought by buyers, but without a deliberate and organised linkage to assured markets. Even for those farmers who have contact details of potential buyers, their planning is based on past demand, or the experiences they have had, rather than production based on what the market requires. The extension staff and the irrigation cooperative have not been able to develop any formal market linkages for the farmers. A few farmers have been able to supply to the retail chains in formal markets (Pick and Pay, Spar and Checkers) under the names of established white commercial farmers. This results in farmers selling most of their produce through informal spot markets.

In-depth interviews with the 11 key respondent farmers reveal that these farmers considered themselves as 'successful farmers' during the periods/years when they are/were able to sell most of their produce. This suggests that successful irrigation farming is only possible when farmers are linked with reliable produce markets. The least successful years were the years in

which farmers could not sell their produce due to inaccessible markets or low levels of production.

The only organised initiative that is in place is the school feeding pilot programme, in which there is an arrangement of selling farmers' produce (especially vegetables) to the local schools. This arrangement is facilitated through the provincial Department of Education, as a pilot programme. Although the farmers appreciate this initiative, it does not have the capacity to purchase all the farmers' produce and there are reported payment delays from the government. Some farmers were also not happy with the purchase prices offered by the government, compared to the prices they received when selling through other marketing channels.

4.1.3 Irrigation infrastructure

The irrigation scheme infrastructure is old and inefficient, as the Department of Agriculture has not allocated any funds for maintenance or rehabilitation. This shows total neglect by the government and local authorities. Currently the sub-canals are broken down with cracks that result in extensive water leakages. Farmers therefore have limited access to adequate water that results in lower productivity and lower utilisation of the scheme. According to the extension officers, the previous minority government used to have dedicated personnel responsible for maintenance and repairs for irrigation schemes. This ensured maintenance of the schemes.

The findings at New Forest Irrigation Scheme similarly revealed concerns with water shortages, which result in conflicts between farmers and farmers often spending days, nights and weekends tending to the flow of water in order to prevent crop water stress. The water shortage situation at New Forest is compounded by neglect, as the government has never repaired the canals that channel water to the fields. This is the main reason why the majority of plot holders have abandoned the fields.

4.2 New Forest irrigation cooperative

The International Cooperative Alliance principles for cooperatives were applied to the New Forest irrigation scheme cooperative (Ortmann & King, 2007a:227; Gray, 2014:24; ICA, 2014). Although the guidelines mention seven key principles, some writers argue that the first three are applicable exclusively to cooperatives.

In terms of *voluntary and open membership*, the cooperative is open to all New Forest irrigators without discrimination on gender, social, racial or religious discrimination. However, the members still need to accept responsibilities of membership such as participation and contribution to the cooperative functioning. This is not manifesting through active participation in meetings, and proper management of the cooperative. In terms of *democratic membership control*, the cooperative is a democratic organization controlled by its members. Elections of office bearers are held every three years. Voting rights equality is evident when electing office bearers though not evident in decision-making. They have a constitution in place that provides governance guidelines for the committee. The decisions though are made by active members who constitute the minority of the irrigators.

With regards to *member economic participation*, members are supposed to contribute equitably to the cooperative through joining fees (R100) and annual subscription fees (R200).

In practice this is not happening as the cooperative sometimes lacks money for running their offices. Though there are guidelines on how capital is used, the control and usage is left to the office bearers, of which sometimes there are disagreements with members.

On *autonomy and independence*, the cooperative is autonomous and controlled by its members by and large. Due to over-reliance on government funding, the extension staff (the government proxy) tends to have an influence on their day-to-day operations thus compromising their independence. On *education, training and information*, neither training nor education has been provided to members and elected representatives to date. Information is only provided to representatives that frequently attend the monthly meetings or visit the offices. In terms of *cooperation among cooperatives*, the cooperative is not linked to other cooperatives be they local or national. The only interface they have is with the extension staff. This therefore limits their exposure to information and opportunities that they could exploit. With regards to *concern for community*, the irrigation cooperative has not developed to the stage of developing policies for sustainable development. It is still battling to satisfy the needs of its members that are not even united through the cooperative platform.

The farmers are not satisfied with the manner in which the irrigation cooperative is run. The feeling is that the cooperative is present physically but not active at all. The roles expected from the cooperative include managing the allocation of tractors to the farmers, stocking of seed for farmers to purchase, and assistance with marketing their produce. The other organizational roles absent include enforcing the rules and norms to enable irrigators to farm harmoniously. All these roles are not performed adequately. The New Forest irrigation farmers do not operate as a unified or well-coordinated irrigation system. By and large, individual farmers with their individual planting activities try to obtain a livelihood. The only element bringing the irrigators together is the land and water, though fights over limited water are prevalent with partial intervention from the cooperative.

4.3 New Forest cooperative tractor tillage services

In 2008, the government introduced tractor hire services through the Bushbuckridge local municipality, in an effort to assist farmers with tillage and thus boost productivity. This well-intentioned gesture crowded out private tractor service providers that used to supply the services of around 20 tractors in the central part of Bushbuckridge and at least 10 in the south (BLM, 2010:47). Currently it is difficult to obtain private tractor hire services, thus forcing farmers to rely on the tractors available from the irrigation cooperative. The department of Agriculture gave the New Forest irrigation cooperative two tractors for usage by the plot holders. This was part of a pilot programme for empowering the New Forest irrigation cooperative, with the hope that farmers would be self-reliant rather than rely on service providers. The farmers feel that the two tractors are not adequate for their tillage needs.

The irrigation cooperative equally feels that the two tractors at their disposal are inadequate to cater for their needs for ploughing, disking and ridging. The cooperative is overwhelmed by tractor service requests from the plot-holders. It tries to meet the tillage needs of every plot holder without the requisite capacity. This leads to delays between the time a tractor is requested and the time the service is provided, impacting negatively on the cropping programs. Allan is one of the many farmers that decry the irrigation cooperative tractor services. The delay in obtaining tractor services can take between 15 to 20 days. It becomes difficult to plan a cropping schedule. Allan recalls an incident when he had already bought cabbage seedlings for planting and immediately paid for tractor services. By the time the

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cooperative provided the tractor services his entire supply of seedlings was spoiled, that had cost him R6, 000 to purchase. One cannot expect the cooperative to meet the existing level of demand for tractors as this involves about 150 active farmers requiring tractor services (ploughing, disking and ridging) all at the same time.

The two tractors are subject to frequent breakdowns. At the time of the interview (August 2013) only one tractor was working, while the other was not, requiring major repairs. The frustration that farmers have is that they pay for the tractor services in advance before services can be provided.

4.4 Department of Rural Development and Land Reform tractors

The department of Rural Development and Land Reform (DRDLR) provides tractor services to dry-land farmers and to irrigators only during the rainy season, through a contracted company. The DRDLR purchased about 20 tractors (10 for Dinglydale area and 10 for New Forest area) and then contracted a service provider to offer a service to dry-land farmers (covering approximately 1000ha of land) and performing repairs and maintenance. These tractors are housed at the New Forest irrigation cooperative offices.

Tractor service provision by the DRDLR falls under a programme called “Masibuyele Emasimini”, meaning, “Let us return to farming”. This programme was worth R500 million in Mpumalanga province and formed part of a larger Food Security and Agricultural programme launched between 2005/06 to 2009/10 (Sikwela 2013:95). A total of 175 tractors were distributed across the province under this initiative. This tractor service is free of charge to both the dry-land farmers and irrigators. During the month of August 2013 all these tractors had been parked, as it was off- rainy-season, although there were other deeper unresolved issues between the government and the service provider. These tensions were mostly in relation to unverified claims for payment by the service provider and delays in payment by the government.

The contractual arrangement is for dry-land farmers primarily, however irrigators do benefit during the rainy season. As only one tractor under the control of the cooperative was functional during the month of August 2013, the irrigators could not access the other 20 tractors under DRDLR. The irrigation committee has hopes that the government’s plan to transfer 70% of these tractors to the management of the irrigation cooperative and leave 30% under the “Masibuyele Emasimini” dry-land farmers will be realised soon. The ‘back- and-forth’ management of tractors by the provincial department has not been beneficial to the smallholder farmers. The Bushbuckridge local municipality (BLM 2010:47) described tractor management as follows:

Essentially the policy shifted from “tractors to be managed within each scheme” in early 2008 to “tractors to be managed by the municipality throughout the municipal area” later in 2008, to “tractors being only available for subsistence farmers and not commercial farmers” in 2009, to “tractors being suspended for budget reasons” in the first quarter of 2010.

This shows inconsistency in policy direction within the department, with negative consequences for access to tillage services by smallholder farmers. As there are no grazing lands for farmers’ livestock, other options of animal drawn implements may not be relevant (Simalenga & Joubert, 1997:3).

5. CONCLUSION AND RECOMMENDATIONS

Though various studies note that *Irrigation Management Transfers* led to the collapse of many irrigation schemes as government support was withdrawn, the irrigation scheme revitalization program (especially in Limpopo and Eastern Cape) provided funding for rehabilitation of some schemes (Cousins, 2013:126; Fanadzo, 2012:1959; Perret, Lavigne, Stirer, Yokwe, & Dikgale, 2003:17). This form of support, however, has generally been either inadequate or inappropriate. In some cases the focus has been solely on infrastructure rehabilitation, without any technical support in the form of farmer training or building institutional mechanisms for operating and maintaining the irrigation schemes. The New Forest scheme did not benefit from any government-led rehabilitation or revitalization programme to date. This has resulted in the gradual deterioration and breakdown of irrigation infrastructure.

The study of Tugela Ferry and Zanyokwe irrigation schemes by Fanadzo (2012:1962) noted that very weak support services exist at the irrigation schemes. This has manifested in poor relationship between farmers and extension services, limited involvement of extension officers, and a lack of practical skills and know-how on the part of extension staff. Similar findings were noted at Zanyokwe irrigation and Thabina irrigation schemes (Fanadzo, Chiduza, Mnkeni, van der Stoep & Stevens, 2010: 32; Perret *et al.*, 2003:17). This study of New Forest irrigation scheme equally shows that a poor relationship exists between the extension services and the plot holders who feel short-changed from their services.

The department of Agriculture Forestry and Fisheries (DAFF) has worked to profile extension staff, capacitate them, and close the gap between the current personnel and the desired level (in relation to both numbers and ‘quality’) (DAFF, 2009a:9; DAFF, 2009b: 3, DAFF, 2005:11). However, a small share of New Forest farmers have received training and extension services from government, a pattern that is also noted for government programmes more widely by Aliber & Hall (2012:551), and Chauke, Nekhavhabe & Pfumayaramba (2013:1083). Extension personnel need to offer farmers appropriate technical advice, such as what crops to grow, agronomic aspects, marketing, and irrigation scheduling. Further research and investigation is needed to ascertain what extension support and training is required from the perspective of smallholder irrigators.

The role of extension is to facilitate and mobilize farmers to be organised and work together, thus enabling them to build their social capital. This is not happening at the New Forest irrigation scheme, and this is similar to the findings of Mnkeni, Chiduza, Modi, Stevens, Monde, van der Stoep, & Dladla (2010:327), who report that Tugela Ferry and Zanyokwe irrigation schemes have weak organizational and institutional arrangements that affect their productivity and overall performance. The recommendation is therefore to strengthen farmer organization and institutional arrangements at New Forest Irrigation Scheme. The irrigation cooperative needs to be empowered and take up its leadership role at the scheme. This empowerment should cascade down to the farmers’ ward-level committees. The institutional rules (both underlying norms and formal rules) need to be examined, updated and owned by farmers and enforced to ensure that governance is clear, accepted and formalised.

As training has never been provided to the New Forest irrigation cooperative on their roles, this needs to be prioritized. Training needs to be provided continuously as the cooperative committee is changed every three years. The irrigation cooperative needs to be linked with other secondary cooperatives, the private sector and development structures beyond the local

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extension officers so that they are exposed to new information and opportunities for smallholder farmers. The development of strong apex organisations for irrigation farmers in Mpumalanga would help the locally embedded New Forest irrigation cooperative to enter into the mainstream of provincial-level farming development. This would enable them to access services and resources such as finance, marketing and advisory services that are available in the province and nationally (DAFF, 2012:7).

A well-functioning cooperative should be able to provide inputs in bulk at the warehouse for purchase by the irrigators. This would enable standardisation (type and quality) of the crops grown, and enable farmers to purchase inputs closer to home, and more cheaply as a result of bulk discounts. As a substantial market for inputs exists at New Forest irrigation, private agricultural supply companies could establish branches at the nearby shopping centre so that farm inputs are more available and accessible.

Tillage is an important component of farming for smallholder irrigators in South Africa, without which farmers cannot produce their crops. Very few farmers at the New Forest irrigation scheme own livestock for tilling their land, while the majority rely on the two tractors provided by the irrigation cooperative. The Department of Agriculture and the Department of Rural Development and Land Reform need to put their heads together to resolve the tillage crisis that irrigation farmers face. It is unjustifiable to park 20 tractors for dry-land farming throughout the year and only release them to dry-land farmers, while irrigators need these services throughout the year.

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