

The Impact of Green Schemes on the Livelihood of Communities in the Kavango Region, Namibia

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Abstract

Agricultural production in the dry lands is limited by inadequate rainfall to grow crops but irrigated agriculture increases crop yields for food security and economic benefits to the community. The irrigation projects in Namibia have been termed as Green Schemes as they give a green formation that is different from the surrounding dry vegetation. This study investigated the impacts of the Green Scheme on the livelihood of communities. In particular it sought to ask: are there economic benefits and a change in the diversification of food stuff to people living around the Green Schemes; and what challenges do the people around the Green Schemes experience? A survey was conducted on 30 households in each of the two villages. Purposive and random sampling techniques were used to select Green Schemes and households respectively. Personal interviews were undertaken using structured and unstructured questionnaires. Descriptive statistics, frequencies and cross tabulations were used to outline respondents according to the impacts of the Green Scheme. The study revealed that there was no significant association between economic activities of the two village settings ($p > 0.05$). Most variables were the same before and after the scheme for both village settings. Changes in food diversification for people were assessed and results indicated that food items for consumption reduced for Sikondo village and increased in Siyandeya village. The study further highlights community's assertion that Green Schemes are not adding significant improvements or changes to community livelihoods as no significant developments in the surrounding villages have been attributed to the Green Schemes. The study further highlights that while there are benefits from the Green Schemes; these are minimal and are not worth their continuing challenges of water shortages and sanitation, their losses and expectations for improved livelihood. Significantly this study highlights the need to inculcate a change in attitude so as to encourage collaborative efforts between communities and the Green Schemes management which will impact on the livelihood of people positively.

Keywords: Kavango, Green scheme, Government intervention, Communities, Livelihood, Socio-economics, impacts, irrigation project.

1. Introduction

Agriculture is the backbone of human lives and economic growth, especially the developing countries. Recently, the impacts of climate change are posing challenges on the agricultural sector affecting the more than billions of poor resource-farmers (Challinor et al. 2007). The most vulnerable are people who depend on small-scale farms living in China, India and Sub-Saharan Africa (*Toward Sustainable Agricultural Systems in the 21st century*, 2010; Challinor et al., 2007). In sub-Saharan Africa, more than 750 million people live in extreme poverty (earning less than US\$1 per day). About two-thirds of the people rely on subsistence agriculture for food and income (Anon 2010).

Sub-Saharan Africa had a limited range of crops when Europeans first arrived in the 15th century, the most important being sorghum (*Sorghum vulgare*) and several millets. In parts of West Africa indigenous yams, rice and banana were grown. New food crops, including cassava and maize, were introduced after the discovery of the Americas (Anon n.d.). However, in the past 20 years it is evident that precipitation patterns has changed in the sub-Saharan Africa. The climate change is affecting the traditional agricultural practice which requires interventions to produce sufficient food (Beddington, et al., 2012).

To maintain sustainable food production, farmers have adopted crop diversification and irrigation (Juana, et al., 2013). "The use of water for agricultural production in water scarcity regions requires innovative and sustainable research, and an appropriate transfer of technologies" (Pereira, et al., 2002). According to Burney & Naylor (2012), promotion of smallholder irrigation is cited as a strategy for enhancing income generation and food security for sub-Saharan Africa's poor farmers. They caution however that in the long run, it should lead to institutional feedbacks that support sustained economic development and nutritional improvements. Irrigation makes agriculture possible in areas previously unsuitable for intensive crop production. Although irrigation in Africa has the potential to boost agricultural productivity, food production on the continent is almost entirely rain fed (You et al. 2011). However, *Toward Sustainable Agricultural Systems in*

the 21st Century, (2010) informs that Africa's poor agricultural performance is attributed by wide range of factors limiting production which include; shrinking farm sizes, seed availability and distribution systems, inadequate human capital needed to support sustainable agricultural intensification. However, the potential for irrigation investments in Africa is highly dependent upon geographic, hydrologic, agronomic, and economic factors that need to be taken into account when assessing the long-term viability and sustainability of planned projects" (You et al. 2011).

Namibia is a semi-arid country which 70% of its two million inhabitants depend on agriculture (Fiebiger et al. 2010). Traditionally, forms of agriculture have been subsistence, mixed farming of livestock and crops. In the North, rain-fed staple crop production is widely practiced due relatively higher rainfall compared with the rest of the country (Fiebiger et al. 2010). However, prolonged drought frequently causes crop failure leading to food insecurity. As a result, the government of the Republic of Namibia created irrigated agricultural program termed as Green Schemes. Green Schemes has a total land allocation of 9,429 hectares (ha) of which 3,435 ha are under production in the //Kharas, Kavango East and West regions, Zambezi and Omusati regions. Fiebiger *et al.*, (2010) informs that developments in irrigation farming take place on a private level, where farmers take up mainly vegetable production on various scales. Farming ranges from bucket-irrigated micro-plots in river plains to mechanized drip irrigation on plots sized up to 13ha.

Green Schemes are mainly Namibian government funded irrigation program aimed at reducing poverty by increasing agricultural production and job creation and export. For the farm to be a Green Scheme, it undergoes qualification process including the size of the farm and the agricultural practices (Ministry of Agriculture Water and Forestry 2008). Twelve Green Schemes have been established in Namibia, namely: Etunda, Hardap, Kalimbeza, Mashare, Musese, Ndonga-Linena, Orange River, Shadikongoro, Shitemo, Sikondo, Tantjieskoppe, and Uvungu Vhungu. The objective of this study was to examine the impacts of the Green Scheme program on the livelihood of people surrounding the schemes. The specific objectives were to determine the economic benefits of people around Green Schemes; to assess changes in food diversification for people surrounding the schemes and to assess challenges faced by people around the Green Schemes.

2. Materials and methods

2.1 Study area

A survey was carried out at Sikondo village where Sikondo Irrigation Project is based and the neighboring village-Siyandeya. Sikondo is situated about 20 km west of Rundu, along Rundu - Nkurenkuru highway. The total area of the project is 850 ha of which 580 ha is under commercial farming while 270 ha are for medium-scale farming. The medium-scale farming unit is allocated to Nine (9) farmers, occupying 30 hectares each (Anon n.d.). The study area is located in Kavango West region which is one of the 14 political regions in Namibia. According to National Planning Commission report, this region is the poorest region in the country with a poverty head-count of 53.2 %. The region is one of the high rainfall (over 600 mm average per annum) figures in the country where generally, subsistence rain-fed agriculture is common.

2.2 Sampling design and data collection

A random sample was drawn from the population for both settings. The households were selected using simple random sampling method. A Global Positioning System (GPS) was used during allocation of numbers to households. Qualitative method of data collection was used in which respondents were questioned through interviews (Gill et al. 2008). The study plan involved the gathering of primary information on socioeconomic characteristics from households living in the two selected communities; one with a Green Scheme (government intervention), and second, a community without Green scheme intervention. The sample size comprised of 30 households from each community. Data was analyzed in SPSS (version 19) and Microsoft Office Excel 2007 statistical packages. Descriptive statistics and Chi-square tests were used for comparison and an association between and within villages.

3. Results and discussion

The impacts of the Green Schemes on the livelihood of people covered categories such as: economic activities; characteristics of home dwelling; land acquisition; challenges faced by the beneficiaries around the scheme; benefits and constraints attributed by the Green Scheme; challenges faced by the communities and food diversification.

3.1 Impact of Green Scheme on the livelihood of communities

Table 1(a(i)) shows that before intervention, farming full-time was the main occupation in Sikondo amounting to 42.9%. Other occupations such as permanent and part time wage constituted less than 7.2% where as 35.7% consisted of the unemployed. Table 1(b(i)) similarly identifies full-time farming as the main occupation of the respondents with the Green Scheme constituting about 50% while other positions ranged between 3.3% and 10%.

Farming remained the major occupation before and after the establishment of the Green Scheme in Sikondo. Unemployment rate increased from 42.9% before to 50% after the Green Scheme. This was because most people no longer had their own fields or farms as before where they use to employ others to do clearing and harvesting work. This was against the findings of (Zuwarimwe et al., 2014) where Epalela community members owned their land and could invest in the development of their land that could lead to the unlocking of its potential. As in Sikondo, farming was the main occupation for Siyandeya residents amounting to 86.2% (Table 1(a(i))) before the green scheme and to 55.2% afterwards Table 1 (b(i)). Despite this continued dominance before and afterwards, a decrease in full-time farming as the main occupations was observed in Siyandeya after the establishment of the Green Scheme. The decrease may be attributed to the drought that hit the country as a whole. Most farmers have shifted from farming to seeking employment in the Green scheme. Currently, Namibia is suffering a severe drought with wilting crops and dying livestock (University of Namibia 2016).

None of the respondents in Siyandeya lacked an income nor got less than N\$100 per month on average. The majority of the respondents for Sikondo had average income between N\$1,001 and N\$2,000 (34.5%) whereas for Siyandeya was between N\$501- N\$1,000 (41.4%). After the Green Scheme, the highest average income for the respondents was in the category of N\$101-N\$500 with 36.7% in Sikondo and 40% in Siyandeya (Table 1 (a(i))) and (b(i)):

The study identified that most respondents got their income from the sale of livestock/livestock products crop sales; and herding livestock for others from both villages (Table 1(a(i))). The sources of income after the Green Scheme were not very different from those before the Green Scheme. However, an increase was observed in the sale of livestock products by 10% (36.6% for Sikondo) and a reduction by 0.06% in sales livestock products in Siyandeya (26.2%) as shown in Table 1(b(i)). Crop sale decreased in both villages. The decrease can be attributed to the reduction in the farm sizes and the climatic conditions affecting the cultivation (University of Namibia 2016).

Of the monthly income before Green Scheme, between N\$101-N\$500 is spent per month by the majority of the respondents (51.7%) in Siyandeya village where as N\$501- N\$1,000 was spent for Sikondo village (Table 1(a(ii))). After Green Scheme, between N\$101-N\$500 is spent per month by the majority of the respondents (43.3%) in Sikondo village (table 1(b(ii))). It should be noted that the monthly expenditure for Sikondo residents ranging from N\$101-N\$500 increased after the Green Scheme. The change can be attributed to the current situation of purchasing most food stuff and other commodities from the shops as opposed to them growing their own at a fair scale and buying few commodities from the shops. According to (Jauch 2013) if at least 60% of the household income is spent on food then the household is living in poverty. These result of this study indicate that the objectives of the scheme with regards to poverty or food security (Ministry of Agriculture Water and Forestry 2008) was not met by the Green Schemes.

This study sought to investigate on what commodity the average income was spent (Table 1(a(ii))) and (b(ii))) and if the same commodities and services were bought before and after the establishment of the Green Scheme. However, Sikondo spends more on food and less on education which was the opposite before the establishment of the Green scheme. This means that after the establishment of the Green Scheme, Sikondo residents buy most of their food items, if not all. Low investment in education by Sikondo village is explained by the free education system in Namibia from Pre-primary (Grade 0) to high school (Grade 12).

Table 2(a) and (b) shows the investments in four (4) capitals. The study found that both respondents of Siyandeya and Sikondo had livestock as the main physical asset which numbered 84% for Siyandeya and 79.2% for Sikondo. Other physical assets for Sikondo and Siyandeya respectively included bicycles; brick house; and shop. Only 8.3% respondents owned a car in Sikondo before the Green Scheme and none for Siyandeya. Sikondo had savings and employment wage as financial capital with 72.7% and 14% in form of savings, as well as 27.3% and 34.8% as employment wage before and after Green Scheme respectively. All respondents from Siyandeya had savings as a financial capital of a (100%). It was however noted that the savings are not kept to mature, rather the money saved is spent immediately.

Most respondents from Sikondo (41%) and Siyandeya (31%) invested in the education of children before the Green Scheme as a form of human capital. Notwithstanding the above, even after the initiation of the Green Schemes, respondents invested in human capital especially in the education for children. These can be attributed to the newly introduced free education for primary and secondary education. Self education also showed an increase in a number of respondents who invested in it (20.4% Sikondo; 32.5% Siyandeya). A lot of trainings have been offered to villagers especially women that included craft work and training leading to voluntary and counselling careers.

Some had experiences in sewing, others in the use of certain machinery. About 23% and 29.9% invested in self education whereas 27.9% and 24.1% invested in human capital for Sikondo and Siyandeya respectively. The social investments in which the respondents took part before the Green Scheme included joint neighbor fence repair (41.2%) followed by guarding animals jointly at stock posts (39.2%) in Sikondo. The minority took part in joint borehole water points (19.6). The latter included digging boreholes and wells together.

38.6% of respondents from Siyandeya were involved in joint borehole water points, 29.8% in joint neighbor fence repair, another 29.8% in guarding animals jointly at stock posts.

There was no statistically significant association between GRN intervention and Non GRN intervention village settings $p=0.635$ ($p>0.05$) in housing improvements. This data suggest that both Sikondo and Siyandeya had similar housing (Table 3(a)). No statistical significant association was also found between Sikondo and Siyandeya villages on type of materials used in the surrounding boundary ($p=0.085$). Both villages used river reeds as the major fencing followed by wooden poles less used wired fence as well as maize and millet stalks before the establishment of the Green Scheme (table 3(a)). Other type of fencing observed were milk trees (*Euphorbia tirucalli*) hedge fence, locally known as *Kaveya*, and palm tree leaf main stem. Same type of surroundings were found to be used by both villages after the establishment of the Green Scheme (Table 3(b)).

Results depicts that 46.7% and 60% respondents gave away their land for the establishment of the Green Scheme from Sikondo and Siyandeya accordingly (Table 4). Despite being residents some did not have fields or land where the Scheme is established as they were either migrants or they were not born nor raised at the village. In addition it was found that no land was given as an alternative to the farmers that gave their land for the establishment of the Green Schemes. Farmers had to look for their own pastures to make it a field or farm for production. Atleast 52% of Sikondo respondents received support after giving the land to the Green Scheme although 10% of the respondents in Sikondo indicated that they received support from an organisation that they were not aware of. In Siyandeya only 25.9% got that support in form of financial package from Ministry of Agriculture. A concern was raised with regard to the package and the field land value that was given away and this concern included the mismatch between the size of the land and the worth of the package received.

The Green scheme was acknowledged for its contribution towards benefiting the communities (Table 6). Benefits that formed as other kind of development included provision of various food items for schools (50%). The other benefits highlighted were employment; agricultural training; food for sale; food for consumption; and crop residues (which is an extremely hated practice). Most respondents claimed that after harvest collection was practiced only at the beginning of the first harvest in the Green Scheme project in Namibia but it ceased eventually. It is apparent that the medium scale farmers in the Green Scheme have resorted to burning the left overs in the field and plough it in as a means to make their field more fertile for the next cultivation season. At times the crop residues are poured somewhere (like a dumpsite) outside the scheme for the community to come and pick it up from there. Since in most cases the food items poured are rotten all these is seen as disrespect or less regard to the humanity of the community. Casual work requires a Namibian identification document to be able to be employed and this leave the fate for employment for villagers without national identification with the final option of picking out a paper from a box comprising a Yes/No at the Green Scheme offices which determines the fate of working in the scheme that month .

Constraints attributed to the establishment of the green scheme included long distance to new fields; loss of access to medicinal and food plants; lack of land for livestock grazing; and others that seemed equally important included difficulties to obtain seed inventory; lack of land for cultivation; long distance to access grass; loss of wood land. Some had lost everything. "*Others have to go around the scheme to new fields; we are being killed; we go far to get firewood.*" one respondent stated.

No developments were attributed to the Green Scheme in both villages as per expectations (Ministry of Agriculture Water and Forestry 1995). The community members had a lot of expectations when it comes to the Green Schemes including job creation; improving food security of the people; improvement of social infrastructure such as schools and hospitals and to give support to village development ideas (Figure 1). Additions were made as further expectations that the communities wanted to see being brought to fruition. Such additions included provision of water and electricity; school goers to be given holiday jobs; employ the people who cleared the land permanently; and employ the people close to the scheme as priority. None of the expectations were met by the Green Scheme. Moreover, the study find out a total of 84.2% respondents disagreed that the scheme has improved their lives positively while only a mere 15.8% respondents from both villages confirmed that their lives were indeed changed by the Green Scheme positively (Figure 2). The newly established Harambee Prosperity Plan will come in handy in alleviating poverty by reducing deaths causes by hunger especially Namibia being an upper middle-income country (Office of the President 2016):.

3.2 Food diversification

Respondents consumed a diverse number of food items before the establishment of the green scheme. The village with no GRN intervention showed diversity than the village with GRN intervention. Millet and maize were the most consumed crops in both communities. The result depicts the fact that millet and maize and a very common vegetable called Mutete (*Hibiscus sabdarifa*, is the staple foods for the two villages. While fish is generally believed as a popular staple food for the Kavango West region, an extremely low percentage, about 3.3% residents was recorded and this low percentage is justified due to the long distance of the Kavango River from the two villages. The study further established that the source of food items for consumption before GRN

intervention was the same for both village settings (Figure 4) with the field being the main source of food items even after displacement (in the case of Sikondo). The figures entail that even after losing the fields to the Green Scheme (Sikondo), the community members are still able to cultivate elsewhere.

The establishment of the green scheme impacted upon Sikondo village as most of the food items reduced significantly. Furthermore, food diversity of community members from Sikondo decreased with the GRN intervention. This tells that one of the objectives of the Green Scheme of food diversification is not met at a household level of the community in which the Green Scheme is based. Although most of the food items (crops and vegetables) are grown in the Sikondo irrigation project, the data showed that not every household member has access to it through purchasing or in kind. Maize and millet remained the most consumed food item followed by Sorghum as well as watermelons and nuts. The non GRN intervened community of Siyandeya showed the same pattern of food items as before in exception that the consumption of fish has equally decreased and they no longer grew nuts (Figure 3). In Siyandeya, food diversification increased with the intervention in place. Most of the food items that were not consumed before the Sikondo irrigation project are now part of their diets. An exception is the fish and nuts. This can be attributed to the fact that the Green Scheme does not grow nuts at a larger scale for distribution. Fish is one of the staple food for the Kavango habitants, but for these villages the distance covered to get to the fresh water fish from the Kavango River is very long (about 5 to 10 kilometers). These result from buying fish when they have money and only opt to go and catch fish if agreed as a village or with neighbours for safety reasons. The increase in the food diversification in Siyandeya village is due to a women's project (Joint Venture Project) in the neighbouring village Kasote. Some of the women in Siyandeya are beneficiaries and in turn spread the gardening techniques to fellow women, relatives and friends. Shops showed to be the main source of food supply for the Siyandeya community members (38%) after intervention:

3.3 Challenges faced by communities

The targeted communities identified challenges such as water, sanitation, energy sources and land usage.

A total of 1.3% of residents from both village settings got water from the public tap. The current water sources used by the villagers are not different from those before the Scheme. Sikondo does not use public taps and Siyandeya does not get water from the household taps as these do not exist. Both Sikondo and Siyandeya commonly use water from the dam as the main source of water. These dams were not as a result of the intervention. Before the intervention, both communities mainly used bushes as toilets, though Siyandeya had toilets as an addition. Residents from Siyandeya mostly used water dam as a source of water, while 36.6%, 7.3%, 7.3% got water from borehole, river and well respectively (Table 7). The water in Siyandeya from the borehole is salty and could not be consumed or used to quench thirst, it is mostly used for cooking and washing. Sikondo also used water from the dam (34.3%) whereas 25.7%; 22.9% and 14.3% got water from the river, well and borehole. This variable sought to know if there are any measures that were offered to the villagers that could perhaps contribute positively to their livelihood. The green scheme did not offer the communities any sort of sanitation measures.

Land use was one of the challenges that the respondents saw worth mentioning. The land that was given for the establishment of the Green scheme benefited them as indicated by Table 7. Some gave the land voluntarily while others only gave after being convinced by the chief (traditional leader). For them the benefits that they use to get from the land that was lost would still continue to be a positive addition to their livelihood to date. Other land usages included collection of plants used in making traditional methods for catching fish; collection of poles for fencing homesteads; acacia trees for livestock kraals, there is a well in which people used to fetch water and collect clay as well as the killing of wild animals for wild meat.

Though results show many of the benefits that the villagers got from the land before the intervention, it is worth mentioning that they do not get anything from the scheme anymore as access to the facility is not given to all. The land that was given is only mainly used for commercial farming, the little pieces of land (as were referred to by the respondents) are used for homesteads and little gardens for maize. The available land after the Green Scheme is used for building homesteads. The land that was once their subsistence farms is used for commercial farming by the scheme. The establishment of the scheme resulted in land being taken away from community members of Sikondo without their consent (26 respondents). At least 3 respondents confirmed that their lands were acquired with consent. In terms of State development in communal areas the Ministry obtains the land through the Land Board in terms of Leasehold or Occupational Land Right, develops the land itself or jointly with a private investor, and the land is utilized by irrigation farmers under lease or profit sharing agreements with the Ministry (Hansen & Kathora 2013). The majority of the respondents claimed that this procedure was not followed in obtaining the land from them. As in Sikondo, Siyandeya respondents mostly stated that the land was taken without the owners' consent and only 6.7% were aware of the issue.

Community members suggested as a way forward that the Green Scheme be fair when it comes to employment and employ as priority the people from the village so that they benefit first. The management of the

Green Scheme was advised to work together with community leaders towards the attainment of a positive change in people's livelihood. There was a lack of coordination in the administration; a lack of transparency; and inadequate monitoring of performance of the irrigation projects (Zuwarimwe et al. 2014). The villagers expected that the intervention will be able to provide clean running water for the community as well as to allow them to get electricity transformer to the village from which they can pay for extensions to their households which did not materialize. The water that the community consumes is not clean (from wells); therefore it was proposed that the scheme look into giving the communities training in agriculture as well as in water purification. They further suggested that Green Schemes should be buying chemicals for them to treat the water and to teach communities how to treat it. The biggest concern was the plowing in of crop residues. The respondents demonstrated and showed a disappointment in the only intervention that was supposed to be the source of income and food security.

5. Conclusion

The study reveals that there was no significant association between socioeconomic activities of the two village settings ($p > 0.05$). Most variables were the same before and after the scheme for both village settings. Changes in food diversification for people indicated that food items for consumption reduced for a GRN intervention village of Sikondo and increased in a non GRN intervention village of Siyandeya. The study further revealed that the hope of encouraging the villagers to diversify food depends on factors such as the affordability of the food stuff when sold on site of the scheme. What is missing in the Green scheme is a lack of intervention to provide the community members with the knowledge required to earn a living instead of waiting for residues. The study highlights community's assertion that Green Schemes are not adding significant improvements or changes to community livelihoods as no significant developments in the surrounding villages have been attributed to the Green Schemes. While there are benefits from the Green Schemes to the communities such as employment opportunities within the Green Schemes, these are minimal and are not worth their losses and expectations for improved livelihood. But communities surrounding the Schemes continue to face challenges such as water, sanitation, lack of jobs and energy. Villagers also faced a lot of challenges from the moment their land was given for the establishment of the Green Scheme. Many lost homes, productive farms and plants of medicinal value to the human body.

There is need to inculcate a change in attitude of communities and Green Scheme managements so as to encourage collaborative efforts between communities and the Green Scheme management which will impact on the livelihood of people positively. Future research is recommended to include funded and non funded private irrigation project of different scales, with factors such as machine or bucket irrigated agriculture.

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Table 1(a(i)): Occupation, average income and source of income before the Green Scheme

Variables	Sikondo		Siyandeya		Chi-square	
	N	%	N	%	X2	p-value
Main occupation of respondent						
Permanent wage	1	3.6	2	6.7		
Part time/casual/contract employment	2	7.1	1	3.3		
Unemployed	10	35.7	1	3.3		
Farming full time (communal)	12	42.9	25	83.3		
Other	1	3.6	1	3.3		
Was still young/at school	2	7.1	0			
Average income					17.722	0.007*
No income	4	13.8	0			
Less than NS100	1	3.4	0			
NS101-NS500	3	10.3	10	34.5		
NS501- NS1,000	4	13.8	12	41.4		
NS1,001-NS2,000	10	34.5	5	17.2		
NS2,001-NS4,000	5	17.2	2	6.9		
NS4,001-NS8,000	2	6.9	0			
Sources of income					11.428	0.121
Sale of livestock/livestock products	17	26.6	19	26.8		
Crop sales	17	26.6	24	33.8		
Herding livestock for others	13	20.3	21	29.6		
Full wage employment (GRN)	2	3.1	0			
Full wage employment (elsewhere)	5	7.8	1	1.4		
Casual/seasonal employment	6	9.4	1	1.4		
Informal trade	3	4.7	3	4.2		
Old age pension	3	7.3	10	16.4		
Other	9	22	0			

* p-value less than 0.05

Table 1(a(ii)): Average expenditure, commodities and services before the Green Scheme

Variables	Sikondo		Siyandeya		Chi-square	
	N	%	N	%	X2	p-value
Average expenses					16.379	0.012*
No income	4	13.8	0			
Less than NS100	1	3.4	4	13.8		
NS101-NS500	6	20.7	15	51.7		
NS501- NS1,000	10	34.5	8	27.6		
NS1,001-NS2,000	7	24.1	1	3.4		
NS2,001-NS4,000	0		1	3.4		
NS4,001-NS8,000	1	3.4	0			
Commodities and services on which the income is spent					4.762	0.575
Food	15	12.3	27	16.4		
Education	23	18.9	29	17.6		
Health	25	20.5	29	17.6		
Clothing	25	20.5	29	17.6		
Transport	17	13.9	26	15.8		
Savings	15	12.3	25	15.2		
Others	2	1.6	0			

* p-value less than 0.05

Table 1 (b(i)) Occupation, average income and source of income after the Green Scheme (n=60)

Variables	Sikondo		Siyandeya		Chi-square	
	N	%	N	%	X2	p-value
Main occupation of respondent						
Permanent wage	2	6.7	1	3.3		
Part time/casual- Green Scheme	3	10	2	6.7		
Part time/casual- Elsewhere	1	3.3	1	3.3		
Unemployed	15	50	8	26.7		
Retired/ pensioner	1	3.3	2	6.7		
Farming full time (communal)	8	26.7	16	53.3		
Average income					7.42	0.191
No income	5	16.7	2	6.7		
Less than NS100	2	6.7	2	6.7		
NS101-NS500	11	36.7	12	40		
NS501- NS1,000	6	20	5	16.7		
NS1,001-NS2,000	3	10	9	30		
NS2,001-NS4,000	3	10	0			
Sources of income					28.427	0.000*
Sale of livestock/livestock products	15	36.6	16	26.2		
Crop sales	4	9.8	15	24.6		
Herding livestock for others	1	2.4	12	19.7		
Full wage employment (GRN)	0		1	1.6		
Full wage employment (elsewhere)	1	2.4	0			
Casual/seasonal employment	4	9.8	2	3.3		
Informal trade	4	9.8	5	8.2		
Old age pension	0		2	2.7		

* p-value less than 0.05

Table 1 (b(ii)) Average expenditure, commodities and services after the Green Scheme (n=60)

Variables	Sikondo		Siyandeya		Chi-square	
	N	%	N	%	X2	p-value
Average expenses					14.553	0.012*
No income	6	20	4		13.3	
Less than NS100	4	13.3	11		36.7	
NS101-NS500	13	43.3	4		13.3	
NS501- NS1,000	2	6.7	9		30	
NS1,001-NS2,000	4	13.3	2		6.7	
NS2,001-NS4,000	1	3.3	0			
Commodities and services on which the income is spent					10.868	0.144
Food	27	18.8	30		20	
Education	24	16.7	13		8.7	
Health	26	18.1	29		19.3	
Clothing	25	17.4	29		19.3	
Transport	2	1.4	0			
Savings	23	16	27		18	
Others	14	9.7	22		14.7	

* p-value less than 0.05

Table 2(b) Investment in assets after the Green Scheme (n=60)

Variables	Sikondo		Siyandeya		Chi-square	
	N	%	N	%	X2	p-value
Physical assets						
Livestock	17	73.9	16	64		
Bicycle	5	21.7	5	20		
Car	0		1	4		
Brick house	7	30.4	2	8		
Shop	3	13	1	4		
Metal ploughs	16	69.6	14	56		
Television	2	8.7	1	4		
Radio	18	78.3	24	96		
Machineries	2	8.7	0			
Financial capital					11.189	0.004*
Savings	14	60.9	23	100		
Employment wage	9	39.1	0			
Human capital					3.721	0.293
Self education and training	11	20.4	25	32.5		
Education of children	25	46.3	25	32.5		
Experience in field at workplace	13	24.1	17	22.1		
Competency in certain field	5	9.3	10	13		
Social investment					17.493	0.000*
Joint neighbor fence repair	14	38.9	2	6.9		
Guarding animals jointly	8	22.2	1	3.4		
Joint borehole water points	14	38.9	26	89.7		

Table 2(b) Investment in assets after the Green Scheme (n=60)

Variables	Sikondo		Siyandeya		Chi-square	
	N	%	N	%	X2	p-value
Physical assets						
Livestock	17	73.9	16	64		
Bicycle	5	21.7	5	20		
Car	0		1	4		
Brick house	7	30.4	2	8		
Shop	3	13	1	4		
Metal ploughs	16	69.6	14	56		
Television	2	8.7	1	4		
Radio	18	78.3	24	96		
Machineries	2	8.7	0			
Financial capital					11.189	0.004*
Savings	14	60.9	23	100		
Employment wage	9	39.1	0			
Human capital					3.721	0.293
Self education and training	11	20.4	25	32.5		
Education of children	25	46.3	25	32.5		
Experience in field at workplace	13	24.1	17	22.1		
Competency in certain field	5	9.3	10	13		
Social investment					17.493	0.000*
Joint neighbor fence repair	14	38.9	2	6.9		
Guarding animals jointly	8	22.2	1	3.4		
Joint borehole water points	14	38.9	26	89.7		

* p-value less than 0.05

Table 3(a): Characteristics of home dwelling before the Green Scheme

Variables	Sikondo		Siyandeya		Chi-square	
	N	%	N	%	X2	p-value
Housing improvements					2.553	0.635
Additional living space	1	2.3	1	2.1		
Concrete house	1	2.3	1	2.1		
Corrugated iron sheet roof	1	2.3	5	10.4		
Thatched roof with clay wall	28	63.6	27	56.3		
Thatched roof with reed wall	13	29.5	14	29.2		
Type of surrounding household fence					9.66	0.085
Wooden poles	9	25	8	24.2		
River reeds	11	30.6	20	60.6		
Brick wall	1	2.8	0			
Wired fence	1	2.8	1	3		
Maize/millet stalks	7	19.4	3	9.1		

Table 3(b): Characteristics of home dwelling after the Green Scheme (n=60)

Variables	Sikondo		Siyandeya		Chi-square	
	N	%	N	%	X2	p-value
Housing improvements					5.331	0.377
Additional living space	2	3.3	0			
Concrete house	4	6.6	1	1.8		
Corrugated iron sheet roof	14	23	11	19.3		
Thatched roof with clay wall	27	44.3	30	52.6		
Thatched roof with reed wall	13	21.3	15	26.3		
Others	1	1.6	0			
Type of surrounding household fence					10.664	0.058
Wooden poles	9	20.5	8	23.5		
River reeds	14	31.8	21	61.8		
Brick wall	1	2.3	0			
Wired fence	9	20.5	2	5.9		
Maize/millet stalks	5	11.4	2	5.9		

Table 4: Land Acquisition for the Green Scheme

Variables	Sikondo		Siyandeya		Chi-square	
	N	%	N	%	X2	p-value
Establishment of Green Scheme						
Acquired land from villagers(with consent)	26	89.7	27	90		
Acquired land from villagers(without consent)	3	10.3	2	6.7		
Others(No idea)	0		1	3.3		
Gave way farm land for establishment of Green Scheme?					1.071	0.301
Yes	14	46.7	18	60		
No	16	53.3	12	40		
Alternative land given						
Yes	0		0			
No	28	100	26	100		
Settlement support received after settling elsewhere					3.729	0.053
Yes	13	52	7	25.9		
No	12	48	20	74.1		
Kind of settlement received						
Financial package	11	100	8	100		
Source of financial package received					0.847	0.357
MAWF	9	90	8	100		
Others	1	10	0			

Table 5(a) Challenges faced by Sikondo and Siyandeya households before the Green Scheme (n=60)

Variables	Sikondo		Siyandeya		Chi-square	
	N	%	N	%	X2	p-value
Sources of water					12.879	0.012*
Public tap	1	2.9	0			
Borehole	5	14.3	15	36.6		
Water dam	12	34.3	20	48.8		
River	9	25.7	3	7.3		
Well	8	22.9	3	7.3		
Sanitation measures					9.821	0.002*
Toilets	0		10	27.8		
Bush as toilets	30	100	26	72.2		
Land use					5.727	0.678
Subsistence farming	29	19.2	28	18.8		
Livestock herding	24	15.9	25	16.8		
Collection of medicinal plants	23	15.2	24	16.1		
Collection of wild fruits	22	14.6	24	16.1		
Collection of clay	2	1.3	5	3.4		
Collection of wood	24	15.9	24	16.1		
Collection of grass	22	14.6	17	11.4		
Bush as toilet	0		1	0.7		
Others	5	3.3	1	0.7		
Energy sources						
Solar power	3	10	1	3.7		
Firewood	28	93.3	27	100		
Candle light	0		1	3.7		

* p-value less than 0.05

Table 5(b) Challenges faced by Sikondo and Siyandeya households after the Green Scheme (n=60)

Variables	Sikondo		Siyandeya		Chi-square	
	N	%	N	%	X2	p-value
Sources of water					10.286	0.001*
Public tap	0		1	2.3		
Household tap	2	5.9	0			
Borehole	5	14.7	16	36.4		
Water dam	13	38.2	21	47.7		
River	8	23.5	3	6.8		
Well	6	17.6	3	6.8		
Sanitation measures					10.286	0.001*
Toilets	0		12	28.6		
Bush as toilets	30	100	30	71.4		
Land use					10.733	0.151
Subsistence farming	26	43.3	26	31.3		
Livestock herding	13	21.7	20	24.1		
Collection of medicinal plants	2	3.3	8	9.6		
Collection of wild fruits	2	3.3	4	4.8		
Collection of clay	9	15	5	6		
Collection of grass	3	5	14	16.9		
Bush as toilet	2	3.3	2	2.4		
Others	3	5	4	4.8		

* p-value less than 0.05

Table 6. Green Scheme and communities

Variables	Sikondo		Siyandeya		Chi-square	
	N	%	N	%	X2	p-value
Benefits from Scheme						
Employment	5	19.2	2	6.9		
Agricultural training	1	3.8	1	3.4		
Food for sale	1	3.8	1	3.4		
Food for consumption	7	26.9	2	6.9		
Crop residues	20	76.9	27	93.1		
Others	2	7.7	0			
Constraints attributed by Green Scheme					14.508	0.002*
Long distance to new farm field	24	29.6	12	17.1		
Loss of access to medicinal and food plants	23	28.4	30	42.9		
Lack of land for livestock grazing	24	29.6	28	40		
Others	10	12.3	0			

* p-value less than 0.05

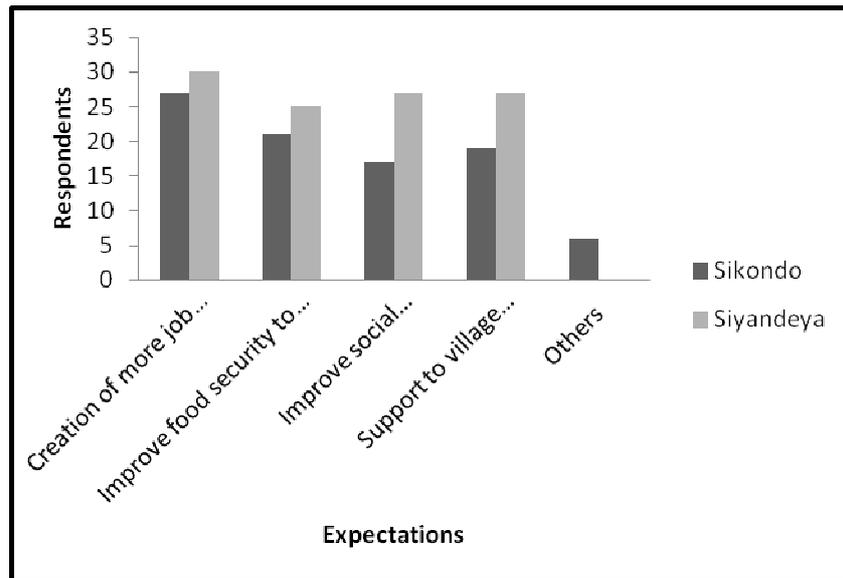


Figure 1: Expectations of communities from the Green Scheme for Sikondo and Siyandeya establishment

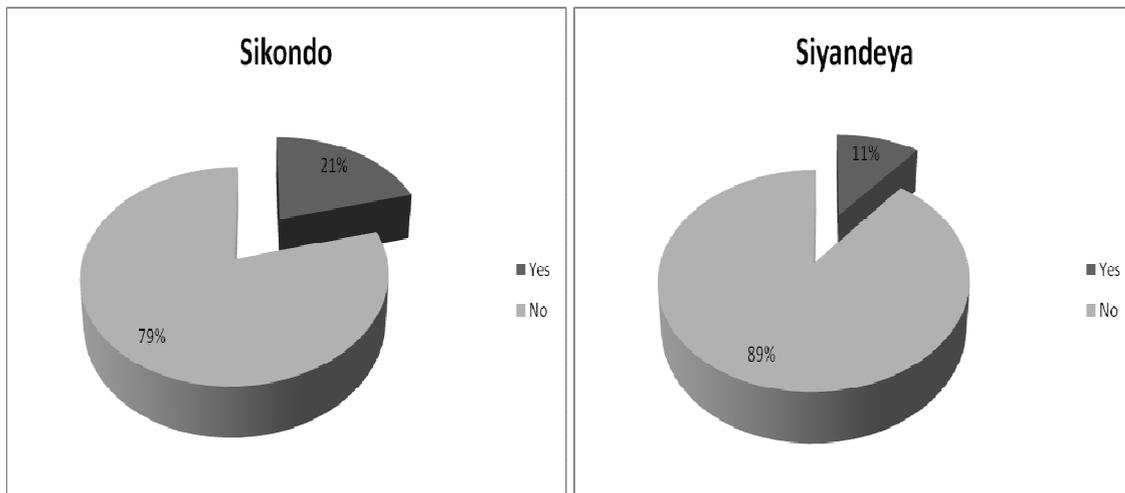
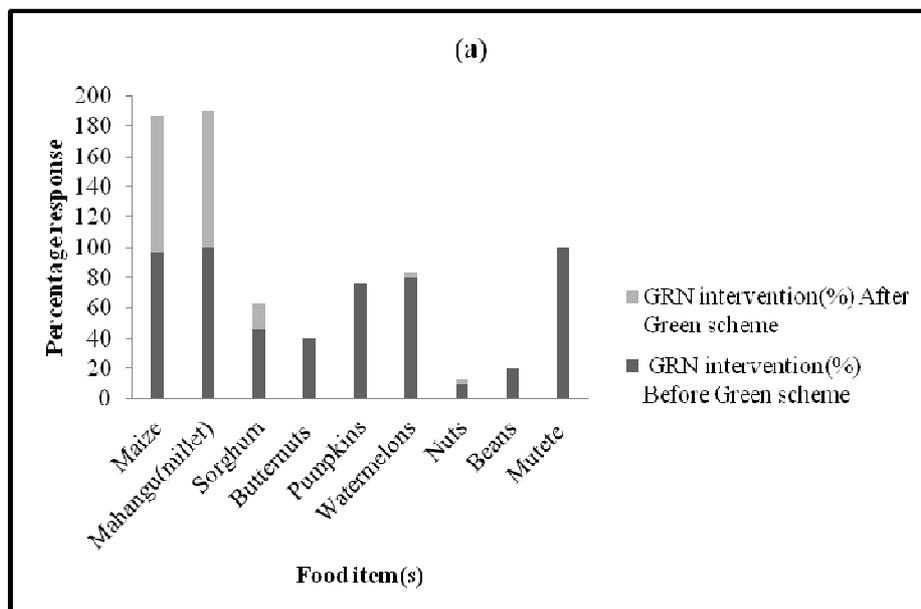


Figure 2: Response by respondents on the impact of Green Schemes in improvement of livelihood



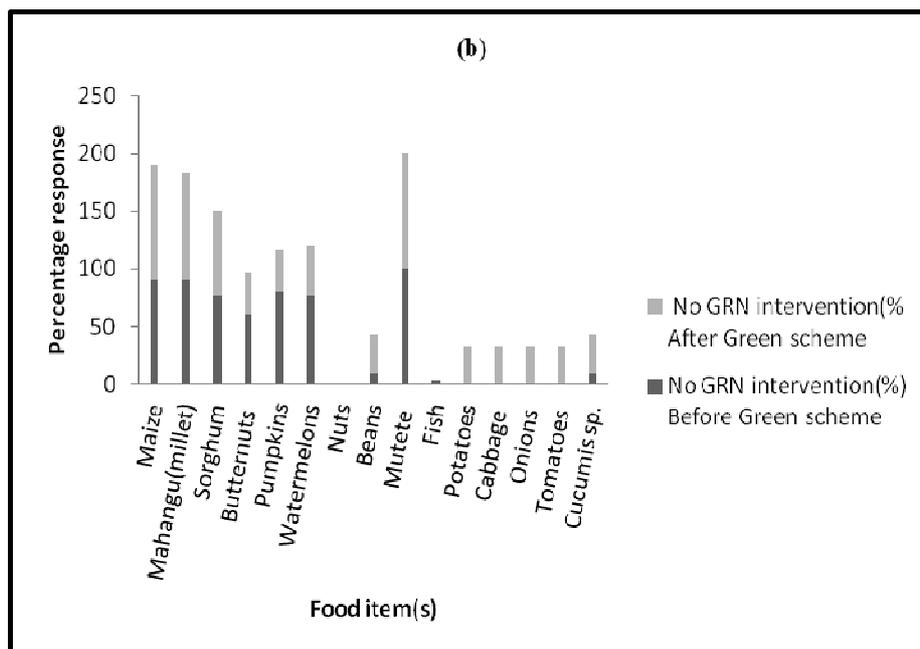


Figure 3: Food items eaten by the communities before (a) and after (b) the Green Scheme

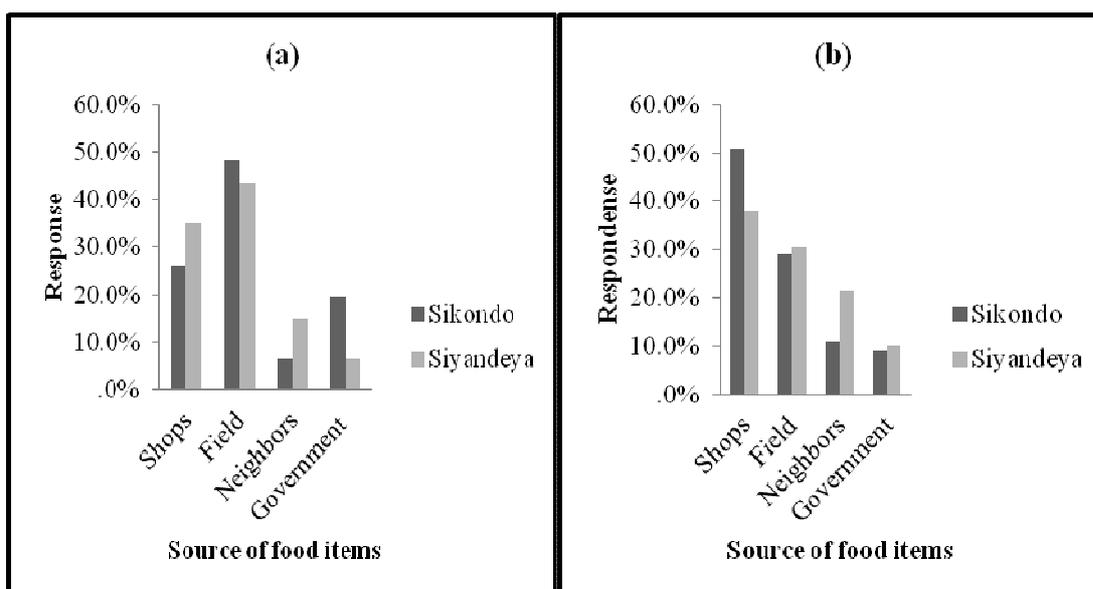


Figure 4: Sources of food items eaten by communities before(a) and after (b) the Green Scheme

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