DEPARTMENT OF AGRICULTURAL ECONOMICS AND EXTENSION

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The Impact of Irrigation Development on Women Farmers in Zimbabwe: The Case of Mushandike and Tagarika Irrigation Schemes

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Introduction

This study on the impact of irrigation development on Zimbabwean women focusses on two schemes, namely, Tagarika in the Midlands Province and Mushandike in Masvingo. Both schemes are located in the same ecological Zones and therefore, have similar cropping conditions.

Tagarika started operating towards the end of 1988 on a resettlement scheme which was established in 1982. The farmers that joined the irrigation project were already engaged in dryland farming on five hectares of arable land allocated to them under the resettlement programme. There were seventeen villages, which included a co-operative farm. Participants in irrigation agriculture were drawn from six of the seventeen villages. In addition to five hectares, those who joined the project were allotted 0.5 hectares of sprinkler irrigated land, plus access to common grazing areas. The irrigation scheme was divided into twenty four plots while the village itself had twenty-five households. Although these twenty-five households were given first preference in the allocation of irrigated plots, not all of them volunteered to participate in irrigation agriculture. Nineteen households were reluctant to join so that the invitation was extended to households resident in other villages. This meant that they had to walk long distances from their homes to their irrigated plots.

With the establishment of the irrigation scheme at Tagarika, new crops were introduced. Farmers who had been producing maize,

groundnuts, rapoko and sunflower were now advised to grow such crops as wheat, potatoes and beans, onions and cabbages on a relatively large and more commercial scale.

On the other hand Mushandike irrigation scheme was organised along different lines. The scheme was established in 1983 as a purely canal irrigation project, located on a resettlement scheme. There were fifteen villages on Mushandike resettlement scheme, five of which were irrigated. Each household was allotted 1.5 hectares of irrigated land where they cultivated maize, wheat, beans and cotton. In two of the irrigated villages, households were allotted an additional 0.1 hectare for market gardening. Unlike Tagarika farmers, those at Mushandike had already accumulated five years experience of irrigation agriculture at the time of data collection.

In both cases, the introduction of irrigation agriculture was part of government's attempt at raising the levels of living of rural households through increased agricultural productivity which would also ensure food security in the country.

For Zimbabwe, irrigation was clearly one of the most important means of raising productivity. With over 60% of farmland lying in drought prone regions, and about 75% of smallholder farming areas located in these regions, irrigation development must be key to increased productivity. (Mbwanda and Rohrbach, 1989). An FAO study arrived at the same conclusion when it stated that irrigation was an essential element of future agricultural production in Africa. (FAO, 1986). This is further supported by

the SADCC Food Security Programme which launched Project Number 12, that was designed to improve irrigation management and development in the region.

The selection of Tagarika and Mushandike as irrigation sites was a purposive one. Both schemes were established on former commercial farms where there already existed some irrigation infrastructure or where the irrigation potential was great because there were dams or water reservoirs. Tagarika already had the dam, pump and pipes, which had been laid out by the previous owner of the farm. Government only had to invest relatively few resources to rehabilitate the existing irrigation facilities. This pattern of targeting irrigation schemes allowed government to provide irrigation facilities to more Small farmers than would have been possible with the limited available resources. Most of these irrigation schemes were established as part of the resettlement programme which resettled the landless, former refugees and people from overpopulated areas. Another of the major attractions of these micro irrigation schemes was that the plots could be sited near the water source, minimising costs.

Like the resettlement programme, the irrigation projects gave use rights to households. These rights were vested in the heads of households who in the majority of cases were men. There were a number of women headed households but they made up a small proportion of the total population. The overall custodian for these rights was the Minister responsible for Lands and each head of household was registered and was expected to conform to

certain regulations. If the registered farmer did not conform, the Minister of Land could evict him and his household. This introduced an element of insecurity on the part of the household.

Women's insecurity on irrigation schemes was further increased by the absence of the support which would normally come from the extended family. In communal areas, where people still enjoyed traditional land use rights, women had more security in their rights because in the event of a dissolution of their relationships, they could remain in their husbands home, cultivating their fields. In some cases new plots would be allotted to them, and they could still enjoy the support of their extended family. On the irrigation scheme however, the dissolution of a relationship meant that the woman had to move out since she was not registered as the settler. There were no traditional social support systems to protect her. Thus the introduction of small-scale irrigation schemes, like the resettlement, tended to erode women's security with respect to land, which was their major source of livelihood.

METHODOLOGY

This report is based on primary data gathered from Mushandike and Tagarika irrigation schemes. The bulk of the data was collected using structured precoded questionnaires. This approach was particularly useful for recording quantitative data which was processed to provide the summary statistics and tables found throughout the report.

Informal interviews or dialogues were conducted to supplement information on the questionnaire. Where it was necessary to draw out specific information, the researchers asked leading questions which would make interviewees focus on particular issues.

Sitting in on village committee meetings was an important source of information, both reported and observed.. It presented an opportunity to observe decision making processes at the village level. In addition, it gave a better insight into some of the problems facing farmers.

Village committee meetings were often attended by government officers from various departments. They were used as fora for farmers to present their views to government agencies. These meetings, thus allowed the researchers to get views from both farmers and development agents.

Government officers at the schemes and at provincial offices were also interviewed. They provided background information to the development of the scheme, and some technical information

relating to production practices.

The selection of the samples was in both cases purposive. At Tagarika it aimed to include the majority of irrigation farmers and small minority of purely dryland farmers. Out of a total of twenty-six households selected, twenty-one were from the irrigation scheme. This sample of twenty-one, ensured the inclusion of women heads of households. The original idea was to involve all the twenty-four irrigation farmers, at Tagarika. This was not possible because some of them were not available at the time of the field visit. Thus the sample instead of being thirty, was only twenty-six.

At Mushandike, the important factors were the inclusion of farmers from the longest established schemes and women heads of households. The sample size was thirty.

The coded data was entered into the computer and summary statistics were computed. Tables were also constructed and are provided in the appendices.

TAGARIKA IRRIGATION SCHEME

The Tagarika sample for this study was made up of twenty-six households, twenty-one of whom were engaged in both irrigation and dryland farming and five in rainfed farming only. The average size of a household was ten, each basically comprising of the head of household, spouse, (in the majority of cases), children and sometimes either paternal or maternal grandparents. Quite a large proportion of the households, about 80% were

children below the age of eighteen years. This demographic structure meant that a large number of people supported by the scheme was not able to make significant contribution to irrigation agriculture because they were either away at school most of the time or too young to contribute to agricultural production.

In the majority of households there was hardly any outward migration. Only 0.7% of the men were temporarily employed away from home while 7% were permanently away. Upon further investigation, it was found that the majority of the 7% of the men permanently away from home were not heads of households but adult offsprings. The rate of outward migration was very low because it was government policy that those household heads who were resettled should not take up other forms of employment off the scheme. Secondly, the demographic structure was such that the majority of children were still too young to go out and seek employment elsewhere. The average age of male household heads was forty-seven while that of women spouses and household heads was thirty-seven. The differentials in their levels of education were not as significant as those in their ages. Men spent an average of 4.58 years in school while women spent an average of 4.42 years. The literacy rate for women was relatively high, at 75.4% compared with 70.1% for men. This was partly explained by women's lower average age.

Because Tagarika irrigation scheme was only just being established, when field data was collected, it was difficult to

assess the full impact of its introduction on farmers, especially women farmers. However, what was clear right from the beginning was the fact that irrigation agriculture brought additional labour demand on women in particular. Before the introduction of irrigation agriculture, most households were already experiencing seasonal labour shortages. This was due to the fact that they were cultivating five hectares of land with limited mechanical technology in the absence of extended family and child labour.

It is important to bear in mind that women's labour time was already overstretched, prior to the introduction of irrigation agriculture. They were responsible for over 90% of the food processing and preparation. They procured about 80% of the fuelwood and over 75% of the potable water. Women did the laundry and house cleaning. In addition they provided approximately 60% of the agricultural labour, particularly for such tasks as weeding, harvesting planting and fertiliser application.

With the introduction of the irrigation scheme, the workload was automatically increased for women. In dryland farming they harvested once per year, which meant that the demand for agricultural labour was seasonal. Whereas with irrigation labour demand was continuous throughout the year. They would be harvesting three times per year. This implied a loss of the non-agricultural period, during the dry season when they would previously concentrate on such activities as repairs around the

homestead, bringing in supplies of fuelwood, working on their vegetable gardens etc.

Furthermore, irrigation agriculture was more intensive than dryland farming. It involved greater use of both capital and labour inputs. Large amounts of fertilisers had to be applied. Because moisture levels were high, it also facilitated growth of weeds. Weeding was generally a task for women, and in the absence of herbicides, they had to give extra time to the weeding of irrigated crops. At Tagarika, 14% of the irrigation households were using herbicides. This meant that 86% of the households did all their weeding using hoes. Although 54% of the households owned cultivators which would reduce the weeding, these implements were not frequently used on the scheme because the small size of the plot rendered the use of ox-drawn cultivators relatively inefficient, particularly since on the 0.5 hectare they planted three different types of crops, which required different forms of management. However, the availability of cultivators reduced the workload of their dryland plots. This implied an increase in the workload for men who were generally responsible for the draught cultivations, while women carried out the tedious task of weeding using hoes. As shown on Appendix 6 mens's labour contributions in irrigation agriculture were relatively high. At Tagarika, as shown in the sample data, men's labour contribution in land preparation was as high as 75%, in weeding and harvesting 55%, manuring 53%, spraying chemicals, 56%. Women dominated the planting and fertiliser application, in which they contributed 56% and 52% of the labour respectively,

(see Appendix 6).

Irrigation agriculture, which was market oriented, appeared to have preference in terms of labour time allocation. This was partly because of the pressure from the extension worker who had interest in its success, and also because of farmers' relatively high levels of investment. Sometimes, the demands from irrigation agriculture conflicted with those from rainfed farm areas, with the effect of reducing the efficiency of labour time allocation in both activities. Available data was not adequate to allow definite conclusions on this phenomenon. Appearances, however, seemed to suggest that competition for labour time in the two activities might result in poorer returns from irrigated agriculture, which was more intensive in its management.

About 89% of the Tagarika households owned livestock, which they could use for draught power. For the 11% that did not own drought livestock, the burden of work fell heavily on women. Absence of draught power implied more labour requirements for such activities as weeding. It also meant that men's contributions to such tasks as procurement of water and fuelwood would be near zero. Men who undertook such tasks normally did so with the use of draught power.

Procurement of water at Tagarika did not present serious problems because there were boreholes that had been rehabilitated under the resettlement programme. Irrigation water was not suitable for drinking or household use. The introduction of irrigation

agriculture thus did not affect the availability or accessibility of good quality potable water. All the women interviewed pointed out that they did not wish to use irrigation water for non-agricultural purposes, because the water from boreholes was very clean and quite abundant. Similarly, fuelwood did not present a problem yet because environmental degradation ie. deforestation had not reached high levels. The previous commercial farmer who owned the land had protected it from being overutilised. Fuelwood was thus easily available to the Tagarika households and women did not have to cover long distances to procure their source of energy. The residents of the scheme were however concerned with the activities of residents of adjacent communal areas, who trespassed and procured fuelwood from the scheme's common lands. They were drawing on resources that had been set aside for a small population group. The same people from adjacent communal areas grazed their livestock on the schemes grazing area. Although the immediate effects of this were not yet being acutely felt, the long-term implications were alarming particularly for women. If deforestation was going to reach the levels it had in the adjacent communal areas, women would have greater difficulties coping with their labour demands. Considering that they would still have to make their labour contributions on both dryland and irrigated plots, it would be more burdensome for them to spare hours to walk long distances for the purpose of procuring fuelwood.

A new task that came with irrigation at Tagarika was the changing or moving of watering sprinklers to ensure an even spread of

water over the plants. There was a particular schedule to be followed depending on the season. During the dry months, watering of crops demanded more time. On the days set aside for this task, the position of the sprinkler was supposed to be changed every two or three hours. For the majority of farmers coming from other villages, this meant spending long hours or whole days at the irrigation village. This task was undertaken by women in the most cases. According to some of the women interviewed, it placed a great deal of pressure on their labour time, particularly since it took them quite a distance away from their villages and homes, where they were still responsible for the household work and agricultural activities on their dryland farms. The situation was particularly difficult during term time when school children were not able to help much because they spent most of their day at school. This partly explains the seemingly high rate of male participation in agricultural work even in those tasks that have traditionally been dominated by women.

For those who were based in the irrigation village, the problem was not so acute. What created additional work for them was the livestock problem. During dry seasons livestock is usually left to graze freely, because there is no threat of crop destruction. Irrigation agriculture entailed winter cropping. This meant that, even during this dry season, there was a need to tend to livestock or to keep them away from the crops on the irrigated plots. This was a task that tended to fall on those who where responsible for the watering activities, i.e. women. Because

sprinkler irrigation had just been newly introduced to Tagarika, the knowledge, or techniques in the new activities were still limited to a few; mainly the adult members of households. This tended to further restrict the use of child labour in these activities. Women found themselves overburdened with work since they were among the first to acquire the knowledge.

Women's new responsibilities had the added effect of restricting their participation in decision making at the village level. At Tagarika, there was not a single women elected to the village committee, despite the fact that of the total adult population i.e. people over 18 years of age, 52.54% were women. Their heavy workload might only be a partial explanation. What seemed to emerge during interviews with both men and women was that because irrigation was a new technology brought to the area to facilitate production of cash crops, men tended to play a dominant role. Furthermore, the fact that most irrigated plots were registered in the names of men, appears to have supported their leading role in decision making. They monopolised decision making concerning the running of the irrigation scheme. In fact, this was true of the resettlement scheme in general. Women only had derived access to land and other land based resources. The result was that their access to available services was also derived.

On the resettlement scheme in general, services or facilities were made available to registered settlers. Access to these facilities in general, was more favourable for settlers than for the majority of farmers in communal areas.

At the time of data collection, extension service was inadequate. There was only one agricultural extension worker covering the whole resettlement scheme which was made up of seventeen villages with an average of twenty-five households each. This one extension worker could hardly meet the needs of all farmers, particularly those in irrigation agriculture, who were being introduced to a variety of new things. Farmers on the irrigation scheme were further disadvantaged by the fact that the extension officer was based at another village, and was thus not easily accessible. It was, however, hoped that more extension personnel would join the scheme. In fact, by April 1989, there was already an extension officer specifically responsible for the irrigation scheme while the other one remained responsible for rainfed agriculture.

There where special credit facilities set up for resettlement and irrigation schemes. These were made available for the purchase of sprinklers and horse pipes. In addition, farmers could also purchase biological or seasonal inputs through credit. At Tagarika, no married woman had taken out any loans for irrigation agriculture. The special irrigation credit scheme was dominated by male heads of households and the few women heads of households i.e. the registered settlers. The same pattern was observed on dryland farming.

The research was undertaken before the first harvest so that one could not observe the pattern followed. However, according to the resettlement officer, the twenty-four farming households

involved in the irrigation project set up a marketing committee which would identify marketing channels, particularly for such commodities as potatoes, onions and cabbages. These crops were not controlled and normally individuals found their own markets. The setting up of the Marketing Committee did not however, preclude individual marketing.

According to plans, the marketing committee would approach such institutions as schools, hospitals and supermarkets in both urban centres and rural areas. Some of their major targets were in the city of Gweru, their provincial capital. The responsibility of the committee entailed a certain degree of travelling. For men, it did not create too many complications because their responsibilities did not of necessity tie them down to the home. For women, however, it was very inconvenient. Their household tasks demanded their presence. Similarly, their child rearing responsibilities made travelling burdensome. Because of these and other factors such as processes of socialisation, there were no women elected to the marketing committee.

The marketing of major crops from rainfed agriculture was dominated by men who had acquired marketing cards. However, in some households, women had already acquired marketing cards, and were marketing some of the grain from dryland farming. These households had seen advantages in women taking over some of the marketing particularly in situations where women were not credit recipients. Because loans were repaid through a stop-order system, implemented by the marketing Boards, if women marketed

some of the produce, there would be no deductions made on their revenue. This was desirable particularly in situations where marketing was done in stages. It meant that all the deductions would not necessarily be effected during the first marketing stage. The income from the produce marketed by women would ease the pressure that is normally felt when all deductions are made in the first marketing. A number of women indicated that they would follow the same practice with their produce from the irrigation scheme if men were agreeable.

It is important to note that this practice is not unique to irrigation and resettlement farmers, but is common to those households that utilise agricultural credit. Since credit facilities are more easily accessible to resettlement and irrigation farmers, it is likely that the practice will spread more rapidly among them.

Day to day marketing activities have always been the domain of women in this area. Both buying and selling of vegetables, poultry products etc is often done by women. With the introduction of such crops as onions and possibly tomatoes, at Tagarika, it is anticipated that women's marketing roles will be greatly expanded. However, it may well be that men will gradually take over this role since it may become more commercially viable, now that vegetables have been included in the group of major crops.

A negative pattern that seemed to emerge was that land registration tended to limit or restrict access by women who were generally spouses. Women's security with respect to land was greatly eroded. As noted earlier, when a relationship between husband and wife was dissolved, the woman moved out of the scheme almost empty handed. Her chance of staying on the scheme was zero. Yet in communal areas, a woman especially one with children, could remain in the area and either continue to cultivate her fields or be allotted her own piece of land. She would get support from the husband's extended family. In communal areas, the longer the family stayed on the land the more secure they became and the more secure women's positions vis-a-vis land were. It has been shown in some research findings that the older women enjoyed a favourable and more secure relationship with their productive resources, and within their communities in general.(Chimedza, 1988).

An example of a situation where women's security at Tagarika irrigation scheme was being eroded, came up for discussion at one of the village committee meetings. The main agenda of the meeting was to establish the rules and regulations for the distribution and maintenance of irrigation facilities i.e. water, pipes, engines etc. A point was raised that the registered members of the scheme who did not conform with the rules, to a point where even a high fine was not adequate punishment, would have to be evicted. There were no provisions made for the rest of the household, which would be the wife and children. This was in line with the Ministry of Lands' guidelines that applied to

resettlement schemes. According to his mandate, the Minister had the right to evict settlers who did not conform or who committed crimes. Some of the most common crimes were thefts and rape cases, committed mainly by male household heads. Instead of taking legal action against the individual responsible for the crime, the rest of the household had to be victimised. They would be deprived of their only source of livelihood, which would not be the case in communal areas where no individual is officially registered as having use rights to land.

Although some women attended the village committee meeting at Tagarika, non of them voiced any opinion. This was typical of most meetings conducted at this village. When asked, women responded by saying that they agreed with what the men were saying. In fact, throughout these meetings, women were the ones who got up to change the positions of sprinklers so that they missed out on some of the discussions.

However, in private interviews, women raised objections on some of the issues that had been passed in the meeting. When asked why they did not raise these objections openly, the majority said that even if they did, men were not likely to have paid much attention to them. Since there were no women in the committee, it would be pointless, because their views would not be represented in the final decision making body. Thus, they were almost indifferent to what went on in the meetings, although the decisions made affected them directly. These decisions related

to fees and fines, resolving disputes among water users and the maintenance of pumps and pipes. Some women actually felt that it was men's domain which they did not wish to interfere with. According to one interviewee, engines and pipes were not meant for women to manage. This was despite the fact that women were managing pipes and sprinklers daily.

Other than occasionally attending village committee meetings, women participated in organisations that dealt with home economics, hygiene, nutrition and health or sanitation issues. These were exclusively women's organisations.

Women appeared to have been disadvantaged considerably by the introduction of irrigation agriculture. They however, believed that potential benefits would easily outweigh the costs. Promised high returns to their labour served as a major incentive to farmers. As pointed out earlier, these promised benefits could not be observed because at the time of the field work of this study, the scheme was only being established and no marketing had taken place yet. The researchers were only able to record average incomes from dryland farming. It is important to note that the average annual net income of $814.50 recorded, in Appendix 4 came from dryland farming only. This statistic was particularly useful for the purpose of comparing income from dryland farming with that from irrigation agriculture at Mushandike. It gave an indication of the gap that existed between irrigation and rainfed agriculture.

Mushandike Irrigation Scheme

Mushandike irrigation scheme was organised differently from Tagarika. The scheme was established in 1983 as a purely, canal irrigation project, located on a resettlement scheme, with fifteen villages, five of which were irrigated. Each household was allotted 1.5 hectares of flood irrigation. In two villages, each household had an additional 0.1 hectare for market gardening. The irrigation farmers produced four major crops; namely maize, wheat, cotton and beans.

The sample for Mushandike consisted of thirty households. A multi-stage purposive sampling procedure was followed. The first stage involved the selection of the three longest established villages. The second stage ensured the inclusion of all women heads of households in these villages. Finally, the rest of the sample was randomly selected from the male headed households.

The purposive selection of the longest established villages was meant to provide the researcher with an opportunity to capture the farmers' lagged responses to various changes brought about by the introduction of irrigation agriculture. The longer the period the easier it would be to assess the impact of irrigation development on women. Furthermore the inclusion of women headed households would allow the researcher to observe whether there was any differential impact on women heads of households and on women spouses. On the whole it would also be possible to tell whether women headed households had any advantages or disadvantages over male headed households. Out of the sample of

thirty households, eight or 27% were headed by women.

The average household size in Mushandike was nine, with 79% of the members aged below eighteen years. The average age of the male head of household was forty-three while that of the women spouses was thirty-seven. Like the Tagarika situation, there was not much difference in men and women's levels of education and literacy rates. Men spent an average of 5.8 years in school while women spent 5 years. About 79% of the women could read while only 75% of the men could read. Of the literate people at Mushandike irrigation scheme, 56% were women while men were in the minority. Women's numerical superiority in literacy could be partly explained by their lower average age. The younger the people were, the higher their chances of being literate. Since most men, invariably, married younger women, the wives stood a better chance of being literate. Another contributory factor was that more women tended to join adult literacy classes than men. They normally did this through their clubs.

Although the literacy rate for women was higher than that of men, women's rate of participation in the irrigation management workshops that were organised by the extension officers was lower. This was partly due to the fact that those who attended were nominated through the village committees. Out of the village committees in the sample, there was only one woman representative on one committee. This meant that women's role in decision making processes at the village level was insignificant, although numerically, they were superior. 52.54%

of the people over eighteen years of age were women.

Women's near absence in village committees which were responsible for the management of the irrigation project did not imply lack of participation in irrigation agricultural activities. They were involved as suppliers of labour, with little visible decision making power. The table on Appendix 7 shows the rates of involvement in various tasks, broken down by sex. Land preparation and manuring, were tasks that have been dominated by men. Fertiliser application had been largely a woman's task in many areas. In Tagarika for example, 52% of the fertiliser application was carried out by women who were also responsible for most of the planting. In Mushandike, 52% of the processing was done by men. This was a significantly high level of participation in an activity that had been traditionally known to be dominated by women. Other traditional women's tasks were weeding and harvesting.

86% of Mushandike households had livestock of an average herd of seven animals, which provided draught power used in most male dominated tasks such as land preparation, planting, cultivating and manuring. In manuring, ox-drawn scotchcarts were frequently used to transport dung from cattle kraals to the fields. 80% of the households had scotchcarts.

Another male-dominated task that utilised draught power was ploughing. 90% of the households owned ploughs. Some households that owned ox-drawn ploughs did not own draught animals. They relied on hiring or borrowing. Whatever the case was, almost all

the ploughing was done with the use of ox-drawn ploughs.

On the whole, the rate of male involvement in agricultural activities was relatively high on the irrigation scheme. The quality of data on labour was however, not very good. This was due to time constraints. Because the researchers did not have the time to observe households carry out the various tasks, they had to depend on the recall of the interviewees. In some cases, there appeared to be an underestimation of women's labour inputs, which tended to be disrupted by their other household responsibilities.

On the other hand, men were actually moving into some of the traditional women's tasks such as processing. This was partly because all the agriculture was geared towards the market. Also important was that some of the crops were relatively new to the farmers and there was no tradition of women performing these tasks with the new crops. Wheat for example, was introduced to most farmers when they joined the irrigation project.

Households on irrigation schemes were in a favourable position in terms of their access to agricultural support services. At Mushandike, for example, there was one extension worker per village of forty-five households. This favourable extension worker/farmer ratio made it easy for the various members of households to gain access to extension service. Women farmers, for example were in constant touch with their extension officers. According to the interviewees, extension workers came to the

irrigated plots, almost on a daily basis and held both individual and group discussions.

As with Tagarika, credit facilities were made available to all those involved in irrigation agriculture. Again, there was a special credit scheme designed for the project. The availability of credit facilities did not necessarily imply greater access for women in general. It implied greater access for household heads. There were hardly any women spouses that applied for and were granted credit. Because loan sizes or seasonal inputs were mainly determined by the size of plot and the quantity of recommended input ratios, most households did not see any advantage in submitting separate requests. In addition, the question of marketing which was linked with credit influenced the decision on who would apply for loans. It is important here to note that there is no law or regulation that precludes women from obtaining agricultural loans. Basically there is no special type of collateral required except a good recommendation from extension offices. In fact, almost all irrigation farmers qualify for loans except those with a poor repayment record. However, there are other barriers to women's access. These may either be social, cultural or institutional.

The marketing of major crops was male dominated. It was done through the central marketing boards which only purchased from registered sellers. A very small proportion of the women were registered.

Women, however, dominated the marketing of vegetables and poultry products. This activity could either be undertaken around or away from home. The marketing away from home normally took place on days that were designated as resting days i.e. when people were not supposed to work in the fields. Marketing activities frequently took women and children to rural service centres, bus stops or major roadsides where they spent most of the day selling their produce while at the same time tending children and either knitting, sewing or doing basketry. After they completed selling their produce, they also purchased their requirements from shops or other women. Frequently, a number of activities were carried out simultaneously.

The above was equally true in cases where the selling of produce took place around the home. Women, who were primarily responsible for this type of marketing, continued with their household chores and only broke to serve customers. Such marketing activities did not interfere much with women's household chores.

There were hardly any public marketing facilities provided for such activities except for the market stalls made available at the rural service centres. The bulk of the micro-level buying and selling was carried out under makeshift conditions. Some of the women interviewed preferred to continue marketing their vegetables and poultry products informally because they liked the flexibility it allowed them.

However, those who wanted to expand their marketing felt that

facilities needed to be improved to become more formal. They wished to see facilities similar to those provided at service centres, duplicated at village level, to allow people coming from outside the irrigation scheme, easier access to produce on sale. This point was reiterated by those women who cultivated vegetables on the 0.1 hectare vegetable garden.

It is important to note that women's high rate of involvement in market gardening is not only unique to Mushandike. According to Rukuni "A similar trend was recorded in Zimbabwe were women are more actively involved in "comma-hectare" schemes, tilling 0.1 to 0.3ha of irrigated vegetables". (Rukuni, 1989).

While women played their part in marketing, it was not very clear as to what influence they exercised in the disposal of proceeds from their marketing activities. Over 70% of them revealed that they retained some of the money earned from marketing vegetable garden and poultry products. This money was used to purchase day-to-day household items. The rest of the earnings were brought into the other household income. The average household annual income at Mushandike was $3000. In most cases, money earned from the informal marketing activities was not included. The same was true for income from non-farm sources. Furthermore, food retentions for household consumption were not included. The average net income figure only represents that income earned from commodities marketed through formal marketing channels. Despite this gross underestimation of their income, Mushandike farmers still faired very well, compared to their counterparts in

Tagarika, whose net income was $815.40. This average net income for Tagarika was from dryland farming only since they had not harvested their first irrigated crop. Mushandike farmers also compared favourably with low income wage earners in the industrial sector, whose minimum wage was then at $2,500 per annum. Considering that Mushandike households, did not have to purchase most of their basic food requirements, their net income of $3,000 per annum placed them in a position where they would still compare favourably with industrial employees earning $6,000 per annum. Note that these irrigation farmers did not incur such costs as accommodation rentals, rates, transport to work etc.

WOMEN HEADED HOUSEHOLDS

Women heads of households were in a special situation. They had complete control over the production, consumption and marketing of their crops. Unlike those in communal areas who tended to consult their male kin, either brothers, uncles or brothers-in-law, in case of widows, those at Mushandike irrigation scheme did not have such members of the extended family to turn to. They would occasionally seek advice from male colleagues, but the extent to which they did so was very limited. They frequently made their decisions on their own or sought technical assistance from extension workers or other development agents.

As shown in Appendix 2, women heads of households were relatively older than the married women. Their average age was 43.13 years, while that of women in general was 37 years. The average age of married women was even lower than thirty-seven. The relatively higher average age of women heads of households granted them a

higher status in the community. Traditionally, in most parts of Zimbabwe, it was the general practice that the older a woman was, the more recognition she got from other members of her community. Furthermore, the older a woman was, the more likely she was to have adult children, who elevated their status.

On the whole, women headed households did not appear to be disadvantaged in relation to male headed ones. In terms of their income from the major crops, women headed households faired reasonably well. The minimum net income recorded for women headed households was $810.45 while the maximum stood at $ 5 102.45. For male headed households, the minimum and maximum were $1225 and $6,455 respectively. Incomes for women headed households were relatively lower than those of male ones. However the differences were not vast. A partial explanation for these income differentials was that, in women headed households, labour demands were concentrated on fewer people. The fact that there was only one, instead of two or more adults implied a disadvantage. In other words, women heads of households did not have an other adult spouse with whom they could share their work.

The standard deviation for incomes earned by women households is relatively high, giving the impression of greater disparities in this group. A word of caution here. The figure $1 617,55 for the standard deviation, in this case exaggerates the disparities because of the very small size of the sample. Out of the sample of thirty households, only seven were headed by women and the rest, twenty-three, by men. A larger sample of women headed

households might have displayed a smaller variation.

On the higher incomes earned by some women headed households, it appeared that remittances from adult offsprings in wage employment, contributed significantly. The woman with the highest income was being assisted in the purchase of seasonal inputs and paying for hired labour by her children. This meant that her credit requirements were not very high, and thus, her input costs appeared lower.

Children in wage employment, tended to pay more attention to the needs of the parents, where there were either widows, divorcees or unmarried. In male headed households, the assumption was that they could manage. This sympathetic attitude of adult children towards their mothers put a lot of women heads of households in favourable positions. This, and the fact that they controlled their productive resources, precluded such women from the group of the most disadvantaged residents of the irrigation scheme.

Higher incomes tend to benefit whole households in general. Some people have argued that they benefit men only. Such an argument assumes that women have no control, whatsoever, over the household income because they do not have any decision making power. This may be true for some households, just as it could be true for some urban households. For the majority of households at Mushandike, husband and wife tended to consult each other on the disposal of their income from the major crops. Decisions to make certain investments, to purchase luxury items

and save, were often made jointly. In most cases the husband was allotted a certain amount as pocket money while the wife exercised a great deal of freedom with the money earned from poultry products and market gardening. That was women's major source of pocket money. 87% of the households had an average of twenty-eight chickens which provided eggs, meat and manure, mainly used in the vegetable gardens. The relatively high incomes from the major crops gave women more access to and control over a substantial part of the household income.

The situation was not quite the same for all types of households. Women in the few polygamous situations did not have the same access to and control over resources as those in monogamous marriages. The different wives had varying decision-making influences. What was common was for the senior wife to be consulted by the husband. They would make some of the major decisions jointly and then relay them to the junior wives. However, income from market gardening and poultry products was controlled by all wives. Each one worked her small piece of land, marketed her produce separately, and retained the proceeds for her personal use, which included purchase of household items. On the whole, the increased household incomes from irrigation agriculture benefitted women and men.

The introduction of beans as one of the major irrigated crops contributed towards an improved nutritional status. Not all the beans produced on the scheme were marketed. Approximately 52.4% of the beans produced were retained for domestic consumption.

The average output was seven bags so that households retained an average of 3.58 bags of beans. It is important to note that these were dried beans retained after harvesting. Some of the beans were consumed fresh, before harvesting. This ensured a reasonable supply of protein.

Carbohydrate requirements from their staple maize were also adequately met from own production. The average output for the year 1988 was 45 bags of which 70% or 32 were marketed. The rest about 13.5 bags were retained for own consumption[1]. Wheat production averaged 52 bags of which 83% were marketed. The level of wheat consumption was not as high as that of maize. In fact most households preferred to market the wheat, earn money and then purchase bread. Wheat was the highest money earner, bringing in an average of $1401.5, with cotton coming second at an average of $1200, beans at $744 and then maize coming last at $509. These figures represent gross incomes from the respective crops. (Appendix 7)

The average cost of all inputs was $840. There was a great deal of variation in input use with the minimum input cost at $444 while the maximum stood at $2,694. This variation in input use also manifested itself in income differentials. The minimum annual income was $849 while the maximum was $6,455. Already, the processes of social differentiation were apparent, supporting the common argument that commercialisation in agriculture results in greater social differentiation.

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[1]See table on Appendix 7.

Despite some of the negative effects of irrigation i.e. increased workloads, exclusion from decision making bodies such as village committees and reduced security in landholding, women felt that on the whole, their lives had improved since they joined the irrigation project. The increased incomes gave them better lives since they could purchase a lot of the luxury items that they could not afford when they were dryland farmers.

Women at Mushandike expressed their concern about inadequate health facilities. The whole of Mushandike resettlement scheme, fifteen villages, was serviced with one clinic, At the time of data collection, there was no qualified medical person to man the clinic. The health situation was particularly problematic because of the prevalence of malaria carrying mosquitoes whose populations were increased by the open canals which provided suitable breeding places. Due to the absence of medical people, it was not possible to obtain statistics on the incidents of malaria. It was thus difficult to assess the full impact of water related diseases. Such statistics would be useful in attempting to understand the impact of irrigation development on women, because in most cases the sick members of a household are looked after by women. It is the women who take children and other adults to the hospital. It is the women who stay up at night nursing sick children. In fact they play the roles of nurse and doctor, because it is often they, who go out to look for medicinal herbs in the woodlands. These household health demands place an extra burden on women's labour time. The slow progress in provision of medical facilities has thus hitting

women the most. In some cases, women had to walk distances of up to five kilometres, with babies on their backs, in an effort to get medical attention for their children. This was made more difficult by the fact that the bus service in the area was not adequate. Public transport was an area that required some attention.

CONCLUSION

The initial conclusions that could be made for Tagarika were that irrigation agriculture placed greater demands on women's labour time. Because crops were grown throughout the year time allowed for other activities was greatly reduced. The age structure of the household members was unfavourable in that the proportion of children that could contribute to agricultural work was small.

Men demonstrated a relatively high level of involvement in all agricultural tasks. This was one of the positive features observed. Coupled with easier access to agricultural support services, this appeared to motivate women to persevere because they were hopeful of the potential benefits. The erosion of women's land rights and their exclusion from decision making bodies, did not take precedence over their desire to increase returns to their labour. Women appeared to shelve these issues while concentrating on learning more about the new agricultural practices.

Mushandike irrigation scheme which had been established for a longer period, allowed researchers to come up with some

conclusions which may require further testing. A positive major conclusion was that irrigation development raised levels of income for the rural people, and this tended to benefit households in general and not particular members. Women gained control of a proportion of the income. In addition, greater income differentials were surfacing. An annual income range of $1,000 to $6,500 was recorded for the Mushandike sample. Gross incomes were very much higher.

The level of women's participation in decision making at village level followed a similar pattern as that at Tagarika. The conclusion on this issue was that because of the erosion of their land rights, women's decision making rights were also being eroded. Another factor which might have been partly responsible for women's exclusion was their lower average age. It was not common practice for women of child bearing age to play a leading role in local politics.

It appears that once the question of women's relationship, vis-a-vis land is settled, other issues have their own rights to land they should be able to easily access agricultural support services which include credit, extension, training courses and marketing.

In terms of technology, there were not that many changes that were taking place other than the irrigation technology itself. As indicated earlier women were learning about irrigation techniques almost at the same rate as men. The only difference

was observed at Mushandike where some of the farmers, mainly men, were selected for special training courses.

RECOMMENDATIONS

Based on data collected from both Mushandike and Tagarika, this study make the following suggestions:

1) The situation of women at Tagarika could be improved if irrigation agriculture was not combined with dryland farming. Women would be able to allocate their labour time more efficiently if their irrigated plots were increased in size and they gave up dryland farming. This would also benefit men. This suggestion comes out of observations made in a short period of time. The complementarity or conflict between rainfed and irrigation agriculture is an issue that requires further investigation.

2) Land Registration guidelines need to be modified to ensure women's security. This is not necessarily to suggest joint or individual registration. It is beyond the scope of this study to do so.

3) Although agricultural support services are reasonably available, there is an urgency for strengthening socio-economic services such as health facilities, marketing, transport etc.

4) Strengthening women's organisational capacities could enable them to communicate their views and problems more effectively. Their expressed needs may thus be addressed.

5) There is an unquestionable need to provide day care facilities for children to allow mothers to carry out their tasks without worrying about tending children. The high demands on women's labour time are sufficient reasons for the establishment of such facilities.

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APPENDI

AGE G

0-15
16-30
31-40
41-50
50-75

AGE G

0-15
16-30
31-40
41-50
50-75

APPENDIX 1

****
TAGARIKA FEMALE/MALE AGE GROUP PERCENTAGE RATIOS
****

AGE GROUP	FREQUENCY			PERCENTAGE	
	WOMEN	MEN	TOTAL	WOMEN	MEN
0-15 YEARS	51	58	109	46.8	53.2
16-30 YEARS	51	44	95	53.7	46.3
31-40 YEARS	15	18	33	45.5	54.5
41-50 YEARS	12	7	19	63.2	36.8
50-75 YEARS	5	9	14	35.7	64.3

****
MUSHANDIKE FEMALE/MALE AGE GROUP PERCENTAGE RATIOS
****

AGE GROUP	FREQUENCY			PERCENTAGE	
	FEMALE	MALE	TOTAL	FEMALE	MALE
0-15 YEARS	64	57	121	52.9	47.1
16-30 YEARS	51	42	93	54.8	45.2
31-40 YEARS	15	7	22	68.2	31.8
41-50 YEARS	8	11	19	42.1	57.9
50-75 YEARS	6	6	12	50.0	50.0

APPENDIX 2

****
MUSHANDIKE SURVEY
****

AVERAGE AGE OF WOMAN HEAD OF HOUSEHOLD	43.13 YEARS
PERCENTAGE OF WOMEN OVER 18 YEARS	52.54 %
PERCENTAGE OF MEN OVER 18 YEARS	47.46 %

APPENDIX 3

TAGARIKA/MUSHANDIKE SURVEYS
****

	MUSHANDIKE	TAGARIKA
**********		
ASSET OWNERSHIP STATISTICS		
**********		
AVERAGE NO. OF HUTS	2.6	2.50
AVERAGE NO. OF HOUSES	2.0	0.85
AVERAGE NO. OF STORE-ROOMS	1.05	1.19
% OF PLOUGH OWNERS	90.00 %	96.20 %
% OF NON-PLOUGH OWNERS	10.00 %	3.80 %
% OF CULTIVATOR OWNERS	16.70 %	53.80 %
% OF NON-CULTIVATOR OWNERS	83.30 %	46.20 %
% OF SCOTCH-CART OWNERS	80.00 %	69.20 %
% OF NON SCOTCH-CART OWNERS	20.00 %	30.80 %
% OF WHEEL-BARROW OWNERS	66.70 %	61.50 %
% OF NON WHEEL-BARROW OWNERS	33.30 %	38.50 %
**********		
LIVESTOCK OWNERSHIP		
**********		
AVERAGE NO. OF GOATS	7.00	4.12
AVERAGE NO. OF CHICKENS	27.50	13.54
AVERAGE NO. OF PIGS	00.00	1.23

APPENDIX 4

****
MUSHANDIKE AND TAGARIKA SURVEYS
****

	MUSHANDIKE	TAGARIKA
FARMERS WITH DRAUGHT POWER	86.7 %	100.00 %
FARMERS WITHOUT DRAUGHT POWER	13.3 %	0.00 %
FARMERS USING HERBICIDES	15.4 %	7.70 %
FARMERS NOT USING HERBICIDES	84.6 %	92.30 %
FERTILSER PROPORTION SPENT ON MAIZE	21.08 %	56.22 %
INPUTS COSTS PROPORTION SPENT ON WHEAT	44.50 %	0.00 %
AVERAGE NET INCOME	$2 987.80	- $814.50

APPENDIX

LAND PRE
MANURING
PLANTING
FERTILISE
SPRAYING
WEEDING
HARVESTI
PROCESSI

APPENDIX 5

****
TAGARIKA FEMALE/MALE LABOUR INPUTS STATISTICS
****

	PERCENTAGE PROPORTION INPUT BY:	
	WOMEN	MEN
LAND PREPARATION	25.21	74.79
MANURING	47.50	52.50
PLANTING	55.79	44.21
FERTILISER APPLICATION	51.89	48.12
SPRAYING	44.02	55.98
WEEDING	44.93	55.07
HARVESTING	49.44	50.56
PROCESSING	42.02	57.98

APPENDIX 5

****
TAGARIKA FEMALE/MALE LABOUR INPUTS STATISTICS
****

	PERCENTAGE PROPORTION INPUT BY:	
	WOMEN	MEN
LAND PREPARATION	25.21	74.79
MANURING	47.50	52.50
PLANTING	55.79	44.21
FERTILISER APPLICATION	51.89	48.12
SPRAYING	44.02	55.98
WEEDING	44.93	55.07
HARVESTING	49.44	50.56
PROCESSING	42.02	57.98

APPENDIX 6

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MUSHANDIKE FEMALE/MALE LABOUR INPUTS STATISTICS
****

	PERCENTAGE PROPORTION INPUT BY:	
	WOMEN	MEN
LAND PREPARATION	39.32	60.68
MANURING	33.33	66.67
PLANTING	48.53	51.47
FERTILISER APPLICATION	32.50	67.50
SPRAYING	34.49	65.51
WEEDING	54.22	45.78
HARVESTING	51.22	48.78
PROCESSING	47.84	52.16

APPENDIX 7

****
MUSHANDIKE/TAGARIKA INCOMES PER CROP
****

	GROSS INCOME ($)	INPUT COSTS ($)	NET INCOME ($)
MUSHANDIKE			
**********			
MAIZE	508.67	48.82	459.85
BEANS	744.43	50.51	693.92
WHEAT	1 401.57	135.25	1266.32
COTTON	1 200.63	43.56	1157.07
TOTAL	3 855.30	278.14	3 577.16
******			
TAGARIKA			
********			
MAIZE	425.43	86.18	339.25
GROUNDNUTS	24.63	12.00	12.63
ROUNDNUTS	77.00	00.00	77.00
SORGHUM	210.00	00.00	210.00
RAPOKO	37.50	00.00	37.50
SUNFLOWER	73.10	00.00	73.10
TOTAL	847.66	98.18	749.48

APPENDIX B

****
CROP OUTPUT STATISTICS
****

AVERAGE MAIZE BAGS HARVESTED	44.53		72.10	
AVERAGE WHEAT BAGS HARVESTED	51.57		00.00	
AV. COTTON BALES HARVESTED	8.98		00.00	
AV. G/NUTS BAGS HARVESTED	0.00		6.71	
AV. MILLET BAGS HARVESTED	0.00		6.00	
AV. ROUNDNUT BAGS HARVESTED	0.00		5.25	
AV. SORGHUM BAGS HARVESTED	0.00		17.00	
AV. RAPOKO BAGS HARVESTED	0.00		7.18	
AV. SUNFLOWER BAGS HARVESTED	0.00		6.50	
MAIZE PERCENTAGE MARKETED	70.10	%	59.89	%
WHEAT PERCENTAGE MARKETED	82.66	%	00.00	%
COTTON PERCENTAGE MARKETED	100.00	%	00.00	%
G/NUT PERCENTAGE MARKETED	0.00	%	28.03	%
MILLET PERCENTAGE MARKETED	0.00	%	50.00	%
ROUNDNUTS PERCENTAGE MARKETED	0.00	%	33.62	%
SORGHUM PERCENTAGE MARKETED	0.00	%	55.56	%
RAPOKO PERCENTAGE MARKETED	0.00	%	42.33	%
SUNFLOWER PERCENTAGE MARKETED	0.00	%	47.24	%

APPENDIX 9

****
CROP OUTPUT AVERAGE QUANTITY HARVESTED & RETAINED
****

	M U S H A N D I K E		T A G A R I K A		
CROP	TOTAL	RETENTIONS	TOTAL	RETENTIONS	UNITS
Maize	44.53	13.53	72.10	26.39	bags
Cotton	8.98	0.00	0.00	00.00	bales
Groundnuts	0.00	0.00	6.71	3.73	bags
Wheat	51.57	6.97	0.00	0.00	bags
Millet	0.00	0.00	6.00	3.00	bags
Beans	7.02	3.68	0.00	0.00	bags
Roundnuts	0.00	0.00	5.25	2.57	bags
Sorghum	0.00	0.00	17.00	8.00	bags

APPENDIX 10

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MUSHANDIKE AVERAGE NET INCOMES (in ZIM $)
****

	AVERAGE	STD DEV	MINIMUM	MAXIMUM
WOMEN HEADED HOUSEHOLDS	2653.06	1617.55	810.85	5102.45
MALE HEADED HOUSEHOLDS	3109.77	1019.53	1225.00	6455.00