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THE IMPACT OF VILLAGE
WATER SUPPLIES IN BOTSWANA

A STUDY OF FOUR VILLAGES.

MMATHETHE

MODIPANE

SOJWE

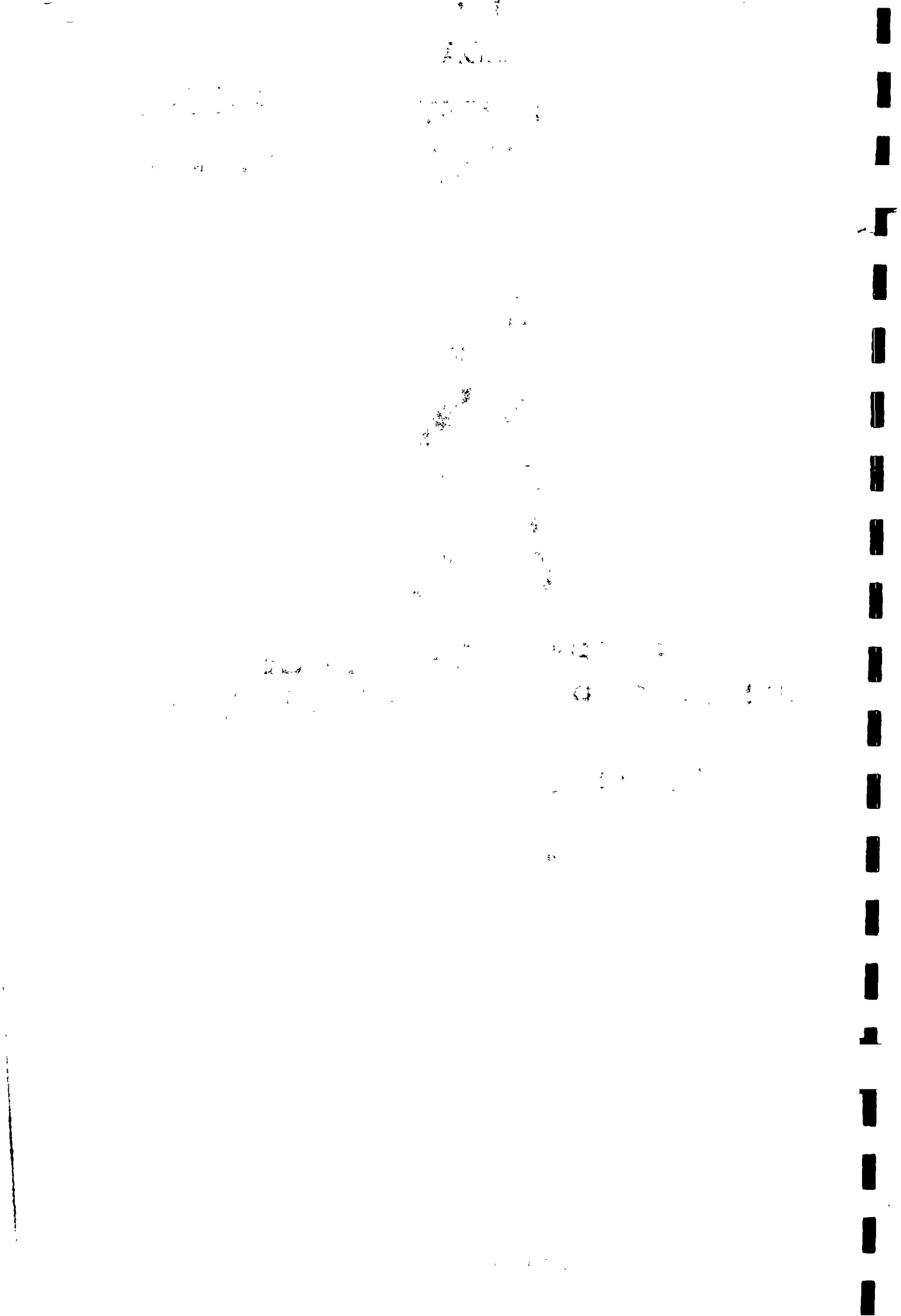
TSAMAYA

Jeanette COPPERMAN

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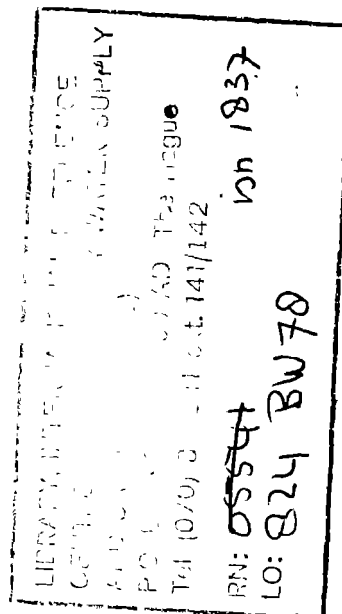
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SEPTEMBER 1978



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PREFACE

The Swedish International Development Agency has been involved in funding the domestic water supply programme in Botswana since 1972. This study was commissioned, in order to gather information about the village level impact of this water supply programme. I would like to thank all the people who have helped with this study, particularly Othata Ramaribana who contributed towards the planning, gathering of information and analysis of data and without whose invaluable help and hard work this study would not have been possible.

I would also like to especially extend my appreciation of the tolerance and help shown by district staff, members of the tribal administration and village extension staff in the four districts we visited.

Thanks also are due to the Department of Water Affairs for lending me an office to work in and to the many people in that Department and in other Ministries and institutions who gave me some of their time, especially Paul Spray who acted as Secretary of the reference group. Final thanks are due to Malcolm Chalmers for editing this report and to Larry Tiernan for helping with the photography.

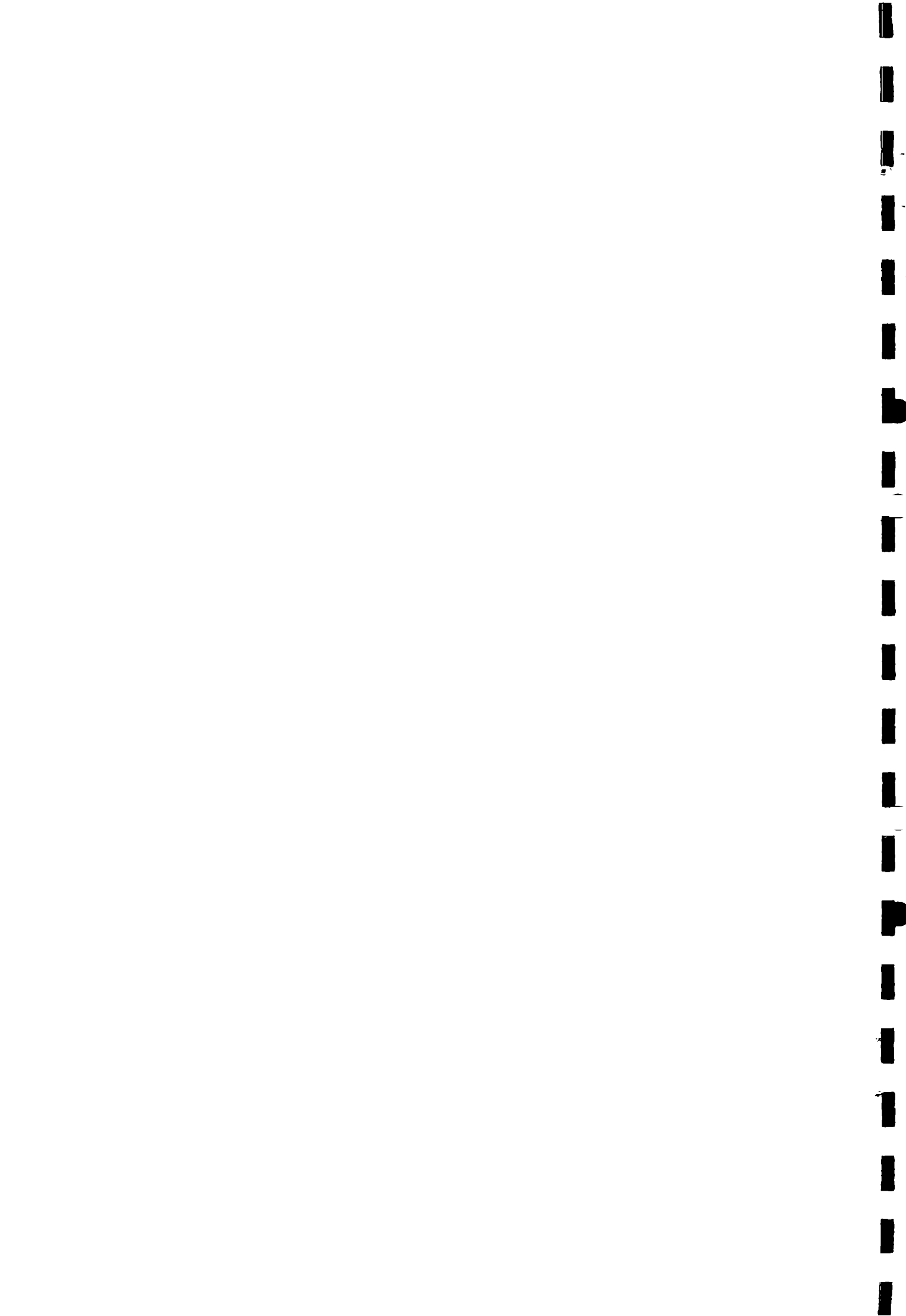
Members of the reference group were:

Paul Spray	-	Secretary, Ministry of Mineral Resources and Water Affairs
Jim Miller	-	Ministry of Local Government and Lands
Nyadze Thipe	-	Ministry of Mineral Resources and Water Affairs
Phillip M. Mauco	-	Rural Development Unit
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Jeanette Copperman

GABORONE
8th October 1978





SUMMARY OF RECOMMENDATIONS

INTRODUCTION

1. Socially and technologically appropriate alternatives to diesel pumps should be investigated for providing water supplies to smaller settlements and lands areas. It should be decided whether lands areas merit an entirely different approach to WB30.

WATER DEMAND AND CONSUMPTION

2. The important daily and seasonal peaks in consumption which we have identified should be taken into account when designing water supplies in order to meet the needs of consumers.
3. The next study should cover both pre harvest and post harvest conditions.
4. Before a borehole is reticulated it should be checked that the water tastes acceptable. Rainwater tanks as a method of providing sweet drinking water could be investigated.

COMMUNITY INVOLVEMENT?

5. (a) The Ministries of Water Affairs, Local Government and Lands and the Districts should decide together what it is realistic for villagers to expect to be given by government and outline that at a consultation meeting to villagers.
(b) Land Boards also need to be given guidelines as to where to advise people to build and still expect to receive services.
(c) Channels for accommodating village initiative towards improving aspects of the water supply can be set up. To do this decisions about the support to be given at each stage by government and Districts need outlining.
6. For smaller settlements alternative smaller scale water supply schemes should be considered. The experience of RIIC can be learnt from and similar pilot studies set up.



(v)

7. In larger villages community involvement and responsibility should be encouraged by putting information about water supplies at community points and giving specific responsibility for some supervisory tasks to the headman, VDC and Councillors.
8. (a) Pumper should be chosen by the community, sent away on a course and receive some community supervision.
(b) Women be encouraged to become pumpers.
(c) Pumpers be given regular leave.
9. Tools to be issued to the pumper for dealing with manageable repairs.

Payment - options for change.

- Abolish P2 water fees - District Councils concentrate on collecting fees from private connections and cattle watering.
- The community contribute towards the diesel, contribution according to the size of the village.

HEALTH

10. Water Affairs have input into the forthcoming environmental sanitation campaign.
11. Villagers views on the provision of a village wash basin for washing clothes should be solicited. The basin to be put in the village at the borehole or wherever Water Affairs and the villagers feel it is appropriate.
12. Family Welfare Educators need to be fully utilised for giving education about water supplies and back-up materials should be available. A campaign approach ought to be considered using utilisation of the water supply as an occasion.



EDUCATION

13. Children should be taken to the borehole and have its workings explained to them.

Water be presented as a scarce resource to be conserved.

A simple pump could be made with them to show the principles of pumping water up from underground.

EMPLOYMENT

14. Alternative methods of establishing cattle watering points outside the village should be considered, together with the support necessary for their construction.



SECTION 1 INTRODUCTION

1. The aims of this study are to look at the general social and economic effects of water supplies on the village populations in Botswana, particularly on women who are the main collectors and users of water.

We have chosen to study rural villages rather than major villages as it was felt that major villages have been looked at in the pre study of Mahalapye and Palapye and will be re-examined again in the follow up study.

We have tried to combine household surveys with open ended interviews, group discussions and participant observation. Our focus has been concentrated on gathering information which is attitudinal in character rather than quantitative. We present this information in a way which allows different people to speak for themselves.

We have aimed to establish in the course of the work:

- (1) Quantitative changes in water demand and consumption with the introduction of a water supply.
- (2) Present problems with the water supplies.
- (3) Benefits of the supply system.
- (4) The impact of the water supply scheme on the social and physical structure of the village.
- (5) Suggestions for complementary inputs which would maximise the benefits of the water supply programme.

1.2 PERFORMANCE OF THE PRESENT STUDY

This study was carried out over a period of three months by the Consultant, and a Botswanan University student, Othata Ramaribana, who was recruited to help with the planning and implementation of the study.

Six weeks were spent in the field work which covered a total of four villages, these were:

reticulated water supply	-	Mmathete (Southern District)
non reticulated water supply	-	Modipane (Kgatleng District)
reticulated water supply	-	Sojwe (Kweneng District)
reticulated water supply	-	Tsamaya (North East District)



Of the two villages in which in depth study was carried out - Mmathete and Modipane - Mmathete already has a water supply and Modipane is scheduled to receive one in the near future. Two weeks were spent in each of these two villages. Sojwe and Tsameya were visited more briefly to gain an overview of the water situation in these two villages. We aimed to choose villages which would give us a wide range of situations; in the patterns of land settlement in the area; the number of inhabitants in the village; and their present level of access to services.

55 household interviews were carried out in the villages and 15 at the cattle post and lands, making a total of 70. 48 youth groups, VDCs and groups of female villagers were also interviewed. Invaluable background information was provided by village extension workers who also helped with interviewing. Help in interviewing from female extension workers was particularly vital whilst holding discussions with groups of female villagers who were clearly inhibited by a male person.



SECTION II

2. BACKGROUND

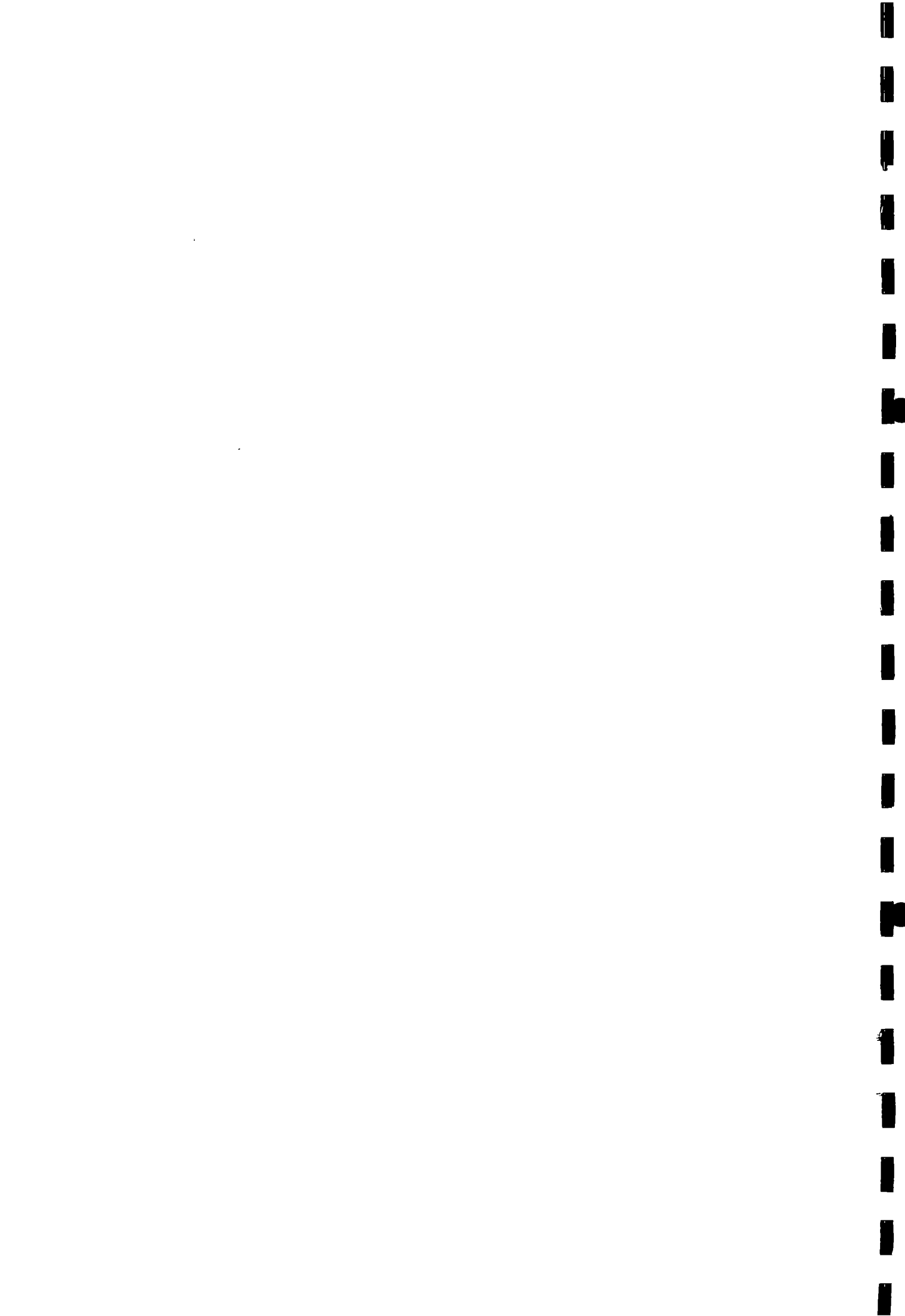
In 1966 when Botswana became Independent it inherited approximately 700 boreholes from the Colonial administration. These boreholes had been drilled and sited by Geological Surveys and then equipped either by contract or by P.W.D. Some of the funds for this drilling came from the Community Development and Welfare Funds, other funds came from contributions made by the communities themselves.

2.1.1 Borehole drilling started in Botswana in 1926 when the first boreholes were drilled by a South African company for the Bakgatla tribe. Chief Isang of the Bakgatla, who was a moderniser, was interested in taking advantage of the new technology to establish reliable water sources. The boreholes were financed by a levy on tribal property, each household had to contribute towards the drilling of the boreholes, and the boreholes were considered tribal property. Each borehole was looked after by a small committee of cattle owners known as a syndicate who contributed equally towards the maintenance and running costs of the borehole and recovered some of their outlay through charging the rest of the community for water - 6d per head per season was charged for a cow and 3d for a goat.

The total number of boreholes drilled in the country is now in the region of 3,400 for government and districts and the same number of successful boreholes registered for private borehole owners. Botswana Preventative Maintenance Scheme looks after approximately 700 boreholes for governmental and district bodies and private borehole owners.

2.1.2 In 1972 the Government of Botswana asked for Swedish assistance to accelerate the expansion of the village water supply programme, bringing major village water supplies under one management and expanding the service to rural areas. The stated objectives of the 5 year water supply scheme were:

- (a) 'to provide water for some 30,000 inhabitants in rural villages;
- (b) provide household water for some 80,000 or more inhabitants of large villages... generally defined as having a seasonal population exceeding 9,000...'



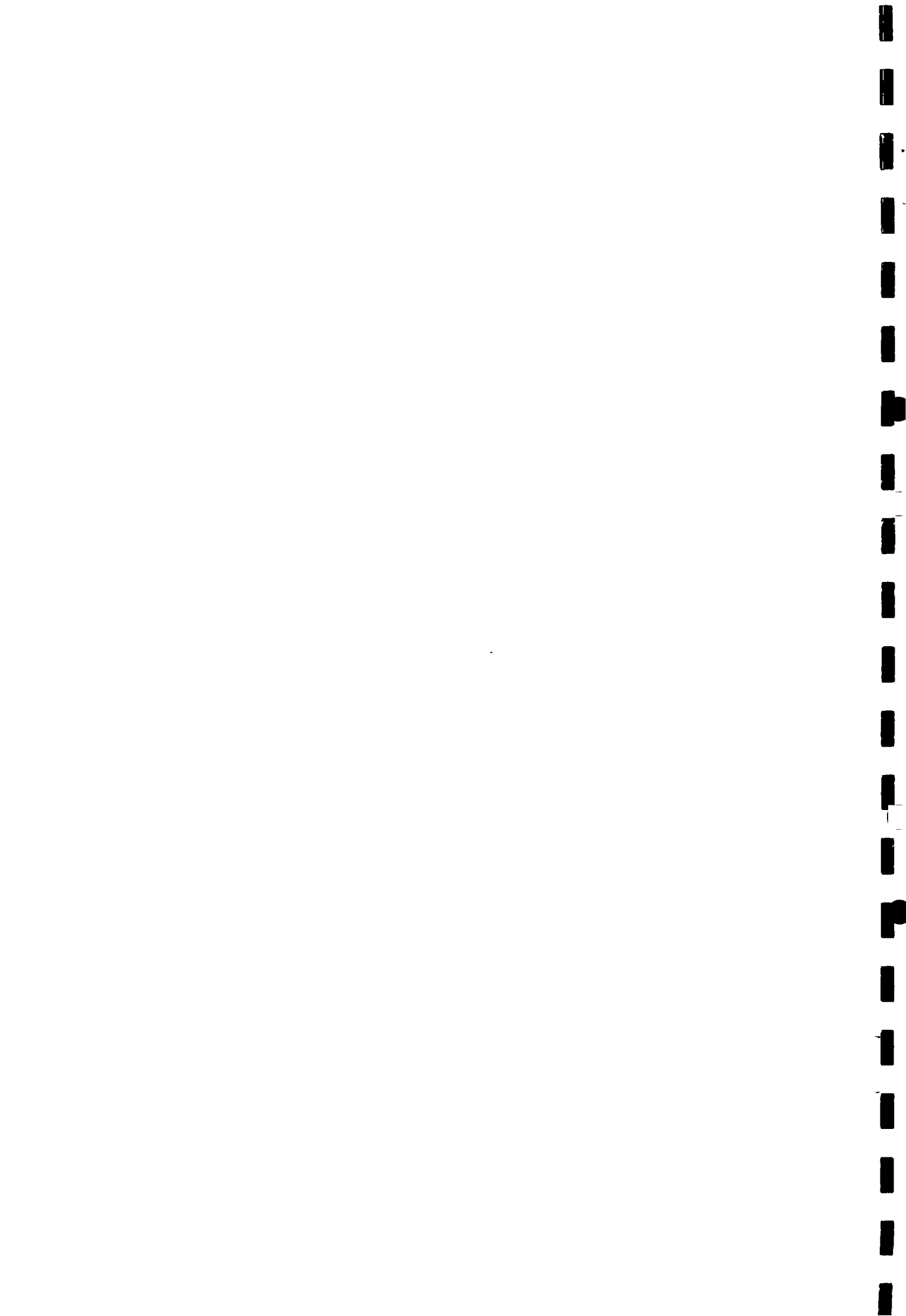
- (c) 'strengthen the capacity of the government departments responsible for the development and management of water supplies.'

This has formed the basis of the present groundwater water supply programme, which is divided into three parts - major village water supplies, rural village water supplies and small village water supplies.

2.1.3 Major Village Water Supplies (WB17) is intended for large villages and falls under the jurisdiction of Water Affairs for maintenance and repairs. There are 16 villages in this programme of which 1 village (Lethlakane) remains to be completed. 17.6% of total population in the country have been covered through WB.17. Several other villages are only partially completed. The aim is to reticulate water to within 400 meters of every household and provide private connections to households willing to pay for them. They have a growth capacity of 40 litres per capita per day. The District Council are responsible for collecting water fees.

2.1.4 Rural Village Water Supplies (WB26) is intended for the installation of water supplies in villages of over 500 population. The aim is also to reticulate water to within 400 meters of each household in the village: 20 litres per capita per day is the consumption rate for growth. On completion the water supplies are handed over at the moment to the District Councils who are responsible for operation, maintenance and revenue collection. The original WB.26 covered 32 villages (with a population of 35,000). Out of these 30 villages have been completed. 5% of the total population are covered in this project. In the extended WB.26 programme there are 64 villages (56,000 people). Water supplies have been completed for 7 villages, 15% of the 56,000 people included in the programme and 1.5% of the total population in the country.

2.1.5 Small Village Water Supplies (WB30) programme was added after the other two programmes and is funded partially by British aid and partially through SIDA. It is designed to serve about 100 small villages with a population of under 500 and usually consists of a borehole and one standpipe in the centre of the village with reticulation to the school and clinic. This scheme is the most far behind in implementation, with 9 villages having been served so far, that is 12% population of the total population to be covered by this programme. There is provision for adding another 150 villages to this programme.



2.2 PRESENT CONCERNS WITH THE PROGRAMME

Most of the major population centres have been provided with water; concern now centres around extending the service to keep up with population growth; adequate maintenance and extension of the supplies; and with the quality of the water being provided in them. The rural village programme is also well underway.

2.2.1 Running and maintaining these supplies has turned out to be a major problem as Councils have inadequate capacity to do this. It was estimated by one District Council that approximately one quarter of their water supplies are not fully functional at any one time. A detailed study of this situation and possible solutions to it is being carried out by Ashford and Miller and is beyond the scope of this report. Unreliability inevitably colours villagers' view of the service they are being given however, and some aspects of maintaining the supply which relate to village control and organization will be discussed later. Small village water supplies are the most behind schedule. There is some trade off between reticulating supplies in larger villages and drilling boreholes in smaller ones as the Department of Water Affairs does not have the capacity to do all this at once.

2.2.2 Although a detailed discussion of water pollution is also beyond the scope of this study, it is important to note that borehole pollution, both bacteriological and chemical, is seen to be an increasingly serious problem with water supplies in Botswana. The problem seems to be mainly due to the proximity of pit latrines and other faecal pollution to the aquifer. One solution to bacteriological pollution is to chlorinate the water. This has no effect on chemical pollution however. To remedy chemical pollution the boreholes should be sited some kilometers from the village. Pollution can be responsible for a whole range of diarrhoeal diseases such as are those being experienced in Mochudi and significantly affects the health benefits which a 'clean' water supply can be expected to bring. Bottle fed babies are particularly vulnerable to those diseases.

2.3 DISTRICT - CENTRE PRIORITIES

Water supplies have had a high priority in all National and District Development plans.* NDP 4 stated that water was an essential infrastructural provision and an 'economic asset'.

* National Development Plan



2.3.1 As part of the preparation for NDP V different districts have submitted plans stating their priorities. The comments of Kgatleng are representative of the comments made by other Districts:

'The availability of water is recognised as perhaps the single most important factor affecting the quality of people's lives in the District'. Water supplies ranked first of 41 priorities. On an overall analysis of the District plans priorities made on a subjective basis by the Ministry of Finance and Development Planning, priority ranking came out as follows:

1st Water Supplies

2nd equal Primary Schools, health, roads

5th equal Industries, cattle, crops, other communications

9th equal Non formal education, secondary schools, vocational training, other social services.

2.3.2 Within the category of water supplies the districts' priorities seemed to be:

- (a) to provide water to places which do not have an unpolluted source;
- (b) to reticulate those which do;
- (c) to increase maintenance capacity of Councils to repair and maintain existing supplies.

Some alternative methods of serving areas were also put up for investigation in some plans:

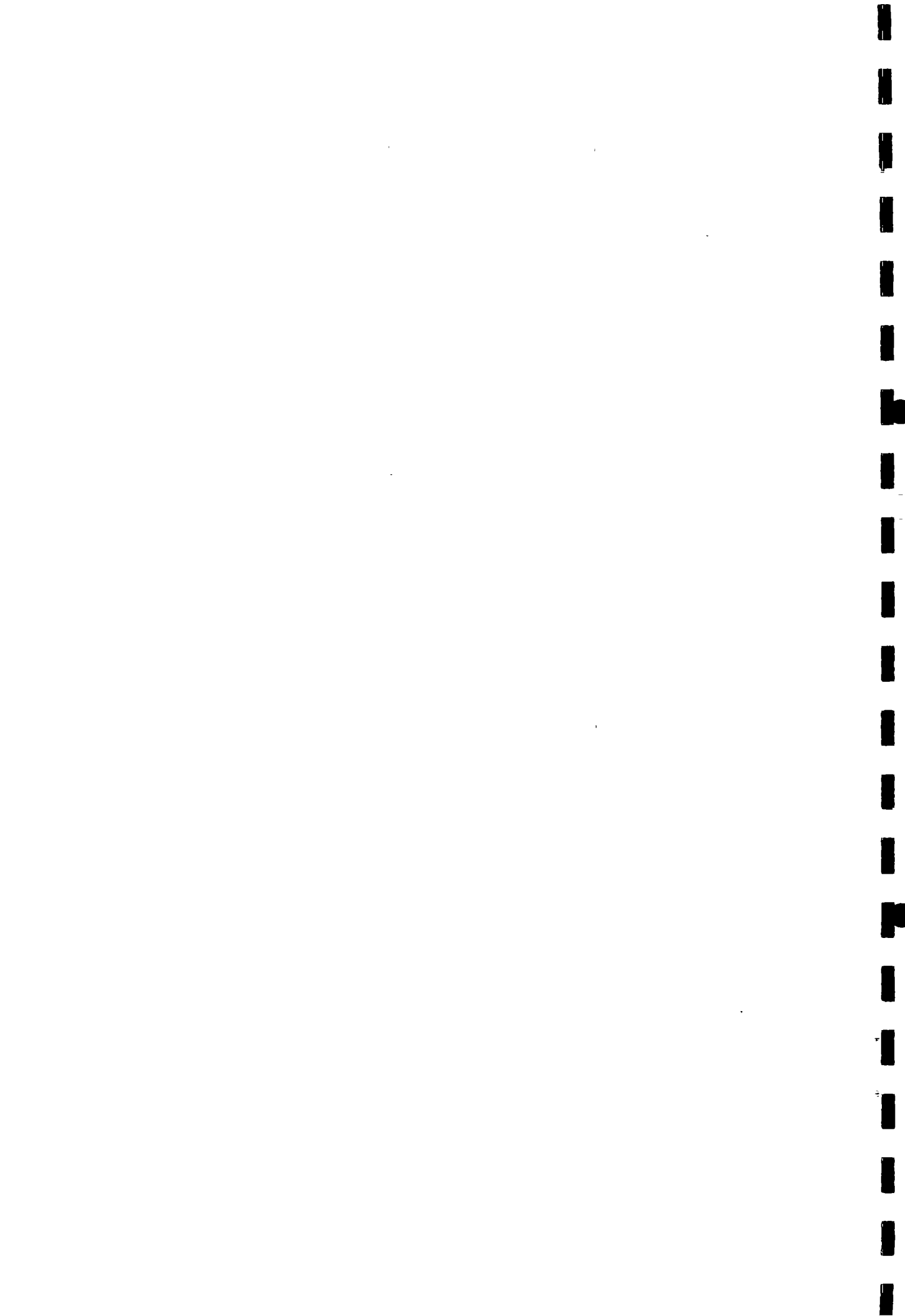
water carriers to lands and cattle post areas (Kgatlang);

de-salinization, purification, hafirs, dams and hauling water with a tank trailer (Southern);

surface water catchment and sand river water extraction (Kweneng).

These three districts also mention water supplies to lands areas as one of the District's priorities.

2.3.3 At the centre, creation of employment in rural areas will be one of the themes of NDP V. ALDEP (the arable lands development programme) will be given high priority as well as infrastructural requirements necessary to facilitate more intensive arable agriculture. Water is one of the top priorities of District Development planning and an indispensable pre-requisite before ALDEP can be fully implemented. The Ministry of Agriculture noted in their keynote paper;



'There are service and infrastructural disincentives at the moment which discourage or even make it impossible for farmers to settle at their lands. Lack of a year round supply of water for human consumption, absence of schooling and health facilities plus tertiary roads are the major constraints faced by arable farmers.'

Water can be seen as an 'economic asset' not just an infrastructural social service provision if it is seen in the light of creating rural employment.

2.3.4 In view of the priority accorded to ALDEP and the Districts' own emphasis on the provision of water facilities to all catchment areas, the following recommendation is made:

RECOMMENDATION 1 to the Ministry of Water Affairs and Mineral Resources
AND SUMMING UP Local Government and Lands
Agriculture

There is going to be an increased demand for provision of water to smaller settlements now that large settlements have already been served. This will be accelerated by the emphasis of the Ministry of Agriculture on improving arable agricultural practices which involves having reliable water sources at the lands. As there will be less overall demand for water in these smaller settlements it is important to look at the viability of alternative methods of meeting the demand for water supplies, which are less capital intensive and more community based than diesel pumps. Experimentation with finding a suitable handpump for Botswanan conditions is already being worked on by Rural Innovations Centre in Kanye together with villagers at Selokolela. There also already exist a number of boreholes in Botswana which have been drilled and abandoned because they are too low yielding to merit diesel pumps. The possibility of equipping these boreholes with another kind of pump such as a handpump or a windmill, should be seriously considered. The Ministry of Water Affairs has already begun to look at some alternatives to borehole drilling



with the suggestion in its keynote paper of a shallow well building unit and by financing experimentation with windmills and bio gas. In view of the small number of people which the WB30 programme is supplying in each village, it is appropriate to think in terms of water supplies involving more community participation and less capital and recurrent costs than they do presently, should this still be technologically appropriate.

Interministerial discussions should decide whether extension of the present WB30 programme is going to be the best programme within which to meet increased demand for water supplies in the lands areas or whether a new programme needs to be created. At the moment lands areas are submitted by the Districts to Water Affairs for provision of water supplies under the WB30 programme.



SECTION III

VILLAGE LIFE

3. In order to understand the impact of water supplies on villagers in Botswana, it is important to see water within the general context of 'development' and the fundamental changes taking place within village life today. The particular ways in which these changes have affected women, the group most directly affected by the water programme, should also be examined.

3.0.1 In the past in Botswana, life was well organised with tribal leadership being the most important village authority. On disputes, decisions would be taken by the village headman with the advice of some of his kinsmen and sometimes the participation of other men in the village. If the case could not be settled at ward level, it was taken to the village authority, if it could not be settled there it would be taken to the paramount chief in the tribal capital.

TRADITIONAL WATER MANAGEMENT

3.1 Disputes over water rights were some of the cases which were settled in this way. Water has traditionally been a determining factor in establishing land settlement and land ownership in Botswana, a largely waterless country. Consequently it has been important to establish common law ownership of the water source in the area, as in an unfenced country it has been access to water which has been the deciding factor in who settles in an area and under what terms. Water rights were carefully allocated according to ward by the paramount chief. Kgatleng District is one example of how this system used to work-different wards in Mochudi were allocated spots along the Notwane River to which they could take their cattle to drink, digging wells communally or individually. This system was intended to minimise disputes over well rights.

3.1.1 The following account is an extract of the history which was given to us by the headman at Shade Shade in Kweneng District. It illustrates how his family established the first man made water source there:

'.....we were Botlanka (hereditary servants) of Chief Sechele. We used to stay at Botlapatlau and drink from the Lehpepe River when the pans in Sojwe went dry. Later my uncle dug a small well in Shade Shade and we moved this way bringing some people with us. Wells were also dug in Sojwe at about that time. In 1952 the



government dug the present borehole then we paid 5T per cow to the government. My uncle used to charge people 1 cow every 2 years to drink from his well. People coming with buckets were not charged for water. Government gave the borehole to a syndicate in 1966, they paid 160 Pula for it and went on paying more small sums of money - how much I do not know. We are living here all the time now, we have cattle here, lands and also a school. We would like Council to drill the syndicate another borehole and use this one for domestic use; the cattle could go to a borehole outside the village.'

The Kgotla meeting is the traditional place for discussing village politics and making decisions which affect people in the village. This sort of communal organisation used to be drawn on for the organisation and management of water supplies.

3.1.2 The running and maintenance of the water supplies was dealt with by making the responsibility for these tasks specific to a syndicate in the village. The syndicate were either chosen at a Kgotla meeting or appointed by the chief. They were in charge of keeping the supply going and were allowed to recover some of their outlay by charging water fees. This system of management was employed for most boreholes in Botswana.

3.1.3 The pumper in Mmathete, who had lived in the village all his life, described the procedure as follows for the two tribal boreholes that were drilled near the village:

'A lebatla (public meeting) was called by the chief to hand over the boreholes to the village (in another version of the story the chief appointed the syndicate members himself in Kanye). He told us to elect two syndicates one to run the borehole which now belongs to Council and one to run the borehole which is now used for cattle watering. To belong to the Council borehole syndicate a person paid 5 pounds (10 Pula) to become a member. To join the other syndicate cost 20 pounds (40 Pula). The chief did not tell them a price, they themselves made it high so they shouldn't be a large group. Many people belonged to the first syndicate and it was difficult to manage as there were so many people. The syndicate was elected by the whole village but they felt that the borehole belonged to them. People used to pay 50T per yard for household water, but they complained that they were not getting enough water



and that they shouldn't be using the same borehole with cattle. They complained to Council and they asked Council to take it over. Council took it over and sent me for training, when I got back I found the syndicate had taken the keys of the borehole. They said that Council had not compensated them for taking the borehole..... when we got the keys back there was no diesel for the engine so the people in the village decided to contribute one shilling (10T) to buy oil and diesel until Council would bring some more.....'

The syndicate in this case obviously had its own management problems.

PRESENT DAY VILLAGE AUTHORITY

3.2 This situation in which values were fixed and the rules were known, where everyone had a distinct role to play in relation to village life has changed into a much more fluid, more confused one. Tribal authority has diminished and the increasing importance of the cash economy has meant new values replacing the old ones in life. These changes have produced a series of conflicting demands which it is impossible for people to resolve. In order to meet the demands of modern living - school fees, clothes, tea, sugar, blankets, a cash income is necessary and this usually has to be sought outside the village, especially for people with no cattle to sell. The new elite in the village are the extension workers who have 'been to school' and have a steady income. As tension grows between the young and the old, men and women, educated and non educated, the traditional ways (tša Setswana) and the modern ways (tša makgoa lit. the stranger), there is a breakdown in village authority and leadership.

3.2.1 One woman described the way in which she saw some of the differences between life today and life before as follows:

'There is no proper farming these days, in the past there was a lot of rain unlike now. These days there are no prayers for rain at the Kgotla the chiefs used to make rain, they would hide to make it whilst all sorts of witchcraft went on. This no longer happens due to this development. These days even if a chief calls a meeting people don't turn up due to this development. Women did not attend Kgotla meetings before, they were only allowed to attend during prayers for rain. Even though women go now to the Kgotla they don't contribute very much. They are not used to speaking that is why they don't say much.....If you ask me about my life I can tell you that I have had 5 children, 3 women and 2 men. One of my sons



often goes to work in South Africa, the elder son no longer works, he has had a pain and has not worked since then. One of my daughters is a teacher, the other one just stays at home, she isn't working, she isn't married she just stays with us. The youngest daughter stays at Kangwe where we have our lands, she stays there all the time.'

3.2.2 The problem of poor attendance at Kgotla meetings was often mentioned by extension workers and villagers. It is difficult to secure co-operation between the VDC (Village Development Committee) - the new democratically elected committee in the village, the traditional headman, the councillors and the extension workers. The experience quoted by the headteacher in Modipane illustrated this difficulty:

'The VDC is very weak here, there is not a single club in this village.....when the chairman of the VDC tries to do something the headman says you want to be the headman now. He comes drunk and chases people away although he has been told about the meeting in time.'

3.2.3 The VDC, the headman and the Councillors are usually the village representatives responsible for advising Water Affairs on the placing of standpipes in the village. Interviewees in the villages were asked if they knew the VDCs and the Councillors (everyone knew the headman), the results showed the following:

In Mmathete out of 25 households (village, cattle post and lands), 19 knew the Councillors and 12 knew the members of the VDC. In Modipane out of 25 households (village, lands) 6 knew the Councillor and 17 claimed to know the VDC. The disparity between the numbers of people who knew the Councillor in Modipane and in Mmathete can probably be explained by the fact that the Councillor for Modipane is resident in Oodi. A non resident Councillor was cited as one of the problems with village development in Modipane.

3.2.4 We met the VDC and interviewed them in Mmathete, after several attempts. In Modipane we were unsuccessful through successive misunderstandings concerning them, us and the headman. Self help projects seem to have been largely in abeyance in Modipane, Mmathete and Sojwe since the ending of Inelegeng (food for work). In Tsamaya there appeared to be more village co-operation stimulated by a strong, well respected, authoritarian chief.



WOMEN AND DEVELOPMENT

3.3 As women are the group responsible for household water collection and use, it is important to look at how these changes in village life have affected them in particular. The female respondent quoted in the previous section went on to say:

'I went to school when I was young for a short time, way in the past, but I only learnt to read and write. In those days parents were only concerned with being able to read and write especially to be able to write letters. Parents want to send their children to school now so that they can cope with this modern life. My children's lives are different from mine, especially those children who are educated, for instance my daughter who is a teacher. It is good for a woman to work for herself but it is also good for her to get married. Young people do not seem to want to be married, they go to the towns. Gaborone is a place of 'makgoa'. Women work very hard nowadays: In the past a woman was like a delicate glass of tea, but these days women work very hard, they are even expected to plough for themselves, but development has helped us a lot, we have a clinic and a school in the village now.'

The ambivalence which this old woman feels towards the new way of life comes out in some of the contradictory statements she makes.

3.3.1 Women in Botswana carry heavy psychological, economic and physical burdens. Roughly one third of the male labour force is migrant to South Africa, mainly to the mines. This leaves many women struggling to raise a family on their own, dependant on erratic remittances, their family and the limited job opportunities available. When seeking employment women tend to be in a disadvantageous position, as B. Brown pointed out in her study of women in Kgatleng District:

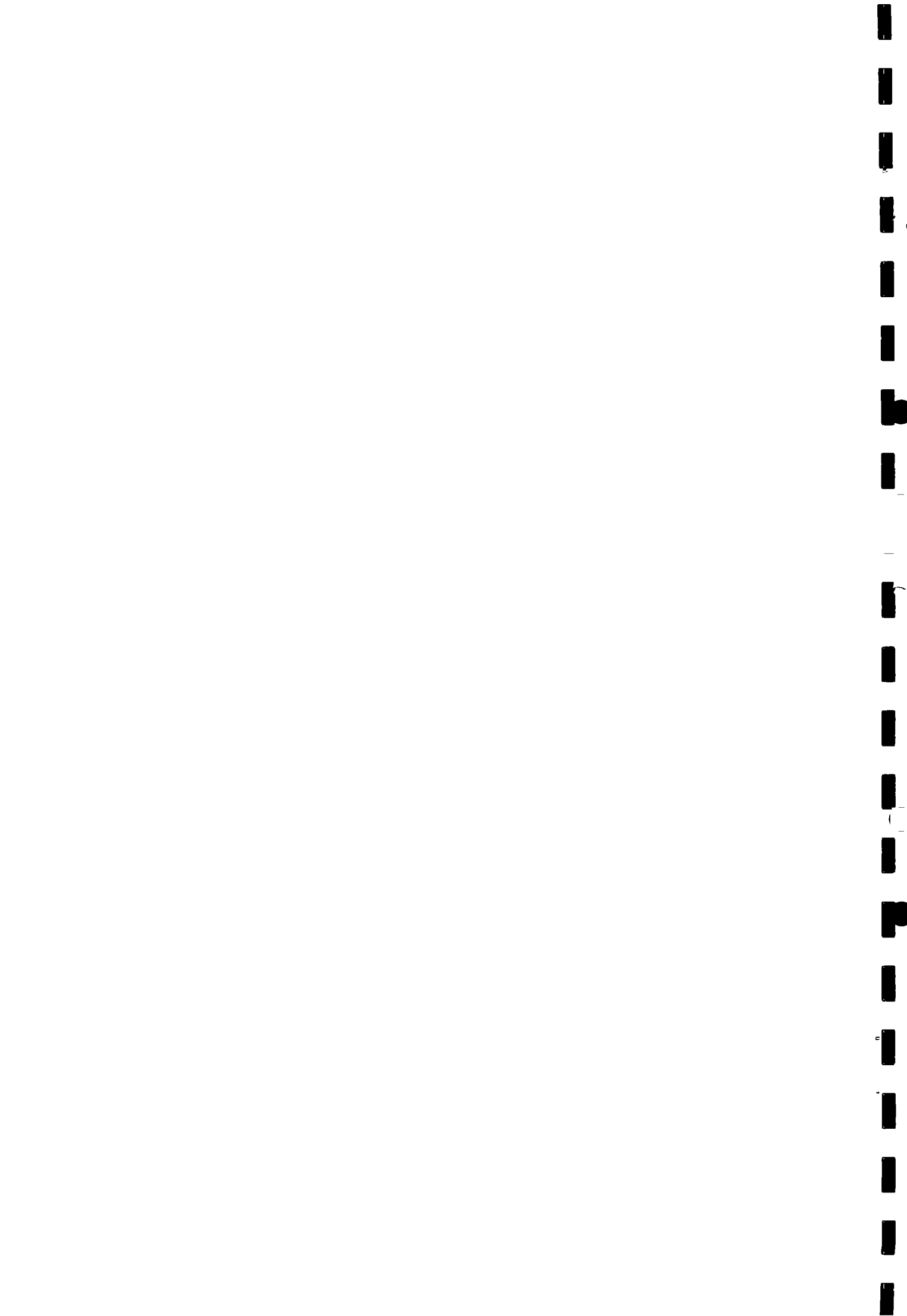
'the labour market is biased in favour of men.....within Botswana Bakgatla women find work in those economic sectors with the lowest pay and the greatest insecurity of employment. They are domestics, cooks and shop assistants with pay ranging from P15 to P45 a month for the lucky few.'

Although women with children are entitled in theory to claim damages from the men who fathered them, in practice damages are often not claimed. Migrant labour to South Africa and to the towns in Botswana has exacerbated many social problems and women have been particularly affected by the results of it.



3.3.2 27% of our sample of 70 households were found to be female headed: this encompasses households headed by widows and households headed by women with children who have never married. Female headed households are estimated to be amongst the poorest section of the population and usually own few or no cattle. It is therefore difficult for them to plough in time, if at all. Without assistance in the form of draught power, a plough, seeds, etc., they often are unable to reap a crop. Amongst our 40 household interviews conducted in Mmathete and Modipane, 50% of householders had ploughed and 50% had not. Reasons given for not ploughing were 'there is no one to help with the ploughing'; 'I cannot afford to hire oxen or a tractor' and 'there was no rain'. The mean yield amongst those that did plough was 12 bags of sorghum. This amount was said to last a family of 8 about 6 months.

In the Rural Incomes Distribution Survey the poorest 50% of households were found to be dependant on remittances, gifts and employment for their income.



SECTION IV

WATER CONSUMPTION AND DEMAND

AIMS OF THE PROGRAMME

4. The aims of the water supply programme were stated in 1972 as being:

'to provide the population firstly with adequate supplies of water for the maintenance of public health and satisfactory conditions of hygiene; secondly safe potable water is needed to ensure eradication of water borne diseases; and ultimately a supply of water sufficient to provide for all reasonable household requirements consistent with the enjoyment of the material and social benefits which rising standards of living will bring and which the population can afford, and the elimination of the wasteful human resource practices of walking long distances over a period of hours daily to obtain meagre supplies.'

4.0.1 An improved standard of health, time and energy saving and water supplies as a pre-requisite for a better standard of living are some of the aims set out in this paragraph. What implications do these goals have for water consumption and demand? It was suggested at a WHO conference that a consumption of 30 litres per person per day is the minimum level needed for establishing a significant health improvement. It was further stated that consumption of under 10 litres per person per day is too low a consumption to be healthy no matter what the quality is of the water being consumed. How is a consumption of 30 litres per person per day achieved? Studies made in East Africa would suggest that:

1* 'once water is brought to within 1 mile use doesn't significantly increase until a tap is provided in each house. Then consumption rises to within the 30-100 litre range.'

4.0.2 Given the resources available in Botswana it seems that it will be a long time before each house in every village, lands and cattle post area can be provided with a tap in their yard. It is important then to work towards improving access to water and its availability and quality even if this falls short of the ideal. Although improved access to water will not necessarily increase household consumption, it will help fulfil the last stated goal of the programme, i.e. the elimination of long walking distances

1* Water for the Thousand Millions
Compiled and edited by A. Pacey, Pergamon Press 1977.





Cattle drinking from water around standpipes



Evening queue at standpipe



to fetch water. It will also ease the introduction of improved patterns of water use in the home and the decreased use of other polluted sources provided that complementary health education inputs are present and effective.

WATER COLLECTION

4.1 On the basis of 3 days of standpipe observations and household interviews the groups responsible for water collection within the household was seen to be as follows:

GROUP INVOLVED

Responsibility for Water Collection	Percentage of trips to the standpipe per day	Percentage of water collected per person per day
Adult women	55%	67%
Female children	25%	21%
Adult males	3%	6%
Male children	16%	6%

From these figures it can be seen that women and girls were the ones primarily responsible for fetching water. Male children usually went to the standpipe when they were younger but stopped going as they got older. Men rarely went either when there was no woman available, or when water was being collected on wheelbarrows and in large jerry cans. In the situation where water was being collected in drums then put onto sledges and donkey carts men were usually involved, as it involved harnessing the draught power, traditionally a man's task. The discrepancy between the number of trips women made to the standpipes and the amount of water they collected can be explained by the fact that they usually carry more water than younger people. Where there was an older woman and some older girls 15+ in the yard, the older girls did most of the water collection. When there were younger children, a man and a woman, usually both women and children made trips to the standpipe in a day, but it was the older woman who was primarily responsible for collection.

4.1.1 Water was collected in metal buckets, old oil cans, plastic paint buckets and other plastic containers. Children were sent to the standpipe with anything from a teapot (very small children) to a wheelbarrow full of jerry cans. In the course of our observations we saw over 10 instances



of children with wheelbarrows full of large water containers. They depend on the help of adults or other children at the standpipe to lift the containers on and off the wheelbarrow (they can weigh 15+ kilos). Metal buckets usually have a capacity of between 10 and 15 litres whilst old oil cans and plastic paint buckets can hold 20 litres. The latter are not normally filled right up to the top as they are very heavy. A gourd or some leaves are often put into the water to steady it whilst it is being carried home, on the head.

PATTERN OF COLLECTION

4.1.2 An average of 3-5 trips were made per household per day to the standpipe, this included trips made by schoolchildren to fetch water to wash themselves with in the morning. It was difficult to specify the exact number of trips made in any one day by one household. As interviewees themselves pointed out, the number of trips depended on the activities going on in the lowapa which vary from day to day and the time of year. During our interviews we tried to ascertain the bare minimum number of trips per day when there were just the usual daily activities going on.

DIFFICULTIES IN DATA COLLECTION

4.1.3 Perceptions of how frequently the household fetches water varied with respondents. This was illustrated during one interview in Tsamaya. When we entered the yard the old lady was not available so we interviewed her daughter, a secondary school student returned home for the holidays. She told us that 2 buckets were collected in the morning and 2 in the afternoon. This became three buckets in the morning and three in the afternoon when all the family was at home (she had other brothers and sisters away at secondary school). When the old lady returned she told us that they usually fetched 2 buckets in the morning and 1 in the afternoon. She also observed that there was no clear cut difference between when the secondary school students were home and when they were not; more water was fetched when they were back but it was difficult to specify how much more.

We experienced another example of this difficulty in Sojwe, whilst interviewing a family who were within 100 meters of a standpipe but over 600 meters from the well. The borehole was not working that day (there was a leak in the pipe) and we were trying to find out if people used less water once they had to walk a further distance. Three men and one woman were present in the yard. The men answered immediately that less water



was used once the standpipe broke down. They said that they did not wash before going out into the village in the morning and that food was not cooked with as much water. The woman on the other hand replied that she used the same amount of water whether she fetched it from the well or from the standpipe because the same activities had to be done in the lowapa.

It was also difficult to define a 'normal' day - yesterday never seemed to be a normal day, as people did some washing, there were visitors in the lowapa or beer had been brewed. When women were being asked how much water was fetched they would also often underestimate by referring only to themselves and not including the number of times other members of the family would go to the water source. All these difficulties in data collection indicate that a figure such as 3.444 is not likely to be accurate or reflect real practices which change from day to day.

TIMES OF WATER COLLECTION

4.1.4 Peak hours for water collection were 8.30 to 11 a.m. in the morning and 5.15 to 6.30 p.m. in the evening. Queues, which increased the time spent in water collection, occurred within these two periods. They become particularly acute after harvest when the village becomes congested. In Mmathete queues were seen to last for up to 20 minutes; at Modipane they occurred only at the spring in the centre of the village and lasted for up to 15 minutes. No long queues were observed in Sojwe or Tsamaya. When Mmathete was revisited in August queues had already begun to form by 5 o'clock, approximately half an hour earlier than in July. One of the main problems seemed to be the low pressure in the standpipes during these times so that it took twice as long to fill a bucket as it did at any other time. Roughly one third more water was collected in the morning than in the afternoon. Water collection starts off earlier in the morning when the weather gets warmer and goes on until later in the evening.

WATER CONSUMPTION

4.2 Individual water consumption plotted against distance from the water source shows the following:



WATER CONSUMPTION AND DISTANCE

<u>Distance from the water source (meters)</u>	<u>Water Consumption per person per day (litres)</u>						
	4-7	8-11	12-15	16-19	20+	Total%	Total Sample
0-200	33	29	33		4	100	18
201-400	32	64		5		100	16
401-600	45	45		5	5	100	16
601-1km	15	80			5	100	14

This table suggests a slight decline in water consumption as distance increases beyond 200 meters. It is difficult to draw any general conclusions from the sample alone but on the basis of interviews we found that households living within 50 meters of a standpipe seemed to use significantly more water. The following comment was representative of these households:

'We cannot tell you how often we go to the standpipes as we are so near to water. We go and get it when we need it. It is much better than it used to be, you have helped us a lot, we can do our work more easily. Even the children can go and fetch water these days.'

During our four days of standpipes observation it was observed that households very close to the standpipe would come up to 10 times a day to fetch water. The fact that people who lived more than 1 km away tended to use a drum plus a sledge and donkey cart changed the method of water collection and made water more readily available in the house.

4.2.1 The range for water consumption per person per day was from 5 litres to 20 litres, most people fell within the 10 - 12 litre range.

Mean water consumptions were found to be as follows:

Modipane - 8 litres per person per day

Mmathete - 10 litres per person per day

Cattle post and lands - 7.5 litres per person per day.

A good deal of seasonal variation can be expected.

4.2.2 Once the supply was over one or two kilometers away water usage decreased for people who did not have access to drums, sledges and draught power. One large group of people who fall into this category



are 'remote area dwellers'.* We came across one group of remote area dwellers at Mogale, the lands around Sojwe. The cattle owners in that area were using drums and sledges to fetch water from Sojwe, about 5 miles away. One family of 12 plus 3 majako (hired) female workers and their children, were finishing one 44 gallon drum in a day. The family of 12 on its own said that they usually finished a drum every 2 days. The group of RADs in the area did not have access to a drum and draught power. There was one family of 3 old ladies and 5 children who had come to work majako for the people who had ploughed, in order to share some of the harvest. They either begged water from the people with drums and draught power or they took buckets and walked to Sojwe. Two women would walk between 5 and 6 hours in the morning to fetch water from Sojwe. They took one big bucket and one small bucket each so that they could drink some water on the way back. Water collection involved so much effort they were only using 30 litres a day in all for supplying the whole family. If water had been left over from the previous day they would sometimes not go at all, until they got desperate. The utensils in the yard had successive scraping of food on them as they were unwilling to use any more water than absolutely necessary, by cleaning them.

4.2.3 On the basis of our interviews there appeared to be a difference between water consumption at the two extremes of distance from the water source, i.e. those households within 50 meters of a standpipe and those households over 1 mile away. Within this range the amount of water used was said to depend on a number of other factors, such as: the number of adult females and of older children available to help with water collection; the season of the year; and individual patterns of water used within the home.

HOUSEHOLD WATER CONSUMPTION

4.3 Another way of looking at water consumption is to calculate the amount consumed by a household rather than by an individual. In all the interviews we conducted water consumption within the household was said to be more dependant on the activities going on within the compound than on the number of people present. When activities such as cooking, washing clothes or building up the lowapa were being performed, the extra water needed lessened proportionately with each additional person. Bathing was an exception to this rule as the same amount of water was needed again for each additional person, provided that clean water was used every time.

*Remote Area Dwellers, otherwise known as non-water rights holders, are people living permanently outside the villages with few or no cattle. There are an estimated 60,000 in Botswana whom the Government is trying to reach by means of the Remote Area Development Programme.



Total household consumption has been calculated on the basis of:

- (a) the information given during the household surveys
- (b) the meter readings taken at standpipes divided by the number of households using each standpipe.

Water Consumption per household per day

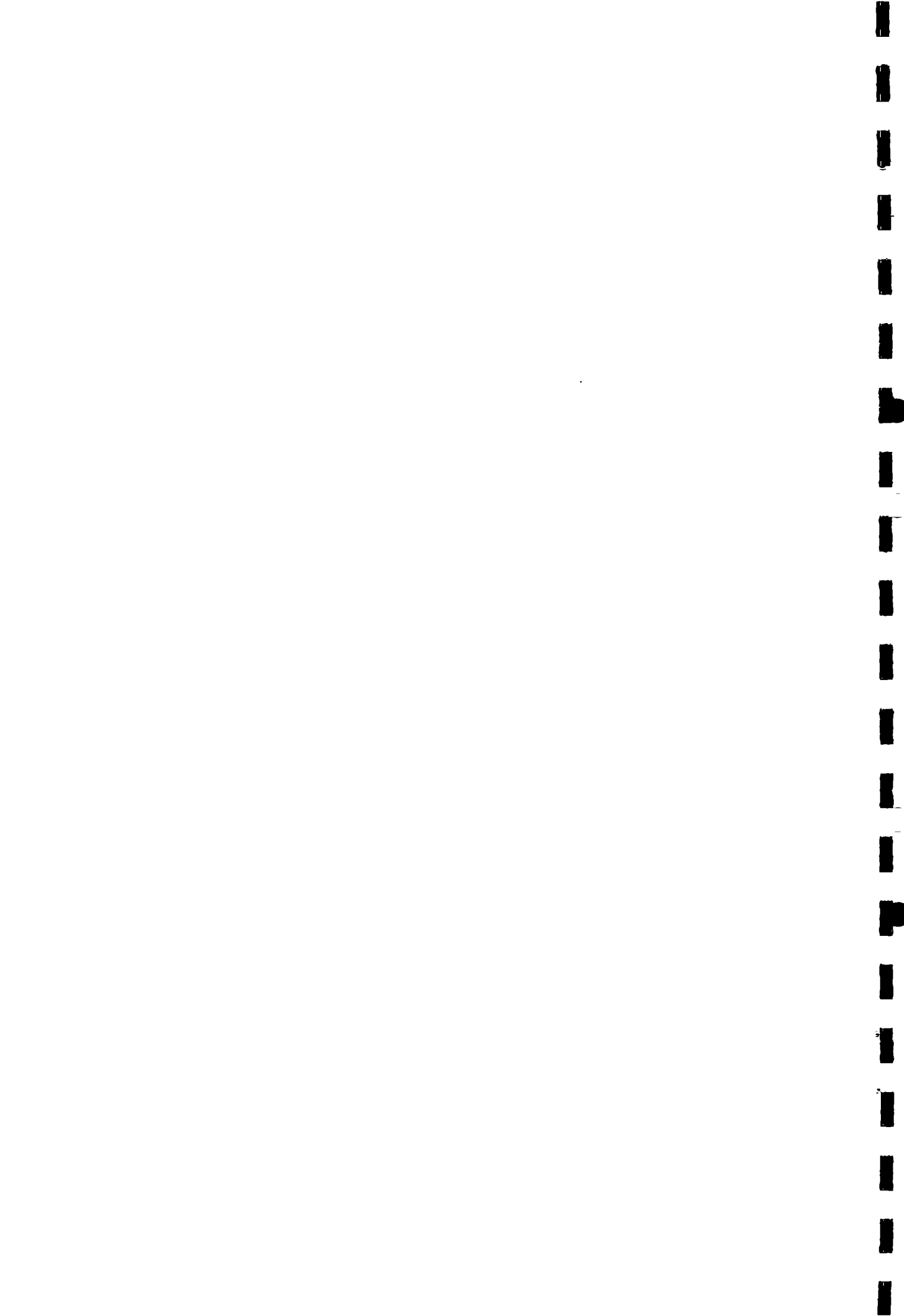
<u>Range</u>	45 - 125 litres
<u>Middle Range</u>	50 - 80 litres
<u>Mean</u>	67 litres

PATTERNS OF WATER USE WITHIN THE HOUSEHOLD

4.3.1 As well as asking people for their usual day-to-day water consumption, we also tried to get an idea of how much water was being used in the household for different activities. The following information is based on 70 household interviews:

MEAN AMOUNT OF WATER USED PER HOUSEHOLD PER WEEK

	<u>Mean</u>	<u>Percent</u>
Washing clothes	115L	14%
Washing the body	170L	20%
Smearing the lowapa (both patching and flooring and the big smearing)	100L	13%
Beer Brewing (Khadl and Bojalwa)	140L	20%
Cooking (including drinking, making tea, etc.)	200L	25%
Other (gardening, building, etc.)	70L	9%





Stamping Sorghum to make porridge



Woman cooking (Information Services)



PIE CHART SHOWING RELATIVE HOUSEHOLD WATER CONSUMPTION



4.3.2 One thing which emerges clearly from this breakdown of consumption is that there is a large peak in water consumption after harvest, in July and August when families return to live in the village. Not only are there a lot more families present in the village but they are also performing activities which consume a lot of water. The 'big smearing', i.e. rebuilding the compound, is done at this time and can use anything between 400 and 3,000 litres of water. It is also the custom to brew Bojalwa (sorghum beer) at this time whilst there is still some sorghum from the fields. Brewing beer can use between 50 litres and 150 litres of water per household.



RECOMMENDATION No. 2 to Ministry of Water Affairs

The important daily and seasonal peaks in consumption which we have identified should be taken into account in design. Inadequate planning can result in long queues at peak collection times, especially after harvest when demand for water can double. Low pressure in standpipes at peak periods was found to be a major problem at Mmathete and to exist in Tsamaya as well.

RECOMMENDATION No. 3 to

Ministry of Water Affairs

Consideration to the time of year should be given when the next study on water consumption is carried out. Efforts could be made to compare post harvest with pre harvest water demand.

4.3.3 No very clear relationships between distance from the water source and the number of times these activities were performed in a week emerged. When asked about the benefits of the water most respondents remarked that they were able to wash and smear more often. Sometimes more beer brewing was mentioned in addition. One clear difference that did emerge however was that respondents in Mmathete were doing the main rebuilding of the compound twice a year, whilst those in Modipane were doing it only once.

VILLAGE LEVEL CONSUMPTION

4.4 A rough estimate of the proportions of village level consumption can be given on the basis of the number of households in the village, the amount of building going on in the village and water used by the clinic and school, private connections, etc. All the villages which we visited were rural villages and did not have any extra activities going on such as brigades, hotels, etc., which would presumably change the pattern of village level consumption. Tsamaya village can be taken as an example:



TOTAL DAILY VILLAGE WATER CONSUMPTION

	<u>Litres</u>
School	5,000
Clinic	5,000
3 commercial vegetable gardeners using 440L x 3	1,320
20 small vegetable gardeners using 60L x 20	1,200
1 Council builder using 6 x 220	1,320
1 private builder	150
Population of 100 using 10L per day each	6,000
6 private connections	3,600
Other	
	<u>23,590</u>

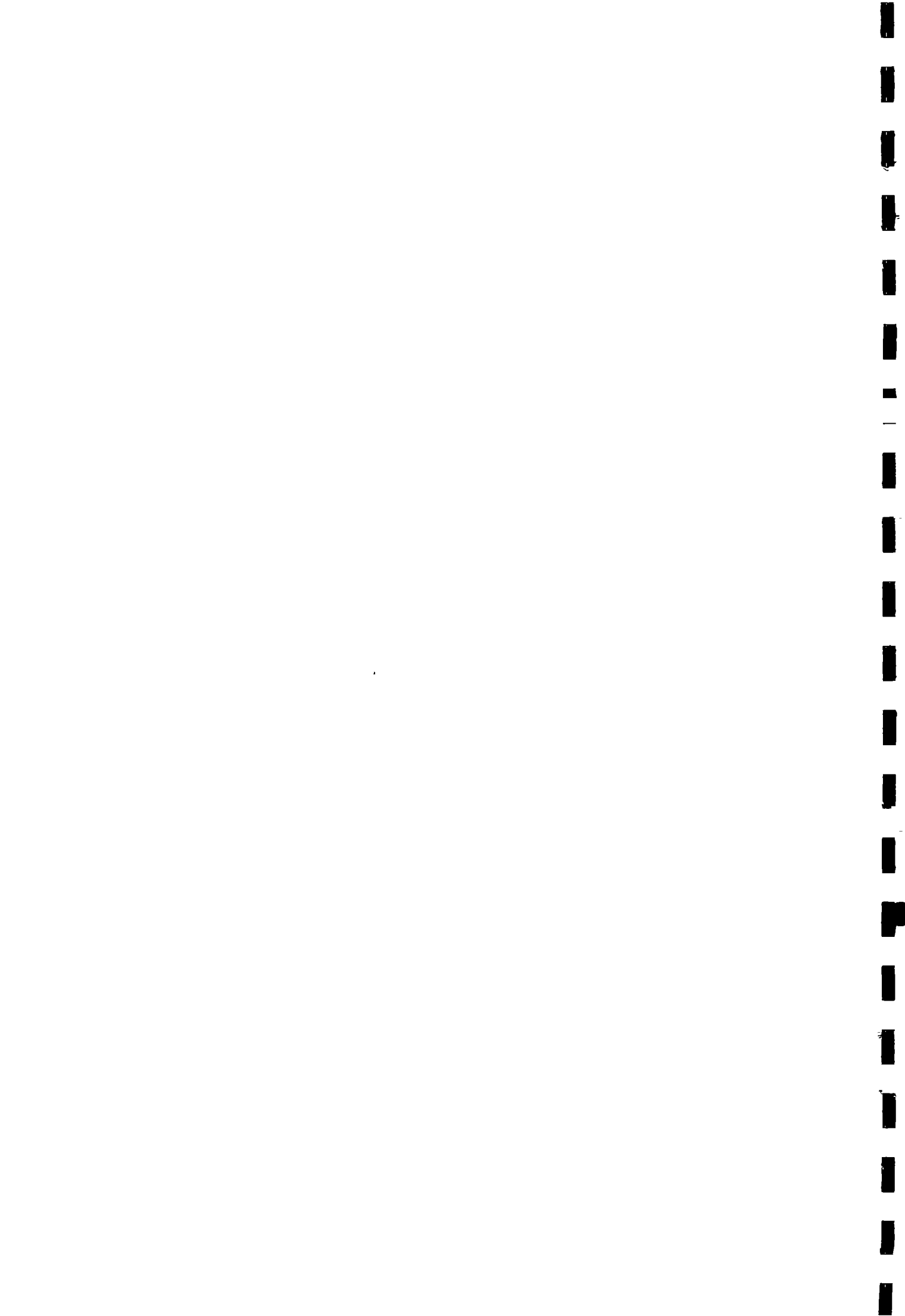
STORAGE OF WATER

4.5 Out of 70 interviews in the villages, cattle post and lands areas asking households what containers they used for storing water, the results show the following:

CONTAINERS USED FOR WATER STORAGE

<u>Container Used</u>	<u>Percentage of Households</u>	<u>Number of Households</u>
Same bucket used for water collection (usually metal)	38%	27
Another bigger bucket (often plastic)	21%	15
Stored water in drums (ranging from 100 to 220 litres)	11%	8
Stored water in clay pots	14%	10
Stored water in jerry cans or plastic containers with lids	14%	10

Storage containers were kept uncovered in approximately 75% of households, otherwise they were usually covered with a piece of board. Households who possessed large plastic containers with fitting lids (14%) tended to be the more 'modern' members of the community. Clay pots and buckets were kept on the floor, often inside the rondaval.



4.5.1 A preliminary comparative test done on the amount of bacteriological pollution in the storage container as opposed to amount found in the water source indicated that some contamination had entered the water either whilst it was being carried in the bucket, or whilst it was being kept in the storage container. Insufficient testing has been done to prove this however.

TRANSPORTATION AND SALE OF WATER

4.6 Within the village it was the practice for each family to collect their own water except amongst extension staff who sometimes asked young girls to do it for them and might pay them in return. One teacher had made an arrangement with her neighbours that they would fetch water for her during the week and she would fetch it at weekends. It did not seem usual however for village families to employ someone from another family to fetch water for them. This also did not seem to have been the practice in the past before the standpipes were put in. The families we interviewed said that they had always done their own water collection, previously going to the water source with other women, as it had been a long way off.

There were several cases of water being transported outside the village to be sold, although this arrangement did not seem to be common. One instance of this was cited at Mogale, the lands area mentioned previously. After harvest a man with a donkey cart was said to have come around with drums of water and to have offered to sell one in return for 3 buckets of sorghum. Another example cited was further west in Kwenong District when someone had come and offered to sell a drum of water in exchange for morama nuts (a wild veld food). This did not seem to be the usual practice in the rural villages we visited unlike in some of the larger villages like Mahalapye where a regular business is made of selling water in drums from the river.

OTHER WATER SOURCES IN USE

4.7 In all the villages we visited there were a number of different water sources in use. Although standpipes were the main source for drawing water in most of Mmathete and Sojwe, and in some of Tsamaya, people were also using a variety of pools, springs and dams. In Modipane (the village without reticulation) the borehole was mainly used by those people living near it, whilst the centre well was used for drinking. In Mokatse (a ward of Modipane about 1 kilometer down the road) springs and dams were being used. In Tsamaya in the east of the village some of the homes are about 800 meters from the standpipes. These people were found to be using springs and only occasionally the standpipe due to distance.



4.7.1 One reason given for using other water sources was convenience. One family in Mmathete at the extreme end of the village told us

'We do not like to queue, some people come to the standpipe and draw water in wheelbarrows, they have two or three containers and then you have to wait a long time. The wells are nearby (about 350 meters). At times we also use the wells because they are nearer, especially when we want to do some washing or smearing.'

4.7.2 Almost all the families that had ploughed, were using seasonal water sources at the lands for part of the year, dams and boreholes once rainwater sources had dried up. This use of polluted water sources for part of the year might affect the health benefits which can follow from provision of a clean water source. Those who had access to draught power and a drum often collected water from the village to take it back to the lands. The cost of filling a drum was 10T/5T per drum at council boreholes. Private borehole owners charged up to 25T per drum.

4.7.3 Perceptions of the cleanliness of water tended to vary with the education of the respondent. More educated people were likely to be aware of 'germs' in the water and the connection between dirty water and diarrhoea. Other interviewees perceived that water was dirty if there were animals using it or if it looked muddy. There was a clear case of this difference in perception at Siviya where the primary school teachers bitterly complained that they were being made to drink unclean water, as the standpipes were not working there and people were scooping water out of the river bed. A group of women whom we interviewed said that their main problem was collecting firewood which was 1-2 hours walk away and that water was not a problem. The women had no perception of the possible dangers of the water although cattle were accustomed to standing in the river bed, which was also used as the toilet for the village.

4.7.4 Households were asked if it was possible to purify this water for drinking in any way. Some of the younger respondents knew that boiling was a means of purification, whilst the older ones did not have any idea how this could be done. No households were found to be boiling water either in the village or at the lands and cattle post. One drawback might have been the non availability of fuel, i.e. firewood, another the preparation and management involved in boiling it. The headteacher at Modipane school remarked for example; 'I know I should not be drinking this well water without boiling it but when I send a child out in the middle of class to fetch me some water to drink, then I drink it when he brings it. It is not possible to start boiling it at that moment.'



4.7.5 As well as using other water sources because they were nearer or the only ones available (at the lands) quite a few of the families also mentioned that rain water tasted better than borehole water. In Modipane, for example, water from the present borehole had an extremely acrid taste which was distasteful even in tea or coffee. In Mmathete where the water tasted reasonably good, several households still mentioned that they preferred the sweet rainwater to the slightly salty borehole water. Iron rainwater catchment tanks were in use at some of the schools and clinics that we visited. They were also seen in use in some private homes, but as rainwater collection requires an iron run off these were only homes with corrugated iron roofs. These houses tended to belong to the wealthier members of the community.

RECOMMENDATION No. 4 to Ministry of Water Affairs

Before a village is reticulated it should be checked that water from the borehole is generally acceptable in taste to most people, as well as being unpolluted. Investigation of rainwater catchment possibilities should be undertaken as an economic way of collecting sweet drinking water.



THE PROBLEMS

4.8 During the survey households were asked about the major problems with the water supplies. Respondents stated the following problems:

'there is not enough water, even though we have the pumps there is still not enough water.'

This tended to mean that the pressure in the standpipes was very low, resulting in long waits at the standpipes during peak consumption hours and especially at peak consumption times of the year. People were seen waiting at the standpipes between 5 and 20 minutes in Mmathete, pre harvest. In villages with standpipes people tended to be more articulate about their water problems than in villages without. People in the reticulated villages had had their expectations raised and felt cheated when their expectations were not met.

4.8.1 'when the borehole breaks down then we have to go a long way for water, there should be two boreholes in the village so that when one breaks down we can use the other one to get water from the pumps.'

In Mmathete the borehole was said to have broken down 3-5 times in the previous year. The reported number of breakdowns and the reported length of time taken to repair them varied from interviewee to interviewee. Time taken to repair different breakages was said to have been between 3 days and one month. The time taken to do the repairs was said to have depended on the availability of spare parts and transport for the maintenance crew. The need for a second borehole to supply water in emergencies was a strongly expressed need in Mmathete. One of these breakdowns was due to a road grader uncovering a pipe and then children subsequently vandalising and breaking the uncovered pipe. This sort of incident could possibly be minimised if there was more community responsibility for day to day care of the water system. Unreliability was a constant theme of conversations in Mmathete, especially. People were indignant that they had been given something which did not seem to be reliable.

The water supply in Tsamaya was seen to be reliable on the whole except that the pressure was low at peak times so that people also complained of 'not enough water'. In Modipane the borehole was reputed to have broken down once in the previous year and to have taken one week to fix.



4.8.2 'the pipes are always breaking' this was the major complaint of villagers in Sojwe. When asked about the benefits of the supply several families remarked "it would bring us a lot of benefit but it is always breaking down." All respondents reported that the borehole broke down at least once a week. There was considerable variation in the time they said that it took to mend it. Most said that it took a short time to repair as pipe breakage was usually the cause of the difficulty and the pumper tried to bandage the pipes himself. One interviewee replied, however, that it could sometimes take between a week and a month before they received water again. One particular stretch of plastic pipe between the borehole and the first standpipe seemed to be mainly responsible for the frequent leakages. The villagers felt that as it was made of plastic and laid over a very rocky area it was always springing holes. The District Council had reported the problem to Water Affairs in May, but W.A. were too understaffed to do anything about it without really knowing what the problem was. (Money has now been voted to deal with the problem). Presumably it would have helped if the District Council had been able to make a fuller report of what was wrong and been aware of exactly what information they were expected to supply.

4.8.3 'the standpipes are too far, government should come and give us a standpipe nearer.'

One strategy for dealing with this complaint will be suggested under the section dealing with community organization, i.e. if villagers feel that they want to extend the standpipes they should contribute money and labour towards that. One important point is that people in the 4 villages which we visited were not found to be moving closer to the standpipes but further away with the expectation that services would be brought to them. In one way this is healthy and unavoidable as the village grows but it is significant that instead of asking land board for land nearer to water, people on the whole are moving out of the village where there is more land available for building. The sub-land boards and the land boards with whom we spoke also had no guidelines from which to advise people on where they should move to if they expected to have services near them. The Kgatleng land board secretary said:

'We only have guidelines in the major villages like Mochudi. In the smaller villages we allocate land usually where people ask for it unless someone in the area objects.'



People were not moving away with the knowledge that they might be unlikely to receive a nearby water supply for some time, but with the expectation that government would do something about it.

RECOMMENDATION No. 5 to Ministry of Water Affairs

Ministry of Local Government and Lands

That an attempt is made to decide what it is realistic for people in the village to expect and planning is carried out accordingly, informing the villagers of that decision. This could be done at the consultation meeting between Water Affairs and the villagers when the positioning of standpipes is being discussed. Otherwise, expectations might keep spiralling until they are highly unrealistic leading to dissatisfaction and disillusionment.

A firm effort needs to be made to make land boards aware of this so that they can advise people accordingly when the time comes to allocate land. Land Boards are currently informed of the meeting and the plan for the reticulation system but it is probable that this information often gets filed away unless a special effort is made to bring it to their attention.



SECTION V COMMUNITY INVOLVEMENT?

DECISION MAKING

5. The ways in which the Districts decide on priorities vary. The village input, if any, into these decisions is through the VDC, the headmen, or the extension staff. Once Water Affairs has accepted the district's priorities the next step is for an officer from Water Affairs to pay a visit to the village to survey the existing water supply;

(ii) to consult with the chief, councillor and VDCs
 on standpipe sites;

(iii) take levels at relevant places in the village.

He then prepares a practical plan according to the consultation.

5.0.1 The plan and an estimate of costs are then sent to the District Councils for comment and the Council is asked to arrange a Kgotla meeting to discuss the plan. The Kgotla meeting is attended by the officer from Water Affairs, the Council representatives, the headman, the Councillors, members of the VDC, and people from the village. Practical amendments to the plans, usually concerning the position of standpipes in the village, are considered according to discussions at the Kgotla meeting and plans for constructing the scheme using paid village labour are made.

When the scheme is complete it is handed over to the District Council who assume responsibility for operation, maintenance and revenue collection.

5.0.2 The villagers' involvement is limited to approving the final plans and contributing paid male labour to dig trenches for the pipes. Women are not employed to dig trenches and they tend to be relatively subdued at the Kgotla meetings although they are the main users of the water supply. It is interesting to note the comments of the headman (a relatively young man) at Bokaa:

'I am not happy because there are not too many women at the Kgotla today. What is going to be discussed concerns water, the women are the people who do the fetching of water and the cooking... I come home and say I want some tea, they make some tea, if I want some water to wash, they provide that...'



5.0.3 When we asked villagers in Mmathete if they knew the standpipes would be put in, almost all the families answered that they did. However, most of them said they had not been consulted about where the standpipes should go. Only the VDC and the headman has in fact been consulted, though the procedure has changed since this case (1976).

In Modipane over half the villagers knew they would be getting standpipes although 6 households did not know. They were mainly households on the Mokatse side of the village who are far away from the Kgotla. (The final consultation had not been carried out there yet).

Both in Tsamaya and in Sojwe the patterns were fairly similar, villagers had been told that they would be receiving water supplies but had contributed nothing beyond their approval for the standpipes, and paid labour to dig trenches.

VILLAGE INITIATIVES

5.1 No major village initiatives related to water were noted during our trips to the four villages, but it was observed that several water conservation measures had been decided upon and these were being generally implemented. In Mmathete it had been decided that no washing should be done at the standpipes other than at the standpipe by the borehole which had the highest pressure, as pressure was already low on the other standpipes. It had also been decided that only people from the lands should be allowed to draw water in drums whilst people in the village should only draw water in buckets. In Modipane the pumper suggested that during the months of August, September and October when demand is at its peak, only two buckets should be collected per family per day. He had informed the Headman, the VDC and the Council about it and claimed that he was receiving their co-operation. In Tsamaya the headman said that they did not allow people to wash next to the standpipes as it would cause big pools of water there which would encourage the cattle to come and drink the water and break the pipes.

5.1.1 In Ramotswa, where the pre-study for this survey was carried out, we were told of an attempt by the community to have the standpipes extended which had been squashed by Council. The Assistant Community Development Officer told us:



'It is better now than before when we didn't have standpipes. Although even now many people complain that they don't have water in their wards. In Ramotswa North, South East and parts of Ramotswa West, people are far from water. For the last three years VDCs have been telling me that they need more standpipes, and other wards have not received the pipes they need yet. The people contributed money in 1976 to be helped to put in their own pipelines, they still have that money and they are still contributing more. Last year at the Council meeting this fact was brought to Council and the Councillors said we will take care of this as its a big project and the villagers can't manage it. The people are still waiting for the standpipes. It was explained to them that if they contribute themselves they would have to dig the trenches themselves as well. They agreed to do this as they are thirsty for water. We did the same in Kanye and in Serowe, and they were willing to do it here.

This is one example of a case where the villagers' initiative has been ignored and their needs are still not met. There are also examples of the opposite happening, i.e. villagers being told that if they dig their own trenches they will receive better service.

THE PUMPERS

5.2 The pumper is the link between the village community, the water supply and government management agencies. He is responsible for operating the borehole and pump as well as doing the simple maintenance tasks such as keeping the pump head clean, filling it with oil, etc. He is also responsible for reporting any larger problems to the District Council or Water Affairs so that they can come and deal with them. As well as starting the pump off in the morning and shutting it off later on he is also meant to inspect all the taps to make sure that they are working properly every day. In some places he is even responsible for revenue collection, although he is usually not trained in record keeping. Some of the younger pumpers are educated although most of the older ones have had very little formal schooling. Pumpers at the moment are always male.

5.2.1 The following history given to us by one man was typical of the pumpers whom we interviewed:

'I worked on the mines from 1948-1956. I didn't do any special job there I just used to chip stone away from the face of the mine wall. I left the mines because one of my sons died and then when



I wanted to go back it was 'money, money, money' and trouble about passes. I didn't have a steady job between 1956 and 1975 until I started here. I used to earn my living by doing piece work in the village, sometimes for a week sometimes for a month. I was married by that time and had 7 children. I didn't start off working as a pumper but as a labourer who dug trenches, then I don't know how it happened, I became a pumper. I haven't ever been sent on any courses to learn about pumping, they just showed me how to operate the pipes and hired me for the job.'

CHOOSING THE PUMPER

5.2.2 There are two methods of choosing pumpers. The first is that the pumper is chosen by the community, sent on a training course and then comes back to his home village. The second method, most common now, is that Council recruits the pumper and posts him to somewhere in the District. At the moment the system of pumper supervision differs according to the District Council. In Kweneng District, for example, the pumper is supervised by a senior pumper who travels around with the truck which delivers the fuel. In Southern District the pumper is supervised by the Revenue Collector in the village who is also responsible for supervising pumpers in a number of neighbouring villages. The community has been given no formal role as yet in supervision, although they presumably exercise an informal control over the actions of the pumper, particularly if he is a member of the village.

5.2.3 People in Modipane and Mmathete were asked what should be the main criterion for choosing a pumper. Almost all the households in both these two villages knew the pumper as both pumpers have been resident for some years in the village (4 years in Modipane, 9 years as pumper in Mmathete). Most households said that the most important thing was whether the pumper did his work or not. Nine households also remarked that they thought it was a good idea if he came from the same village that he was working in and if he was known as a hard worker to the people. This would give the villagers more control over him and they would be likely to choose someone who was known to be hard working. One respondent also said that he would have to take less time off if he was in his home village as he would not have to leave the job when a relative was sick or died.



5.2.4 The pumper in Mmathete had been chosen by the community before the borehole was taken over by Council, and he was said to be doing a reasonable job both by his superior (the Revenue Collector) and people we spoke to in the village. He had been doing his job since 1970 and said that he had not had a holiday or taken a day off to be sick in all that time. He had done a one week training course when Council took the borehole over. The pumper in Modipane had been sent there by Council four years ago. His home was in Mochudi, which is only about 30 kilometers away. He had once taken a holiday and Council had sent a replacement. Both pumpers worked during the weekend as well as during the week. In Mmathete normal pumping hours were from 7 a.m. to sunset during the week and 9 a.m. to sunset at weekends. Pumping hours in Modipane were from 6 a.m. to 6 p.m.

The pumpers in both Sojwe and Tsamaya were fairly new so it was difficult to assess their relationship to the community. The pumper in Sojwe had worked for the District Council as a pumper for a long time but had just recently been posted to Sojwe. The pumper in Tsamaya was a young man who was doing his first job. In Sojwe pumping hours were from 6.30 in the morning to 6.30 in the evening. The pumper had done a 3 week course once in Gaborone. He complained that his wife was working in Molepolole and he did not get much chance to see her as he worked 'Monday to Monday, January to January, ga ba na le 'off' (I do not have any 'off' time). The pumper in Tsamaya claimed to pump for the morning every second day and then to fill the tank at the weekend and go to Francistown. The pressure was observed to be very low in the morning at Tsamaya, though possibly this could be increased if the pumper extended his pumping hours (slightly).

5.2.5 Basing the pumper in his home village encourages community supervision and also makes the pumper's life easier when he is expected to work through weekends, etc. Pumpers themselves expressed a preference for working in their home village in view of their long hours and some villagers themselves also expressed a certain preference for this arrangement.

RECOMMENDATION No. 6 to Ministry of Mineral Resources and Water Affairs
Ministry of Local Government and Lands
Pumpers should be chosen by the whole community and receive training then have some community supervision on their return to the village. When the pumper's supervisor comes to the village, he

Information Refers to
for Community Water Supply



should meet with the VDC and headman as well as the pumper and discuss any problems with them. Responsibility should be clearly defined, i.e. the pumper, headman and VDC should meet every few months and discuss progress and problems.

The suggestion that pumpers be women is a good one. Women are the ones involved in water collection and usage; they are also often more reliable workers and better educated, in Botswana, than men. This process of encouraging the selection of women for pumping jobs should be well worked out - (how is it going to be presented to the villagers?) and carried out gradually wherever possible, so that it involves women in the village themselves (possibly through encouraging discussion at women groups) and secures the support of villagers generally. This will not be easy. It was ridiculed by some District staff whom we spoke to who felt that pumping was a heavy job and required a man's strength, especially in starting the pump up. These notions need to be disproved. It is well worthwhile doing and could be begun by initiating discussion with extension workers who are the ones in day to day contact with villagers. A system be worked out for making sure that pumpers are able to take leave like other government employees.

5.2.6 In all cases the pumper was responsible for reporting any problems with the borehole or the standpipes to the District Council. All the pumpers told us that they were 'not supposed to do repairs', although in fact they all did do emergency repairs. This was particularly important in Sojwe, which is a slightly remote village where the pipe from the borehole is constantly springing leaks. It did this whilst we were there and the pumper switched off the borehole, uncovered the pipe and then bound it up with some old car tyres and wire. He tested to make sure that the 'bandage' was holding before covering the pipe over again. Some young boys who were helping him said that the last pumper sometimes gave people 'a shilling or two' for helping him with the work. There was also a leak in the pipe whilst we were in Modipane when a road grader went across the pipe leading to the standpipe at school. The pumper went into Mochudi to report these things as well as a leak on the pump head of the borehole, and meanwhile he bandaged the pipe up himself.

2

RECOMMENDATION No. 7 In view of the way in which pumpers do emergency repairs presently they should be issued with a set of tools and encouraged to do simple repairs.

WATER FEES

5.3 In each of the District Councils except Kweneng District which we visited, attempts were being made to charge P2 per household per year for water fees. This is meant to be paid per adult woman living in her own lowapa (compound) including female headed households although they are not liable to pay other tax. Private Connections should have a water meter which is regularly read and paid for at the rate of 20T per 1,000 cubic litres.

5.3.1 All the households which we questioned except for the people in Sojwe, knew that they should be paying P2 water fees. Almost all of them claimed to have paid water fees in the previous year at the same time as they paid tax. The exceptions to this rule were in Mokatse, where they said that the Revenue Collector in Oodi had attempted to charge them water fees but as they did not use the Council water (which is about 1km away) they had refused to pay. Some of the households in Tsamaya also intimated that they were not willing to pay P2. They said that until last year the District Council had been charging them 60T now it wanted to charge them P2 and they felt that the leap was too great. The Kweneng District Council had not attempted to collect any water fees at all in Sojwe yet, although they were in the middle of building a house for the Revenue Collector there. It is hard to know what relation these answers bear to reality. It was clear from speaking to Revenue Collectors that at least half the households were not paying water fees. The Collector in Tsamaya said 'When I go to ask for water fees they tell me that they do not have any money.' It was almost impossible to get exact records in any of the villages of how many people had actually paid water fees for the previous year. Council revenue collection seems to be disorganised and the only records available were in the receipt book which had already been sent away for the previous financial year. In Kgatleng the Revenue Collector in Mochudi estimated that only about 25% of people were paying local government tax so it is likely that not more are paying water fees.


5.3.2 When asked whether this payment was fair, respondents gave a number of different answers. The interviewees in Mmathete were very much



more articulate and indignant about the things that were wrong with the water supply than those in Modipane where there is no reticulation at the moment. One household said it was not fair as they were still far from water, another that the standpipe often did not have enough water in it, and so on.

The problem with getting people to pay water fees is that they are viewed 'as a government tax not as a service charge', i.e. people do not see any direct benefit to themselves or improvements in the village when they pay the money, nor does the diesel stop flowing when they do not pay the money.

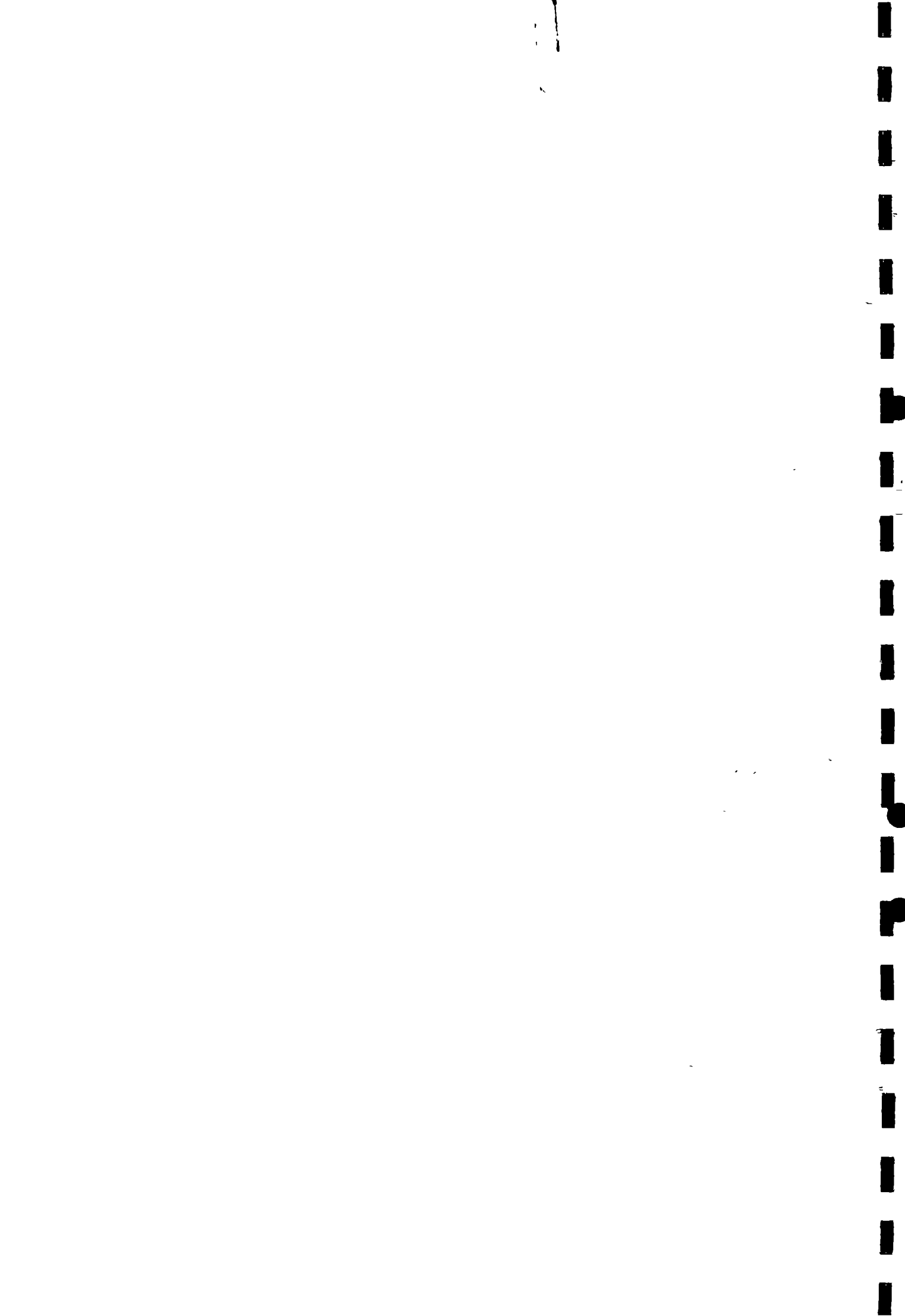
OTHER WATER PAYMENT

5.3.3 It was suggested by some people in the villages that 'water for drinking is not looked at as if it is something you should pay for.' One respondent told us: 'People could get angry with you if you start refusing them water.' This might have been true in the past and on a short term basis in the present, but it does not seem to be generally true of other village sources now. In September - October when water is scarce, people are said to charge large sums of money to discourage other people from 'finishing their water'. The highest example of this which was confirmed was P1 per month for three buckets of water per day from a certain dam outside Modipane. Some examples of more usual prices were 5T a bucket, 50T a year, 10T a month. People do not use these sources during the rainy season as there is plenty of rain water available in pools, wells, etc., but these sources are used when the others have dried up. 

5.3.4 These charges are not always made on a consistent basis. If you are a relative or working for the dam/well/borehole owner you usually do not pay for water. Sometimes the owner will not charge you or sometimes if you do not have cash available you will be made to do odd jobs before being allowed to collect a bucket of water. The 4Bs in Modipane gave one example of this when asked about the different problems in their lives:

'There is not enough water to smear properly. In order to get water we have to do jobs which the people who have the water might want us to do. They can ask you to fetch 8 buckets for them before you can go and fetch your own bucket.'

Payment is charged somewhat erratically on the whole, according to the temperament of the individual water source owner and the season of the year.



When it is charged by an individual, however, people have little option but to pay. Ownership of a water source can confer quite a lot of influence on the owner. The owners of large dams and boreholes (usually syndicated) were observed to be amongst the wealthier section of the village population.

PRIVATE CONNECTIONS

5.4 Tsamaya was the only village in which any private connections were seen. The District Councils in Kgatleng, Kweneng and Southern said that they did not have the capacity to install private connections usually. In Southern if people wanted a connection they had to employ a private contractor to do it and then Council were meant to come and fit the meter. There were only three examples of this being done in the whole district, none of them in Mmathete. Whilst we were staying in the villages people came to ask us about the possibility of having a connection put in their house. Several people in Mmathete were very interested. Contradictory statements had come from Council, however, and the delays had served to confuse them.

In Tsamaya the private connections had been installed whilst the reticulation system itself was being installed in the village in 1976. The engineers had apparently asked if anyone wanted a private connection and had charged 60 Pula for installation. The meters on the connections had all broken and Council had not mended them or charged people for the water which they were using (two vegetable gardeners had private connections). So in fact they had been enjoying free water for over a year.

OPTIONS FOR CHANGE

The present system of revenue collection is inefficient. Options for change are put forward:

~~XX~~ Domestic water fees be abolished - District Councils could then concentrate on collecting cattle watering revenue and money from private connections. Water would then be seen to be a similar infrastructural provision to primary schools, for which government plans to abolish fees in 1980.

Responsibility for buying the diesel could be made a part village responsibility. The extent of the contribution expected varied according to the size of the village. The village contribution could be worked out between the villagers and Council. The headman,



the VDC and the Councillor would be ultimately responsible for making sure that the village target was met, although Revenue Collectors would help supervise collection, and keep records. It would then be possible for villagers to see some relationship between the service they received and the money which they were paying.

It should be noted that in Lesotho village committees were found to be better able to deal with revenue collection on an occasional basis such as for the installation of a water supply than to cope with regular collection of water fees.

CONCLUSIONS

5.5 Community Involvement is not an issue of whether people are paid to dig trenches or whether they dig them unpaid but a matter of the overall say the villagers have in designing and running the supply system. Asking villagers in one village to dig trenches unpaid whilst people in the neighbouring village have been paid for doing it is likely to produce resentment rather than promote community co-operation. If promoting some measure of 'self reliance' is seen as a desirable and realistic goal of water supplies it has to be approached in a way which gives villagers real control over what they hope to receive. At the moment planning is from the top down, villagers are supplied with a service which answers their 'felt need' and their control is limited to saying where the standpipes should go. How realistic is it to think of organising water supplies in Botswana in another way? Why is it important to involve villagers more in this process at all? Some measure of community involvement is necessary for the service to secure the support of its users. Presumably even if villagers are not responsible for maintenance it is important that they take day to day care of the service they are receiving. This was illustrated by what the headman in Ramotswa told us:

'A lot of the problem with water supplies in this village is with people not caring for the standpipes. Just about 3 days ago the Water Affairs man came to tell me that someone had disconnected the pipe to take the tap, water was spilt out for the whole night emptying the reservoir. This is just one example. We have tried speaking to the people about this problem for a long time now. Some even bring their cattle to drink at the standpipes, this causes the Council worry. Water for cattle is outside the village not inside.'



Day to day co-operation with the pumper and supervision of him especially in the remote villages is important so that villagers should be involved in ensuring that the service runs smoothly. Apathy can lead to an unnecessary waste of resources.

5.5.1 In what ways can the community become more involved? To include villagers in the planning and setting up of the water supply, means that the means of technology has to be chosen together with them. There are several examples in Botswana where this is being done, one is in Selokolela where the villagers visited during a consultation tour said that water supplies were their most pressing need. Rural Innovations Centre (Kanye) then held discussions with them using puppetry to decide on the sort of water supply they wanted. Did they want a windmill with its attendant problems or a handpump accompanied by a sand filter with the problems it would have. The villagers eventually chose the latter and are at the moment raising money to buy the parts for the handpump and then they will come to Kanye to make it themselves. This method of installing water supplies is certainly slower and more laborious than sending a drilling rig in to drill a borehole for the villagers. Many meetings have been held using the time of skilled personnel and the hand pump is not yet built. This method has a dual advantage however. Firstly it brings a water supply within reach of a small settlement which presently is not eligible to receive one and could not expect to be served for several years under the WB 30 programme. Secondly, by involving villagers and using a level of technology which is comprehensible to them, maintenance and running of the supply become much less costly and demanding and the repair work necessary should be minimised. Another example of total community involvement is in Ngami land, where the Remote Area Development Officer has been hand digging wells with groups of Basarwa (Bushmen) with the aim that each group will form their own settlement around the well once water has been found. Unfortunately these groups have not been able to strike water so that they are now turning to borehole drilling, as the community mobilization aspect of the project has been successful. In Hukuntsi the well has been equipped with a handpump which pumps water up to a standpipe and can be operated by everyone. This method seems to have been successful in meeting the needs of this small community.

These experiences have two things in common, the first is that they are all dealing with smaller communities. The second is that they have their own skilled manpower resource. To be successful a community based water project needs constant input from skilled personnel to guide and encourage villagers. Social and community development staff could play an active role in promoting this sort of co-operation provided



that skilled manpower with the required technical knowledge was committed from Central Government to working with the district staff. Community involvement might also be socially and technologically appropriate in a small village, but is probably not appropriate in the same way in a major population centre such as Mochudi.

RECOMMENDATION No. 8 to Ministry of Mineral Resources and Water Affairs
Ministry of Agriculture

When supplying of water to lands areas and small settlements is being discussed the experience of RIIC and Hukuntsi must be considered. It should be possible to pilot some other schemes similar to the present one in lands areas. Without considering low capital cost community based alternatives, it might be difficult to significantly accelerate the programme for supplying water to lands areas and small settlements.

RECOMMENDATION No. 9 to Ministry of Local Government and Lands

Ministry of Mineral Resources and Water Affairs
Total community involvement is probably not realistic in larger settlements, however partial involvement with day to day care for water supplies could be encouraged. This could be done by more information being disseminated at community points such as the school (specific recommendations are made on this later), clinic and kgotla. Also by giving VDCs, headmen and extension workers specific responsibilities for working together with the pumper to sort out problems which arise at village level such as water around the standpipes (health hazard) and low pressure in the standpipes (not enough storage, narrow pipes, pumping hours insufficient, etc.). There needs to be channels whereby villagers know what to expect and which they can go through if they want improvements to the present system such as extra standpipes in the village, a cattle watering point outside the village, a village washbasin. This requires strengthening the village-District-Centre liaison, outlining together possible projects which might involve villagers (extension of standpipes, filling in pools around standpipes, washbasin in the



village) and the back up needed to assist at each stage. The villagers could be told what to expect at a meeting and the possible problems with the water supply.



SECTION VI

WHAT BENEFITS?

TIME/ENERGY SAVING

6. 'It is much better, in the old days people had to go a long way to fetch water, they got sick, they could not go so far to look for water, now it is better.'

When asked about the benefits that reticulation had brought almost every family mentioned the relative ease with which they could now fetch water. This is one of the immediate objectives of putting in a water supply and one which requires very little complementary input to achieve.

6.0.1 Water Affairs policy is to reticulate to within 400 meters of every home in the village.

APPROXIMATE PERCENTAGE OF HOUSEHOLDS BEYOND 400 METERS

	<u>Total No. of Households</u>	<u>% of Total beyond 400 meters</u>
Mathete	183 ('71 Census)	10%
Modipane	135 ('76 Census)	Non reticulated. Distance from water source varies with the side of the village and the season of the year.
Sojwe	176 ('76 Census)	6%
Tsamaya	100	15%

In Tsamaya this figure is higher because the village is more spread out and two extreme ends of the village are hardly reached by the reticulation system at all.

6.0.2 DISTANCE TO WATER WITHIN SAMPLE HOUSEHOLDS

	<u>Villages with Reticulation</u>	<u>Villages without Reticulation</u>	<u>Lands and Cattle Post</u>
Range	50-800 meters	200-850 meters	60-4 Kms
Mean Distance	386 meters	510 meters	1.5 hms
Modal Distance	200 meters	400 meters	1.5 hms
Total Sample Size	- (35)	- (20)	- (15)



6.0.3 Within Mmathete people used to walk to a borehole outside the village to fetch water before reticulation. The before/after difference would be as follows:

Before reticulation

8% of households within 400 meters of permanent water source
(i.e. the borehole)

After reticulation

90% of households within 400 meters

In Modipane there was said to be a great deal of seasonal difference in walking distance to the water source. During the rainy season and immediately afterwards when the wells are full of water, walking distances are usually not over 800 meters. As they dry up people use the PWD borehole between Mokatse and Modipane which is over 1 kilometer from some homes. They were forced in the past to go to the borehole between Oodi and Modipane (about 5 kilometers away).

TIME TAKEN

6.0.4 It is estimated that it takes about 1 second to walk 1 meter and that there is usually a 1 minute pause at the standpipe and 2 minutes to fill the bucket when there is no queuing. At the well in Modipane there is approximately a 2 minute pause and 4 minutes to fill a bucket of water. One household collects between 3 and 5 buckets per day. If this is taken as a mean of 4 buckets, time taken in the different villages would be as follows:

TIME TAKEN IN WATER COLLECTION PER HOUSEHOLD

	<u>Villages with reticulation</u>	<u>Villages without reticulation</u>	<u>Lands/Cattle Post</u>
Mean time taken on one trip	16 mins.	23 mins.	Water is often collected with a sledge and a drum. This alters the amount of time spent in water collection. If it was collected in buckets this would take 55 minutes round trip. 3:40 mins if 4 trips made but less trips taken.
Mean time spent per day	1 hr. 4 mins	1 hr. 32 mins	



The mean time difference in water collection between villages with and villages without reticulation is 28 minutes per household per day. The time and energy expended on water collection can be seen as time and energy lost on other activities. A bucket of water 15L weighs 15 kilos.

6.0.5 Respondents said that they used the extra time they had gained for relaxation. They pointed out that it was difficult to specify exactly what they did with the time, but that life was generally easier for them. Given the more important other factors which enter into whether a household decides to plough, it seems unlikely that time saved will necessarily be spent on productive agricultural work. One respondent in Ramotswa said that she went to sell oranges in Gaborone with the extra time she had gained since the reticulated water supply had been put in, but this seemed to be an exception. It is unlikely that the reticulated water on its own would have made such a reordering of her pattern of life possible.

'WOMEN'S WORK'

6.0.6 An adult woman in Botswana works from 6.30 in the morning until around one o'clock and then again from 4 until 6 then goes to bed at about 8 o'clock. In the afternoon she usually rests or goes visiting. Gumba gumba parties where beer is sold are usually held in the afternoon in the village. People go home when it gets dark especially on moonless nights. Unless firewood is bought from someone selling it she goes to fetch it every second day or so, sometimes from an hour's walk away. On these days and the days on which she does the patching and flooring in the compound she works longer hours. The exact amount of time spent working varies with the number of adult females that there are in the yard and with the state in which the lowapa is kept. Given this long arduous work day of heavy physical labour, this extra time to 'ease off' should be seen as valuable in itself. In this context it is appropriate to quote one extension worker whom we interviewed:

'It is still a man's world and men are at the top planning these things. It is hard for a man to realise what goes into the washing of blankets and keeping a baby's bottle clean. Just keeping the home ticking over without keeping anything sterile is difficult.'



6.0.7 At group discussions in Modipane, Mmathete and Tsamaya groups of women were asked what jobs took the most time and energy within the household. The results were the following:

Firewood collection - this was listed as the most demanding task by all three groups. They pointed out that firewood was growing scarcer every year and they had to walk further to gather it or buy it from people who gathered it in donkey carts.

Ploughing

- The women in Tsamaya stressed that this was a difficult task. Men normally do the actual harnessing of the draught power and ploughing whilst women are responsible for hoeing, thinning, scaring the birds, harvesting and threshing. In this case the women said that they also ploughed themselves as many of the men were away.

Women in Modipane said that how hard they worked depended a lot on the time of year - whether they were working in the fields in addition to their other tasks. Two groups mentioned that one problem during the agricultural season was that children were left alone in the village with no adult to look after them.

Stamping corn

Smearing the lowapa

Fetching water

Washing clothes

Gathering thatching grass

Were mentioned amongst the various groups as being other demanding tasks.



BETTER HEALTH?

7. 'Clean water is essential for the health education we are giving, you can stop talking without water.' (F.W.E. Tsamaya).

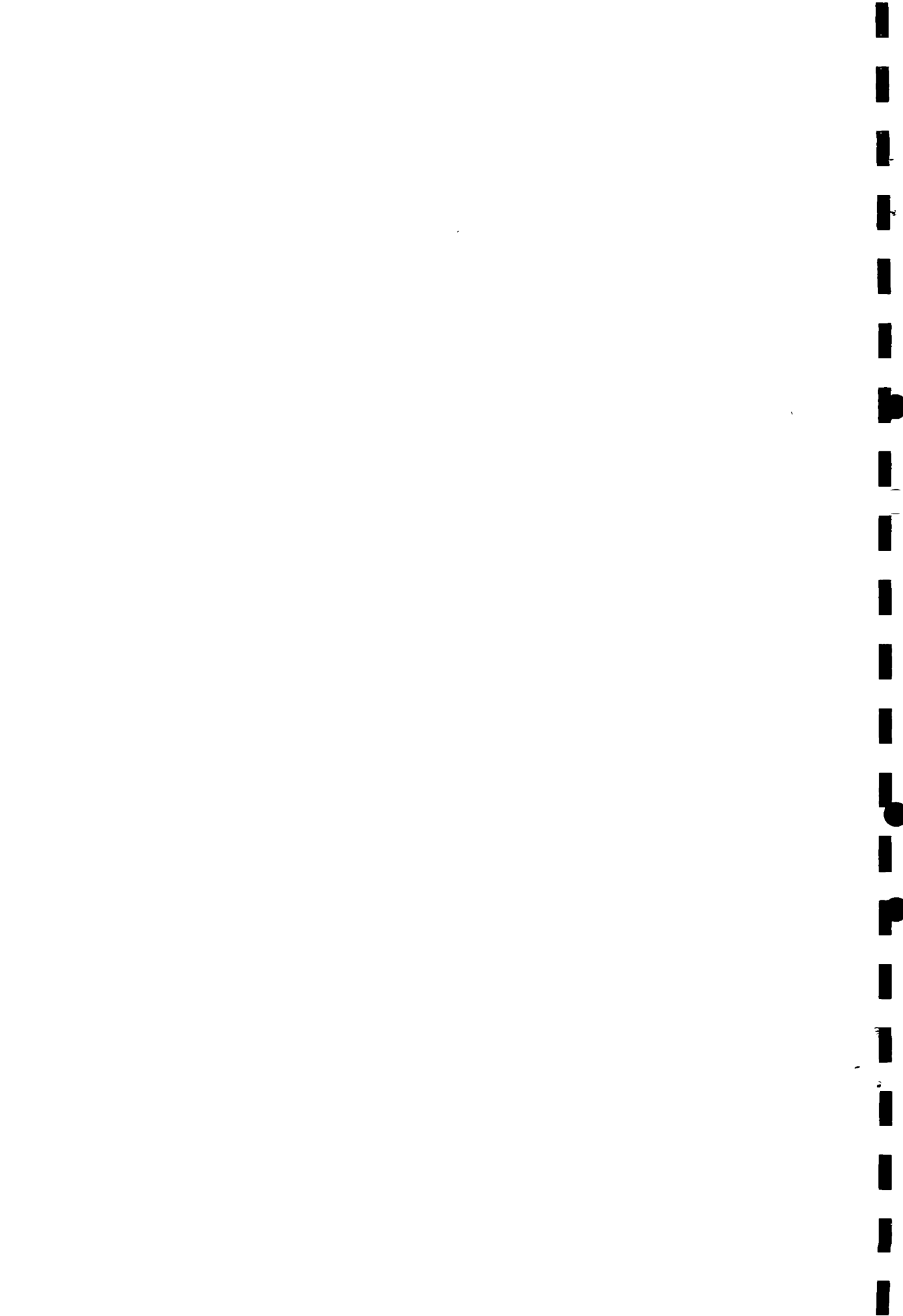
No detailed analysis of the impact of clean water supplies on health has been possible within the time and expertise limits of this study. However it has been pointed out by the Ministry of Health in their keynote paper that clean water is a priority for health improvement, but it is difficult to specify and quantify the benefits that any one improvement alone can bring. This section aims to outline some general points and give some views of the people working in health care.

7.0.1 Health staff in the clinics which we visited noted improvements in the number of skin infections they were treating and also in the number of cases of diarrhoea and vomiting. The staff nurse in Tsamaya told us:

'It is my impression that septic sores are seen much more in villages without water. They lessen when water is put into a village. Diarrhoea seems to be caused by other things besides dirty water. We see more sore eyes in the dry season when there is a lot of dust. There are eye infections especially at Gweta and Nata and at cattle posts where there is no water at all.'

The FWE in Tsamaya pointed out that there seemed to be less diarrhoea now than when the people in the village were drinking from the river. Diarrhoea can be caused by a number of factors such as poor food, polluted water, etc. Without doing extensive testing it is not possible to say whether it is water borne or water washed. The groups most vulnerable to enteric diseases are generally children and babies, whose feeds are prepared with water. Gastroenteritis is one of the killers of children in Botswana. The incidence would be expected to be lower in areas where a clean water supply is in use.

7.0.2 There was no clinic in Mmathete or Tsamaya before 1976 so records cannot be followed back. In Sojwe and Modipane there are only health posts which are visited once a week/every 2 weeks by mobile clinics from Lehpepe and Oodi respectively, whilst Tsamaya and Mmathete have their own clinics. The nurse in Tsamaya pointed out that ringworm was very common, especially in small children, but as it was not painful parents did not bring children to the clinic with it. More extensive research is necessary before any conclusions can be drawn.



WATER POLLUTION

7.0.3 Pollution of the improved water source is becoming an increasingly large problem in Botswana and one which affects health benefits.

Bacteriological and chemical tests were carried out in 18 villages around Gaborone by the Water Pollution Engineer. In Modipane 2 of the (uncovered) wells and the 2 boreholes were investigated. The well in the centre of the village and the well located outside the village were found to have a high level of bacteriological pollution (over 100 times the number of total coliforms bacteria per 100ml. recommended by WHO). The old and new boreholes had very little. The well in the centre of the village and the old borehole also had a high incidence of chemical pollution - about 5 times the safe nitrate level in the water. The new borehole and the well outside the village were relatively free of nitrate pollution. This means that people using the well in the centre of the village and the old borehole (at least half the residents on the Modipane side of the village) are highly susceptible to diseases from the polluted water supply.

FAMILY WELFARE EDUCATORS

7.1 The FWEs are the critical cadre involved in primary health care. They are responsible for educating people about hygiene, communicable diseases, etc. At present there are about 350 in Botswana, and 90 are being trained every year. They are women chosen by the village, sent on a 3 month course and then returned to their village to continue working. As pointed out by one member of the Ministry of Health, they in fact have the most difficult task - changing people's ideas.

'It is possible to give people medicines and vaccines but trying to tell them to change their way of thinking, the way they eat, look after children, is a difficult thing. It depends on what they are used to before and how they are thinking now. It is a slow process.'

It was felt by the interviewee that progress was being made in this field and that people were now more interested in covering wells and boiling water.

7.1.1 Clean water is a necessary prerequisite for effective health education. The person in charge of FWE upgrading training pointed this out.

'We need a water source where we are not dependent on people saving water constantly. For example, where people are getting water from wells at Themashanga there is not enough water for



every member of the household to wash in different water even if there is T.B. in the house. We tell them all sorts of things which we know they can't do without water. For example, we tell them to fully immerse bottles in water, 'boil the bottles then immerse them in water'. You need to keep rinsing things to keep them clean, you can't do that in a drop of water.'

7.1.2 The causes for most diseases are complex. It is very difficult to quantify the benefits which come from any one improvement. An improvement in the amount of bilharzia might be expected when a clean water supply is put into a village. Yet in Mochudi which has a reticulated water supply an estimated 40% of the schoolchildren have bilharzia. Apart from using river water for washing, etc., people also wade through the river when it is in flood as there are only 2 footbridges in the village. Bilharzia is also likely to be increased by poor sanitary conditions whereby faeces enter the water and there are a lot of people in the area. A clean water supply is not going to have much impact then, unless there are a number of complementary inputs - such as better sanitary facilities and more awareness of the disease.

RECOMMENDATION No. 10 to Ministry of Health

Full use should be made of the Family Welfare Educators. The possibility of preparing some back-up materials on water supplies in Botswana and using the installation of a water supply as an occasion for presenting these materials, be considered. These materials could include visual aids such as posters, pictures, etc., and a leaflet with some simple suggestions, for example, covering storage containers and raising them off the floor.

NUTRITION

7.2 Nutrition is another important factor in general health and well being - especially for children who may become apathetic and not grow to their full capacity due to malnutrition. On the forms which are now being used to make a follow-up study of 'at risk' children, there are questions relating to water usage. 'At risk' children are defined as all children below 80% standard weight for age.



Bringing the water source nearer directly affects the amount of energy expended in fetching and carrying water: the more energy which is used relative to the amount of food eaten, the worse malnutrition is likely to become. Provision of a clean water source is also likely to reduce certain diarrhoeal diseases which attack children. Diarrhoeal diseases reach a peak during January and February (the hot season) which affects the weight level as people become dehydrated and lose weight.

7.2.1 A nutritional survey was done in Kgatleng in 1975. It was found that the village with the most children at risk was Modipane, and with least children at risk was at Dikgonnye (a lands area). 42% children were then at risk in Modipane. It is interesting to compare these findings to the research which is being carried out by the nutrition unit now. They have found that the peri urban areas and surrounding villages to the large towns like Gaborone and Francistown seem to have consistently high averages for the percentage of at risk children in the area.

7.2.2 Averages for Gaborone and Francistown were consistently high at *1 around 28-30% of children at risk. One of the highest percentage of 'at risk' children was found to be 45% in Gabane in the Gaborone region. This is possibly due to the 'client' status of the peri urban areas and the low socio economic status of the people living in them. The implications of encouraging people to move into larger villages, as they then become more economic to plan for and provide with water supplies needs to be examined with reference to the resultant stratification, the loss of agricultural base and the social costs of that policy to the poorer members of the community. The re-emphasis on smaller communities engaged in arable agriculture, if successful, should provide a partial alternative to major village/urban drift with its ensuing social problems.

HYGIENE

7.3 Disease Perception

It did not seem from our discussions with people in the village that they had assimilated the relationship between diarrhoea and vomiting and unclean water. When asked what causes diarrhoea people usually

*1 Nutritional surveillance as a Method of Planning the Prevention of Hunger Situations presented to the Drought Conference. Dr. Kreysler.



answered 'bad food'. Many did not know of methods of purifying the water and one even answered that dam water was better than the standpipe water in the village, although this reply was untypical. Bad water was perceived to be turbid water, water where animals drank, salty water and muddy water. Bad water was said to be fit for washing, gardening, smearing, watering smallstock and livestock, but not drinking and cooking. Two different water sources were often in use; for example in Ramotswa amongst households near to the river, river water was used for building, gardening and watering smallstock whilst standpipe water was used for cooking, beer brewing and drinking.

7.3.1 People were also asked what caused flies. Some answered that they did not know, others said that milk attracted flies and that they were worse at the cattle post than in the village. Other interviewees answered that flies were attracted by dirt or food. When asked what attracted mosquitoes, almost all the respondents answered that it was stagnant water as they could be seen mainly after the rains. In terms of perceived health benefits we received answers mainly concerning increased washing, less skin sores and dryness of the skin. The people whom we questioned did seem to be aware of parasites such as ringworm and tape worm.

WASHING

7.3.2 Increased washing is said to be a health aid particularly in helping to reduce the incidence of skin diseases, and diarrhoeal diseases. The approximate mean amount of water spent on washing per household per week was found to be 170 litres. On average adult women in the village washed between 2 and 3 times a week using 1-2 buckets per wash. Men washed between once and twice a week, often using less water. School children usually wash their face, hands and legs every morning before going to school using 5-10 litres of water. Washing is related to appearing 'attractive' thus young women tend to wash more than older women and men. Older people on the whole are more sparing with water when performing different activities. When water is far away children are sometimes washed in the same water as each other and even in some cases adults will use the same water for washing. This practice seems to be reduced when water is brought nearer. Almost all the households had a bath or a basin which was used for washing, and claimed to be using soap. During the dry season in Modipane some women complained that they did not have enough water to wash often enough and that their skins accordingly got very dry and flaky. They also complained that the water from the present borehole in use is very salty and irritates their skin, so they have to buy 'Sav' which not everyone can afford.



7.3.3 Children tend to go and bathe in the rivers and dams during the rainy season and it is going to be difficult to control this practice even if they are aware of the dangers. It seems important then to protect the rivers as much as possible.

7.3.4 Washing clothes was done 2-3 times a week using 4-5 buckets whilst a bigger wash was done once or twice a month using more water. The mean water consumption per household per week on washing clothes was found to be 115L. It was observed that houses close to the water source tended to wash clothes when they got dirty rather than waiting until the 'big wash' to wash the clothes. Several households were also observed doing a big wash at the borehole. In Mmathete several women over the 2 week observation period brought baths with them to save carrying water backwards and forwards and would spend all day at the borehole spreading the clothes out on bushes to dry. In all the villages which we visited it had been decided that no washing should be done at the standpipes because the pressure was too low and because it was felt this would increase the mess around the standpipes. Villagers were asked if they would be interested in having a washbasin at one of the standpipes, as is the practice in other countries. Reactions were mixed, some women felt that it would create a mess around the standpipe whilst others thought that it would be a good idea, especially for the big wash. Five households in Mmathete mentioned that they sometimes took their washing to the borehole. These tended to be households who were far from a standpipe.

RECOMMENDATION No. 11 to Ministry of Water Affairs

It would seem that the installing of a concrete washing basin at the borehole, or one of the standpipes (wherever suitable), would facilitate clothes washing so that women could bring their washing to it instead of having to carry many buckets backwards and forwards. If it was well constructed it need not create a mess around the bottom. This could be proposed to villagers as an extension of the reticulation if they would like it.



SANITATION

7.4 Out of the 40 village interviews conducted:
29 households did not have a latrine
6 had dug latrines (2 of these had fallen down)
5 said that they were in the process of digging the pit/putting
up the superstructure.

Reasons given for not having a latrine were:
can't afford it - 23 respondents
haven't thought about it - 6 respondents
no one to help dig it - 1 respondent

The total number of latrines in each village were observed to be:
Modipane Mmathete
15 (approx.) 23 (approx.)
though a few of these toilets had fallen down.

Houses with toilets usually had one concrete house in the yard as well, indicating that wealth is one factor in whether a household have a latrine or not. This means that in Modipane 1 household out of every 9 has a latrine. In Mmathete 1 household out of every 8 has a latrine.

7.4.1 It is not usual to use a latrine belonging to another family, although public toilets at government institutions will be used by villagers if they are not kept locked. All the latrines were pit latrines except for those in the clinic and the school in Tsamaya. Latrines belonging to the District Council have not been included in the above figures as Council facilities are usually constructed with latrines. The school in Siviya with over 200 pupils was an exception; with no latrine for teachers or pupils. Other households were using 'the bush'. Elsewhere it has been observed that people in smaller villages have certain places which they use for defecation whilst people in larger villages tend to go wherever is nearest. As the village grows, this becomes more of a problem. The 4Bs at Mmathete gave this as one of their main problems in health. They perceived the main health problems in the village as follows:

- 'A lot of children are not properly looked after, they get bacteria in the food'
- 'there are many children in the village with ringworm'
- 'people throw their rubbish into the pit in the centre of the



village. People also use it as a place to defecate. There is also a stream which people use as a toilet. This might spread disease.'

'At night it is especially difficult to go out so you use any place as a toilet.'

RECOMMENDATION No. 12 to Ministry of Mineral Resources and Water Affairs

An environmental sanitation campaign is being organised for 1979. It is important that Water Affairs have a lot of input into this. The latrines currently being recommended are the Botswana Type B and an improved aqua privy. Both these types of latrines have implications for water consumption and pollution of the aquifer which need to be weighed up and discussed. Certain precautions need to be taken, such as setting aside a protection area around the borehole and district staff need informing of these dangers.



EDUCATION

8. Schoolchildren are some of the beneficiaries of the improved water supply and are, not surprisingly, meant to be some of the biggest wasters of water. The headteachers in the villages said that punctual school attendance had improved with the installation in the village of a reticulated water supply, as the children did not have to go so far before school to fetch water for the household.

Three of the schools were also starting vegetable gardens, although school vegetable gardens were also being started in villages without water supplies in working order, e.g. Siviya.

8.0.1 Schoolchildren are some of the biggest beneficiaries of water supplies because they are also being given an awareness (hopefully) of how to use the water to the best advantage. An adult educator observed:

'The educated people in the village are the ones who derive the most benefit from water improvements, not the rich people. The educated people are aware of how to use the water to the best advantage. For example people in the village where I am staying do not generally see a need for vegetable gardens. I am investing a lot in fruit trees as we are now getting a lot of fruit and vegetables from South Africa. This is going to change and I feel the need to be self-reliant, not reliant on South Africa. With fruit trees there is a belief in Setswana that by the time that the tree bears fruit that person dies. When I started my orchard people came to me and said how many children do you have that you can risk dying? Two men asked me last week - "as your fruit trees grow so fast did you put human flesh in your trees." If you resist dying then people associate you with being a witch. We educated people are the ones who benefit most from the water, we have changed attitudes and know what to use it for.'

8.0.2 Standards 1-4 are the standards in which children learn about water. The primary school syllabus is in the process of being revised and the following topics should be considered for inclusion in the new version.



RECOMMENDATION No. 13 to the Ministry of Education

That the children should be taken to visit the borehole and have the way in which the borehole, the standpipes and the storage tank work explained to them as simply as possible.

That water is presented as a scarce resource which needs conserving. A practical project could be for children to do some counting in the lowapa and decide what water is used for, which activities use a lot of water, etc.

Perhaps a simple pump could be made with the children to show them the principle behind pumping water from the ground as well as constructing a sand filter.



SECTION VII

THE EMPLOYMENT ISSUE

Water supplies are not seen in NDP IV as just an Infrastructural service but as 'an economic asset' as well. The relationship between water supplies and different income generating activity will be looked at in turn here.

BUILDING

9. Building falls into two types: traditional building, i.e. smearing the lowapa with a mixture of sand, dung and water, and 'Sekgoa' (Western) building, i.e. concrete houses. Sometimes houses are a mixture of traditional materials and concrete. Traditional building is the preserve of women, while modern building is a man's preserve and is seen as a 'professional' job. Smearing is seen as just one of the household duties and does not usually involve income earning.

9.0.1 Tsa Setswana 'In the Setswana way'.

Building a hut can take between two and three weeks. One woman in Tsamaya said that it took her two weeks to mould a hut using 6 buckets of water (95L) per day. Another two women in Mmathete said that it took the two of them 4 days using one drum of water every 2 days (100 litres a day).

9.0.2 Smearing the lowapa is usually done after harvesting when the family returns to live in the village. Some compounds as well as having an outer fence also have an inner courtyard, sometimes made with designs on it, this inner courtyard has a certain traditional significance. The 'big' smearing then usually consists of rebuilding this (it might have fallen down during the rains whilst the family have been staying at the lands) and doing any repairs necessary to the huts inside the compound. It is also customary in some places to smear a threshing floor, but this is often done at the lands home not in the village.

9.0.3 There was a noticeable difference between Modipane and Mmathete in this smearing as the people in Modipane claimed to only build once a year, whilst the people in Mmathete were usually doing this smearing twice a year. More building in the lowapa was one of the major benefits which was expected from the reticulation in Modipane alongside more washing. Several families in Mmathete said 'before the water was brought nearer we only used to smear once a year now we smear twice.'



As well as the major rebuilding in the compound there is also the constant work to be done of 'patching and reflooring' both outside the huts in the compound and inside the huts themselves. Mud huts take a good deal of care and maintenance which is one of the reasons that people prefer to build in concrete if they can afford to. It is difficult for women to specify how often they do it or how much water they have to use. One woman in Mmathete said 'It depends on whether the place is still in good condition. When it deteriorates we do it again. It is like polishing a house for you, so for us we do it so many times we can't count, you would use a duster; so we smear again.'

Several households planned it down a little further; the amount of maintenance required depends on the amount of wear and tear the floor of the compound is getting. Figures quoted varied between 2 buckets twice a month for both patching and flooring and patching once a week (4 buckets), flooring three times a month (3 buckets).

9.0.4 It was noted in the report on environmental sanitation that 'Levels of both cleanliness and chamber water levels were observed to vary with distance from the standpipe.....'

Although this improvement might not be quantifiable, it was certainly felt strongly by women themselves that it was easier to keep the lowapa clean once they were nearer to water. This does not mean during our observations that this was always done. The amount of work done in the lowapa seemed to depend on a number of variables, not just distance from the standpipe. Proximity to a water source however opens up the possibility to do more. The majority of building done in the village is still being done by women using mud bricks.

9.0.5 Building 'tsa Makgoa' (the white man's way)

The chief builders using concrete in each village were found to be the Council builders or those working for the Council. In both Sojwe and Mmathete the Councils were in the middle of building new facilities in the village. This observation about the amount of building being done for Council as opposed to private individuals was confirmed to some extent when we interviewed one of the professional builders in Tsamaya. He described his business as follows:

'I have been building for more than 12 years. I learnt to build in South Africa and spent 7 years in building there. You can learn a lot staying with the Europeans in South Africa. I then decided to come back and set up with my brother in building. We do most of our



work for the Council now, not for people in the village. In Tsamaya we have built 4 buildings, usually they are 2 or 3 rooms in each and they take us about 2 weeks to build. We use roughly 6 x 44 gallon drums a day in building, it takes a lot of water, mixing concrete, washing the wheelbarrow and washing the tools. Two rooms cost P700 to build if the person supplies their own materials. We hire 6 labourers from the village to work under me and my brother. Since last year a lot of people have started putting up concrete houses because water is near now.....we want to expand our company and employ more qualified builders from the brigades...'

9.0.6 The number of compounds with concrete houses in the yard in each village was roughly the following:

Mmathete : 30

Modipane : 25

Tsamaya : 30+

Sojwe : 15+

Both Mmathete and Tsamaya had people who were professional builders in the village and did building for other people. There seemed to be a lot of people doing their own building as well. One man who was building a concrete house in Mmathete was working with just himself and a labourer. He was collecting 150 litres a day from the standpipe to do building. In Gabane one household close to the standpipe have set up a block making business using water from the standpipe coming through a hose into their yard.

9.0.7 The amount of entrepreneurship shown by people seemed to bear some relationship to the time that they had spent in South Africa. This was found to be true of vegetable gardening also and was mentioned in Carol Curven's original report on Tsamaya. There were also a noticeable number of half finished buildings especially in Modipane and Mmathete. When we asked one family about this they said:

'Our brother started building this house, mixing cement and laying bricks: some other men were helping him. He was using spring water for it as the springs are nearby. When it was as you see it now, he ran out of money to make the cement so he has gone back to the mines in South Africa to earn more money. He will finish the house when he gets back.'



SUMMING UP

Provision of water in the village facilitates both building the modern way and building in the traditional way. It is especially beneficial to women as they often carry water for 'smearing the lowapa' in buckets. It is not possible to say with any certainty that more building is done in a village with water than a village without water although it was mentioned by many respondents as an expected/perceived benefit of reticulated water supply, and the larger rebuilding was found to be done more often.



BEER BREWING

9.1 Beer is brewed because it is 'traditional', e.g. 'I brew as my mother did'. After harvesting it is often combined with a letsema (work party) for fencing the yard; and finally for sale as well as simply for home consumption. Observations about the amount of beer being brewed in the village varied with respondents; some said:

'It is easier to brew beer now than it used to be although we brewed the same way in the past before the pumps.'

whilst others maintained:

'There are no changes in the village because of the water except for beer brewing. There is more beer now than there used to be because water at that time was very scarce.'

Beer brewing in Botswana is of two types - Bojalwa (sorghum beer) and Khadi (beer made from brown sugar fermented with some flavouring). Khadi has a number of other names such as 'Monna mogolo' (a 'real' man), stulapoko, etc. Low grade Khadi has come to be regarded as quite a health hazard.

PATTERNS OF BEER BREWING

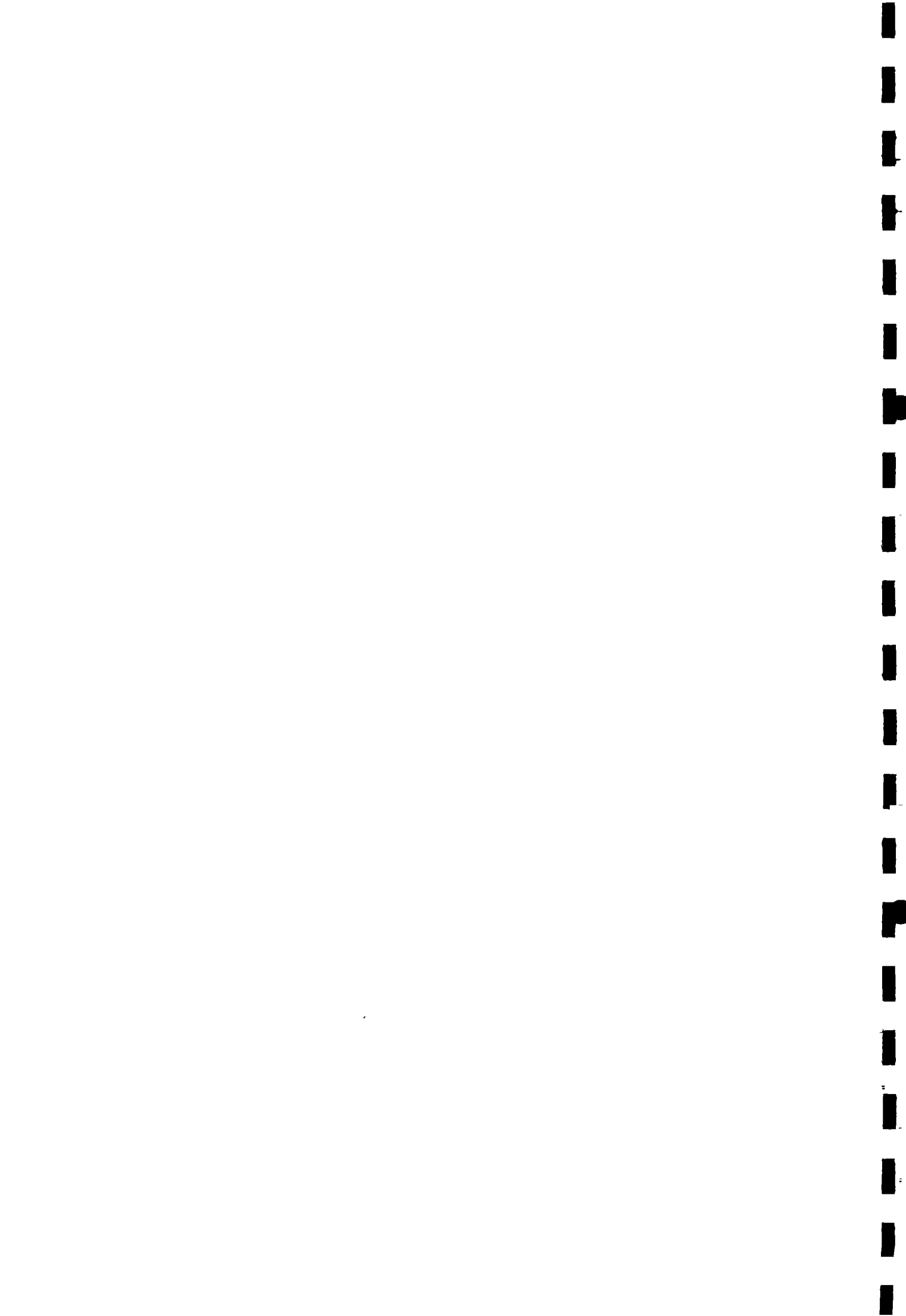
9.1.1 Patterns of beer brewing in the villages appeared to be like this:
Mmathete

The beer business was said to be bad. Only four households in the sample were brewing Khadi more than 4 times a week, for sale. One household said that they were receiving a profit of 80T on 20L, another put the profit at 25T. Women were usually not sure how much profit they were making, they had not calculated the outlay and the profits on the outlay exactly. Bojalwa was being brewed between twice a month and once a year. The amounts of water used in brewing Bojalwa rather than Khadi tended to be larger. The amounts ranged from 75L to one drum of water. 5 households said that they were not brewing beer at all. One reason given for not brewing Bojalwa was:

'We only brew it when there is enough corn. This year we only got 7 bags, that will last the family until December or January, it is not enough to brew beer with.'

Modipane

More families were brewing Bojalwa than Khadi. Only 3 families in the sample were brewing Khadi at all. They also complained that the beer business was bad; 'the village is small perhaps that is the reason that it



is difficult to sell the beer'. There were not as many complaints as there had been in Mmathete. Bojalwa was being brewed between once a week (for sale) and twice a year. Quantities of water used ranged between 60L and a 220 litre drum. Some of the reasons given for not brewing beer were:

'If I have money then I brew beer'.

'I no longer brew beer because people no longer plant sorghum, they only plant maize. When I go for majako (agricultural labour in someone else's field) I come back with maize only.'

The profit from Bojalwa was said to be greater than the profit to be had from Khadi. One figure quoted was P3 profit on a P2 outlay for corn. Beer brewing is a means of income redistribution within the village, beer is in demand and women are able to supply it, in spite of the fact that villages often have a bottle store which stocks bottled and canned drinks. Khadi is usually sold at 5T a cup and 10T a bowl. Bojalwa is sold at 10/15T a bowl. These figures have been relatively static for a long time, and they do not seem to have risen in proportion to the cost of the ingredients.

Tsamaya

Khadi brewing had been forbidden by the headman. Only Chibuku and Bojalwa were drunk. People in the village had been organised to take it in turns to have a beer party. They paid 25T to a member of the VDC who registered their names on a list and then they were told that they could throw a beer party when their turn came around. 5 out of the 10 interviewees said that they did not brew beer at all as they had no sorghum. The rest brewed between 3 times a year and once a year, using between 2 and 3 drums of water. The beer brewing was usually combined with the sale of fatcakes (a mixture of flour and water fried in oil) and sometimes meat. A gumba gumba machine is usually hired for the occasion (P5 a day was one price given).

9.1.2 From this information it can be seen that the amount of beer brewing done varies with the market for the beer, the amount of sorghum people have, personal preference, etc. The Rural Incomes Distribution Survey estimated that beer brewing was an important item in income earning for female headed households with very little other means of support. Bojalwa is commonly preferred to Khadi, although it takes longer to prepare (2-3 days), whilst Khadi can be prepared overnight.



GARDENING

9.2 There was 1 small vegetable garden at the school in Mmathete and there were reported to be over 7 vegetable gardens at the lands, 3 communal and 4 belonging to individuals. Several people in the village (Mmathete) were in the process of preparing gardens. In Tsamaya there were three commercially minded vegetable gardeners and 2 in Siviya. Apart from the *AD there were no vegetable gardens belonging to private people in Modipane or Sojwe. In each of the villages except Tsamaya the school had a vegetable garden and vegetable gardens were being started at the clinics in Tsamaya and Mmathete. The amount of vegetable gardening done did not seem to bear any direct relation to the presence or absence of standpipes. For example, the best communal gardens were seen at the lands areas around Mmathete where people were drawing water from wells. Water close by is a pre-requisite of gardening, so people with gardens tended to be close by a water source which they had often made themselves. The AD* in Mmathete mentioned that the vegetable gardens at the lands had done well last year as there had been a lot of rain; but many hadn't ploughed this year because of the lack of rain. Two of the three large vegetable gardeners in Tsamaya had private connections in their yards and those in Siviya had dug wells in the gardens themselves. The vegetable gardeners at the Mmathete lands had also dug wells, but these wells had dried up and they were considering drilling their own borehole.

9.2.1 The interest of the extension staff in promoting gardens seemed to be an important factor in the number of gardens in the area. The AD in Mmathete and the FWE in Tsamaya were both interested in promoting gardening and had encouraged people and shown them what to do. One or two more people in Mmathete said that they were preparing to plant vegetables, this tends to work by demonstration effect as people are not eager to put all the work necessary into it unless they have seen that people have had benefits elsewhere. Another factor inhibiting gardening is that proper fencing is necessary for maintenance of a good garden to prevent the goats, chickens and cattle getting in. This usually means wire mesh or constant replacement of thorn bush fencing, requirements which are not within everybody's means.

9.2.2 The Ministry of Agriculture now has a unit which is promoting horticulture amongst small farmers. As well as working on the setting up of service estates for vegetable gardeners, they are also interested in promoting more vegetable growing at the cattle post and lands areas.

*AD - Agricultural Demonstrator.



They have noted that to make vegetable gardening an economic venture requires proximity to a large market such as Francistown or Gaborone, which limits its overall possibility as a large economic activity in most of the country. To attempt to grow some vegetables to supplement diet and perhaps sell to neighbours occasionally is a different proposition however.

A CASE HISTORY

9.2.3 The gardeners interviewed in Tsamaya and Siviya who looked on it as an economic venture had all had long term exposure to South Africa and Rhodesia. They were all male. Here are some extracts from the interview with one of them:

'When I finished school I joined the army and went to the second world war. We were sent to the Middle East - Cairo, Jerusalem and Ismailia...We were away for 3 years. When I got back I went to work in Cape Town doing leather work, making suitcases, men's bags and women's bags. I got married in 1957 - we had an 'English' marriage (at the DC's office). My wife stayed here while I was in Cape Town, I got paid £7 a week. Then I went to work in a dairy in Mafeking for three years. I got paid £6 a month there. I worked in Lobatse as a skinner from 1961 to 1969 at the Botswana Meat Corporation. When I came back to Francistown in 1970 I was doing vending jobs selling sugar, cabbages, kaffir corn (mealie meal), anything I could get hold of I sold. I started gardening in Lobatse in 1964 then I left. When I came this way I started gardening again. I started a third time last year but when the rains came so early they destroyed everything. I got the idea from the Transvaal, I worked for a certain Boer there in his fields for 6 months. I stopped gardening again in 1971 because I did not have any water, we were getting water from the railway or digging wells but about that time the wells went dry. I started again when I got a tap in my yard..... I have been doing it on my own without any advice from the molamissi (AD) growing cabbages, spinach, tomatoes, pumpkins, onions, carrots, etc. I haven't been paying for water as the tap broke on the meter last year and they haven't come to fix it... If I had money I would buy kingsmoss manure which keeps the soil moist and cold.... Last year I sold a lot of vegetables and made a profit of 45 Pula. It wasn't properly looked after as the goats got in and destroyed the vegetables - I was in Francistown and my wife wasn't around. I sell my vegetables mostly here but I also sell some in Francistown. I want to make this a big



vegetable garden so I can sell in Francistown..... If I wasn't near Francistown it would not be worth my while because people here only buy vegetables now, but after the rains they have merogo ya setswana from their fields but that is when I have a lot of vegetables. Have you any help to give me with gardening because gardening is very difficult? I don't have insecticides, fencing, etc... I want to make a big garden not just for myself but for the nation.... I have tried to borrow money through the National Development Bank but I was refused. I think it was because I do not have many cattle. I do not want money because with money I might abuse it. I want fencing and insecticides such things.... I like this work very much, it gives a lot of money....'

9.2.4 The FWE in Tsamaya told us that several women in the village had been stimulated to start making vegetable gardens for themselves:

'The mothers are interested in growing vegetables, during home visits I encourage them. They are suffering from lack of relish to put with the porridge so I encourage them to grow vegetables to get something to eat. Some are selling and getting money. There are over 20 vegetable growers in the village now, people start gardens and then leave them when they go to the fields. When they finish at the fields then they start again.'

Another factor which affects people's interest in growing vegetables is the reliability of the water supply. The frequent lack of water in Mmathete was one of the reasons that people gave in the village for not growing vegetables. Two days without watering at a critical stage can mean that all the time and money invested in gardening go to waste.

9.2.5 One problem which affects small entrepreneurs is the lack of credit facilities for small producers without cattle security. This is being tackled to some extent now by a scheme funded by Barclays Bank's Development Fund in which credit is given to small producers.

9.2.6 As well as growing vegetables, people in all the villages were found to be gathering veld foods and eating them as an important seasonal supplement to diet. Some villagers were reluctant to admit this as they felt that gathering was seen as primitive. The FWE in Siviya, however, told us that she was encouraging people to gather: 'We can go and find mogorogorwana and use it instead of oranges.'



CATTLE AND SMALLSTOCK WATERING

9.3 In all the villages which we visited, cattle and smallstock were being kept in the village. A large number of cattle kept in the village was also noted during the pre-study of Mahalapye and Palapye. Only those people with a larger number of cattle had a special cattle post, whilst others would either keep their cattle at the lands all the year round or take them to the lands after harvesting to graze on the stubble in the fields. Lands areas and cattle grazing areas have traditionally been separate to prevent too many disputes over cattle breaking into someone's field whilst they were ploughing and destroying the crops.

9.3.1 Out of the households interviewed in Modipane and Mmathete, 33% kept their cattle in the village for at least part of the year. 51% kept smallstock in the village to be looked after by children. The lack of cattle watering facilities was pointed to by respondents as being one of the problems with the village water supply. Although in Modipane, for example, the cattle were drinking from dams around the village when there was water in them, they still came into the village, polluting the ground and drinking from the water around the standpipes. We were told that goats were even able to operate the press button taps and turn the standpipes on, thereby wasting a lot of water. When the dams dry up people sometimes take bowls of water for the goats and let them drink next to the standpipes.

9.3.2 People are not going to stop keeping cattle in the village because there is a law which forbids it. It is best to encourage the establishment of a permanent cattle watering and smallstock watering point outside the village. It is important to discourage animals around the standpipes polluting the water supply although at the same time there is a strong feeling amongst many people in the village (especially small cattle owners) that they would like to keep their animals near them, as they can't afford to employ anyone to stay out at the cattle post/lands area and they can drink milk from animals kept in the village which is an important part of their diet.

9.3.3 In Mmathete a cattle watering point was being run outside the village by a syndicate operating a borehole. This system was said to work smoothly, the syndicate charged non syndicate members water fees of 70T per cow per year and 10T for a goat. People were also told to bring bush fencing for the borehole if they wanted to draw drums of water to take back to the lands.



RECOMMENDATION No. 14 to Ministry of Mineral Resources and Water Affairs
When a water supply is being installed, approaches to establishing cattle watering points need to be considered. The community should be encouraged to keep cattle watering outside the village.

In the Ministry's keynote paper it was suggested that syndicates could be encouraged to take responsibility for operating cattle watering boreholes. Separate boreholes at which to water cattle outside the village maintained by a syndicate with other villagers paying water fees seems to be one of the best alternatives. Another alternative is to consider the construction of cattle watering points outside the village using the yield from the domestic borehole provided that it is high enough. It should be worked out exactly what funds and support are needed to do this and the community should be at least partially responsible for bearing the cost of this service.



SECTION VIII

THE MIGRATION ISSUE

10. The question of whether people are spending more time out of the village than they used to do and why that might be so, is a very large one. A national migration study is being carried out in Botswana at the moment to determine just some of those things. All that can be given here are some case histories which we noted from the four villages we visited and the implications of these impressions for planning water supplies.

10.0.1 Mmathete

We asked the headman at Mmathete if more people were going to live at their lands permanently. He said:

'Water is like food; just because there is food at the lands people shouldn't come and live permanently at the lands. Water is like that. People shouldn't come and live at the lands. It is customary to have a village, cattle post and lands home separately. People tend to stay more at the lands now because of the new ways of farming, you have to plough, plant and even after harvest you have to continue staying at the lands. Take me for instance, very soon after harvesting I will have to plough again. This has a bad effect on village life, it means that people leave their village homes and abandon custom.'

Clearly he felt that there was some conflict between what people should be doing (according to tradition) and what people (including himself) were actually doing. The Agricultural Demonstrator in Mmathete estimated that about 5% of the village had gone to live permanently at the lands, the rest of the farmers came back to the village at least for some months of the year. He also pointed out that many families in Mmathete itself had given up farming completely. (13 out of our sample of 20 had not ploughed the previous year). He told us about 7 vegetable gardens which had been started in different lands areas, 3 of them communal, and said that people were staying out at the lands to look after them all the year round. Asked why there seemed to be so much gardening out at the lands and none in the village he replied:

'nothing is going well in the village, the problem with people here is that the village is divided into two. The people here belong to two different parties. The councillors, the headman and the organisations like the VDC don't all co-operate, there are a lot of misunderstandings between them. At the lands the only party



which people belong to is the 'farming party'.'

We were able to visit two lands areas and one cattle post around Mmathete area and interview people there.

10.0.2 Gatampa was one lands area with a communal vegetable garden run by the Red Cross organisation there. There were said to be 7 households in the area who had moved out to live permanently there. The family we interviewed still gave their village as Kanye however, although they had abandoned their home there. The children were staying with relatives in another village to go to school. They were fetching water from a man-made spring, before which they had gone on a tractor to Mmathete to collect drums of water. They said:

'We want to borrow money from the National Development Bank to extend our establishment. We have thought of making this place into a big farm with vegetable growing. Our problem is water. We are thinking of drilling our own borehole here.'

This family were wealthy, owning a tractor. They were also 'student farmers' having attended a farming course at Sebile.

10.0.3 Kangwe was another lands cum cattle post area, the other side of Mmathete village. When we went to interview in one home, the household said:

'There's a great scarcity of water around here so we become wild when we see people like you who just come and ask questions, then go away again without having done anything.'

Kangwe is a 'villagised' lands area with an agricultural demonstrator already settled there and a private school financed by members of the community. The AD told us that there were approximately 100 households living around Kangwe, staying there with various degrees of permanency, but that the majority of households wanted to see it become a village so they could stay on the spot, next to their farming. One family whom we interviewed had always lived at the lands. They did not have any cattle of their own but the household head had bought a planter with his earnings from the South African mines. He lent the planter to other cattle owners, who would come and plough for him in return. He was getting a harvest of between 16 and 20 bags of sorghum and beans altogether. The beans he sold to BAMB (transporting them on a donkey cart) whilst the sorghum was sold locally if there was a surplus. This family did not have any village home, their children attended the private school in Kangwe. They said:



'It is good for a person without cattle to make his life at the lands. Even if you haven't ploughed you can still go for majako in someone else's field and get something. You can't go for majako from the village.'

There did not seem to have been any movement into Mmathete to get services.

10.0.4 Modipane

The lands areas belonging to people in the village tended to be only several kilometers away, therefore people walked every day there and back during ploughing season. There were several 'villagised' lands areas near Modipane which contained people who gave their village as Mochudi.

Dikwididi which was said to have about 60 households, was one of these areas. It has been recognized by the District Council as a settlement area and a health post has been established there. A Council school is in the process of being built, and it already has a well stocked shop. The headman of the area gave us the following account of its history:

'Dikwididi started as a bush. It belonged to Chief Linchwe I and then Linchwe chose a certain ward - the Rokologodi from Mochudi to use it as a lands area..... they still had homes in Mochudi and used this as a lands area. When they first settled here springs and pans were used for water. There used to be more rain then, so we didn't need any one water source we just used springs and pans. The place started to expand when my generation found that there was enough water so we would stay here all the time; our parents would go to Mochudi and then come back. We had nothing to do in Mochudi; we were looking after cattle; even now there are cattle around here..... the school started when we saw how many children there were and we couldn't always go to Mochudi with them. We asked Council for a school. The furthest home from here is about the same distance as it is from the Kgotla to Paphane in Mochudi (approx. 2 miles). The people are not moving closer because it is a lands area. More than half the households live permanently at the lands. We are getting water from springs and dams which we dig ourselves or from the nearest borehole at Matlagi, that is still far away, as far as from the Kgotla in Mochudi to Morwa (about 4 miles).'

(This area is scheduled for a Council borehole).

Families were in various stages of permanency at the lands. In one household which we interviewed, the husband stayed at Dikwididi permanently whilst the older children stayed in Mochudi with a relative and the wife commuted to and fro.



Matlagi was a cattle post and lands area at which there was permanent settlement. The facilities there included a health post, a shop and two boreholes. Families were said to be spread out but there was a central meeting point at which they held Kgotla meetings.

10.0.5 Tsamaya

The settlement pattern was slightly different in Tsamaya, as it is in North East District where land is scarce. Lands and village homes tended to be combined, with lands within walking distance of the village. The village was very spread out.

10.0.6 Sojwe

Sojwe was in fact at one time a lands and cattle post area. Village homes were in Lephepe and Molepolole and the people staying out in Sojwe permanently were usually the servants of those who had cattle and lands there. There was also a considerable number of remote area dwellers living at the lands and cattle post areas around Sojwe.

Totlamarulla, a lands area near Sojwe, was one example of a lands and cattle post area, with no communal organization. After the rainy season water was fetched from Mohatle borehole (about 6 kms away). Drums were charged at 50T per drum or poles for fencing for the borehole. One family told us however:

'We go to Sojwe at drought times like after harvest when there is no water, but we don't have any homes there we just make small sheds to live in. We have asked the land board at Sojwe to allocate us land because of the water situation.'

This family had the resources to maintain two homes; poorer families said that they had to decide either to stay where they were or move completely. There was an abandoned borehole in Totlamarulla which people wanted Council to take over.

Tshade Tshade

Tshade Tshade was another example of a 'villagised' lands cum cattle post area near Sojwe. People and cattle were drawing water from the same syndicated borehole. There were 77 children at the school, and the area was said to be expanding as people from other surrounding areas moved closer so that they could send their children to school.



10.1 Within the above examples, there is a trend towards spending more time at the lands than previously amongst people who are agriculturally interested. It seemed from the people that we spoke to that people making this move are either rich and commercially minded farmers, or poorer farmers who have no means of subsistence in the village (other than by migrating out of it). The first category tend to have access to some form of transport - tractor, donkey cart - and the resources to maintain two homes if they want. For the latter category it is more difficult to keep two homes. By opting to live at the lands they lose access to the services available in the village such as a piped water supply, unless these services are brought to the lands. It seemed that many people have opted to spend most of their time at the lands, putting their time and resources into one home instead of into two or three homes. People are in different degrees of permanent settlement at the lands. One pattern which we observed was that the men would stay most of the year at the lands, where cattle would also be kept, the children would stay in the village to go to school and the women would commute between the two places. It seemed also that people were increasingly 'villagising' the lands and setting up their own facilities such as private schools before Council comes to take them over.



SECTION IX

CONCLUSIONS

11. This study has described the impact of village water supplies on 4 small to medium sized villages in Botswana and in the light of this information has made certain recommendations which, if implemented, would maximise the benefits of the programme. The study has found that village water supplies have benefited people in that:

- i) Time and energy expended on water collection is reduced for adult women especially.
- ii) Everyone in the village is given equal access to an improved, all the year round supply which lessens dependency of some individuals on others.
- iii) Household duties (washing, building, cooking, beer brewing) are able to be performed with greater ease and frequency.

The most frequently perceived benefits of the programme were:

- more washing and building
- more beer brewing
- extra time to relax/spend on other household activities
- that children could fetch water on their own

11.0.1 It is extremely difficult to quantify the changes which actually take place within the lowapa and within the village with the installation of a village water supply. Water is only a facilitating factor in change, so that the extent to which that change takes place depends on a number of other complex interrelated factors such as the socio economic status of the recipients and the effectiveness of the village extension workers.

11.0.2 All groups, both rich and poor, benefit from the improved water supply, provided that they have village homes. School children, those with education and entrepreneurial skills and institutions are able to take best advantage of the water as a basis for carrying on their activities. By making access to water equally open to anyone the dependence of non water source owners on people with dams and boreholes is reduced. This is particularly important in the dry season when people have traditionally to 'go from place to place asking for water' and sometimes have to pay high prices to receive it. As the cattle and people population grows and the veld deteriorates, traditional water sources also become more inadequate. People who do not benefit significantly from the present programme are farmers living out at the lands and cattle post areas. As has already been



pointed out some of these people are amongst the poorest section of the population in Botswana with a low level of access to social services. In order to meet the needs of people in low population density areas, the needs of lands and cattle post areas have to be examined and the present programme adapted socially and technologically.

11.0.3 This study has attempted to describe the role which water supplies play in rural people's day to day lives. Now that this general background is available scarce resources should be concentrated on examining specific problem areas rather than conducting more short general studies which are only likely to produce the same conclusions.





15. Yield last year?
If not ploughed, why not?

16. Own: water cart
donkey cart
tractor
car

B. WATER SUPPLY

1. Where do smallstock drink in village?
2. Livestock ever brought to village to drink? When?
3. Sources for own water (own tap, sp, river, etc.)
4. What sources used at the lands do they dry up?
" " " " " c/p what other sources do you
use when the water source
breaks down/dries up?
5. How far away are water sources in the village
at the lands
at the c/p
6. Which family members spend whole year in village
about 6 months
come occasionally
7. Has this changed in recent years?
8. How many buckets, drums, etc., are fetched per day?
9. What kind of bucket, drum is used (direct observation)?
10. What containers are used for storing water (d.o.)? Are they covered/
open?
11. Do you use different amounts at different times of the year?
12. What does the amount you use depend on (No. of people in the lowapa..)
13. Who is responsible for fetching the water?
14. Who fetches the most?
15. How is it fetched?
16. At what times of the day is water fetched?

C. PAYMENT

1. What do you expect to pay/have you paid so far for domestic water?
2. How was this money collected?
3. What did you use to pay before the sp/pc was installed?
4. Payment at the c/p
at the lands
5. Is this village payment a fair amount?



D. HISTORY

1. When was present supply introduced?
2. Who chose the spot for the sp?
3. Did you make any contribution to the installation?
4. What were your previous water sources? How far away were they? Dry up?
5. Do you know the pumper? Who chose him?

E. EFFICIENCY

1. How often does supply break down?
2. Who fixes it? How long does it take?
3. What are the problems with the supply? (lack of pressure at certain times...)
4. Is the water supply good/acceptable/bad??
5. How could it be improved?

F. OPERATION

1. Do you queue to fetch water?
2. Do you go with other people to fetch water?
3. Has the social side of water carrying changed in recent years? Why?
4. Have you considered having a private connection?

G. ACTIVITIES

- | | |
|---|---|
| 1. <u>GARDENING AND FRUIT TREES</u>
Sale/Consumption | Have you ever tried to plant?
Water used
Advice sought
Success/Failure |
| 2. <u>SMEARING LOWAPA</u> | How often
Is there a difference from before
reticulation?
Water used |
| 3. <u>BEER BREWING</u>
Sale/Consumption
Profit? | Kind of beer
When last brewed
How often made
Has this changed recently |
| 4. <u>BUILDING</u>
Profit? | Make/buy bricks
Any building in yard last 2 years |





DRAFT OF TERMS OF REFERENCE FOR A STUDY OF THE VILLAGE WATER SUPPLY
PROGRAMME IN BOTSWANA.

1. INTRODUCTION

The provision of a clean reticulated water supply system in villages has been one of the priorities of the Botswana Government's rural development programme. Since 1972 SIDA has been involved in financing borehole drilling and reticulation schemes to meet this basic need. The purpose of this study is to provide an economic and social assessment of the impact this programme has had on the rural population.

2. EMPLOYER AND LIAISON

The consultant carrying out this study will enter into a contract with SIDA; however the consultant will act in close co-operation with the Ministry of Mineral Resources and Water Affairs.

Representatives of the Ministries of Water Affairs, Local Government and Lands, SIDA and the District Councils concerned will act as a reference group. As well as reporting to SIDA the consultant will interview staff of the District Administration, the Councils, Land Boards and Tribal Administration.

All relevant information and studies should be made available to the consultant.

3. PRINCIPLE OBJECTIVES OF THIS STUDY

The consultant is required to:

- (i) Evaluate the Rural Water Supply Scheme in the light of the Botswana Government's goals for water supply and rural development; and assess the project's effectiveness in meeting the aims of Swedish Assistance Policy.
- (ii) Make recommendations for remedying problems in the present supply system and suggest complementary activities which would maximise the benefits of the water supply programme in future.



4. SPECIFIC AREAS OF STUDY

The consultant is to investigate the socio economic consequences of placing a water reticulation scheme in a village. Particular attention will be paid to:

- (i) The quantitative changes in water needs since water supplies have been introduced and the purposes to which that water is put. The extent to which the water is transported outside the village and the social groups benefiting from this.
- (ii) The amount of time saved by women and children carrying water and their use of that time.
- (iii) Operation of the water supply system - the degree of community responsibility for the operation of the scheme, problems such as time spent queuing at standpipes and supply breakdown. Alternative water sources in use and why?
- (iv) Impact of the scheme on the social and physical structure of the villages. Effects it has had on migration patterns to the lands and the cattle post; and changes in the spatial allocation of plots in the villages.

This information will be examined with reference to the ways in which different social groups benefit from the improved supply.

5. RECOMMENDATIONS

Following examination of the specific areas of study and analysis of the strengths and weaknesses of the present village water supply system, the consultant will make specific recommendations about the future of the village water supply scheme and its implications for Botswana's rural development programme. Information will be collected with particular reference to the social and economic effects of the water programme; its relationship to fostering the political and economic independence of Botswana; together with its contribution to democracy.

