

The Practice of Smallholder Irrigation

Case Studies from Zimbabwe



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ISBN 0-908307-51-9

Published in 1996 by
University of Zimbabwe Publications
P. O. Box MP 203
Mount Pleasant
Harare
Zimbabwe



Mazongoro

Cover photo from the National Archives of Zimbabwe
Cover photo sketch by Bryan Pillay

Typeset by University of Zimbabwe Publications
Printed in Zimbabwe by Mazongoro Paper Converters (Pvt.) Ltd., Harare

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The water acts in the Nyachowa catchment area

Pieter van der Zaag and Niels Röling¹

This chapter deals with a catchment area in Mutare district: that of the Nyachowa river and its tributaries.² The catchment area is made up of lands belonging to Shigodora commercial farm and Zimunya communal area. Our interest is the use of its waters. Irrigation infrastructure was developed by both the commercial and communal farmers at the beginning of this century. Since then water demand has increased whilst the catchment has gradually yielded less. In this chapter we attempt to understand how various people with a stake in Nyachowa waters have coped with this situation of competing interests, and what role formal and perceived rights to Nyachowa water has played. On the basis of the Nyachowa experience we wish to contribute to the current discussions in Zimbabwe on reform of the Water Act.³

The problems experienced in the Nyachowa catchment area are epitomised by the Nyachowa Irrigation Scheme ('the Scheme'). This Scheme was constructed during the 1930s and was assigned an irrigated area of 50 hectares in 1934 by the agriculturalist Alvord who had assisted with its design (Roder, 1965: 106). The last entry in the archival documents concerning the scheme is 1938, reappearing again only in 1954. It is not clear what happened between 1938 and 1954, but during those years 'African irrigators presumably managed their land without government aid' (Roder, 1965: 108). In 1961, Roder reports the scheme to be operational. The 28 plottolders cultivated 45 hectares obtaining maize yields of 1,400 kg per hectare.⁴ Since the 1980s the plottolders have received no appreciable water from the Nyachowa river.⁵ It is therefore doubtful whether we can still speak of the existence of this scheme. Yet it exists in the minds of one-time irrigators and officials.

The Scheme has had serious problems throughout its history. These problems are related to other users of Nyachowa water. In this chapter we adopt a catchment perspective.⁶ In a catchment irrigators have particular perceptions of the river's flow, its behaviour, and of their entitlements to it. With time, practices arise and patterns emerge informed by differing experiences and depending on one's position in the

catchment. A catchment-wide analysis is able to confront the varying perceptions and practices, seeks overlaps or common ground, facilitates a process whereby the players or stakeholders acknowledge each other's position, and may result in a shared problem appreciation (Röling, 1995). In this search for practical solutions, the opportunities and constraints posed by the present legal situation are central to the problem, and to its resolution.

Before reaching that point in the analysis, however, we describe in some detail how different groups perceive the central problem, access to Nyachowa water, and their related practices. Details seem to matter in Nyachowa. It is as if in each part the whole is, at least partly, reflected. This is not an unimportant observation, because if this is true, then the Nyachowa catchment itself reflects, to some extent, the wider Zimbabwean reality.

The chapter is divided into four parts. In the first, we reconstruct how the Nyachowa Scheme came into being, covering the period 1930–1938. The second part attempts to define 'the problem', taking as a starting point the situation in the mid-1950s. In the third, we introduce the present day actors with a stake in Nyachowa water and attempt to describe, though superficially, the actors' practices and perceptions regarding this water. The fourth part looks at institutional actors. The final section concludes that the Water Act, which is now based on grants defined in absolute volumes of water, and on the principle of priority rights, could possibly be redefined in terms of proportional rights to water.

Our study is based on fieldwork conducted during 2 weeks in August 1995, and on some subsequent archival research. Various people in the catchment as well as officers of relevant government departments and non-government organisations were interviewed. Relevant files of Agritex and the Department of Water Development were also consulted, as well as pre-1950 files deposited with the National Archives.

THE PROJECT

The Nyachowa Scheme is a typical example of a project.⁷ It was undertaken by government, and activities first started in the 1930s. Those early intervenors saw the project as an entity in itself, lifting the irrigated area out of its context, giving it a new identity wholly defined within the project's framework, and by doing so attempting to implant an island of modernity (Adams, 1992: 103–104). It is easy to see the artificial nature of such an undertaking. The purposely designed discontinuities may have solved some problems and brought water to some fields. But new problems were bound to emerge sooner or later, as will become evident in the course of this chapter.

The beginning

Archival records reveal that the first idea to construct an irrigation scheme along the Nyachowa river probably came from the native commissioner, Umtali (now Mutare),

Mr Selwyn Bazeley, around 1930.⁸ The project was surveyed by the agriculturist, Mr Emory D. Alvord, a (rudimentary) design for the main furrow made, and a budget of £100 allocated from the Native Reserves Trust.⁹ With these activities, the Nyachowa Scheme became an institutional reality.

The scheme had all the features of a hastily concocted project. When construction started it was not clear how much land would be irrigated,¹⁰ nor how much water was available in the Nyachowa river.¹¹ Worse still, there was controversy about the site of the intake of the main furrow; the final site being selected only weeks before construction started.¹²

Construction started on 18 May 1933. First a meeting was called between Alvord, the native commissioner, and 40 communal farmers; then the surveying and pegging of the first stretch of the main canal started. Eight days of hard work followed: the farmers dug some 1,100 yards, and constructed three dams (a diversion dam at the intake from the Nyachowa, and two canal crossings, one across a small 'spruit', and one across the Nyerutimba which joins the Nyachowa further downstream). Alvord left for Salisbury, and the native commissioner remained in charge of the work.¹³

Alvord was enthusiastic about the progress made in such a short time. Immediately upon arriving at his office in Salisbury (now Harare), he wrote to his boss, the Chief native commissioner:

I should like to call your attention to, what is to me, the most important factor with this irrigation project, the fact that the Natives from that part of the Reserve which is to be served by the furrow are cooperating in its construction and giving labour without wage. This is, in my opinion, the ideal way in which to open up communal irrigation projects on Native Reserves. . . . I was greatly impressed by the manner in which these Natives applied themselves to the work, and, with the exception of the first two days when they were discouraged and felt they were throwing their work away in the belief that the water would not run up hill, they worked like Trojans.¹⁴

By early September, 2.5 miles of canal had been dug.¹⁵

The first problems

The 1933/34 rainy season was bad. The recently dug furrow was used for supplementary irrigation of the maize crop. Not without problems, though. Alvord wrote:

There is much wrangling and quarrelling over this furrow and people have intentionally opened the furrow and dissipated the water on the virgin veld. The reason that no one except the demonstrator has used the water is because of this quarrelling.¹⁶

The native commissioner saw it differently:

The 42 Natives who cooperated in making the furrow are working in complete unanimity. They have used the water to its fullest extent not only on their demonstration plots but on their ordinary lands. Their crops are in excellent conditions.¹⁷

In July 1934, Alvord visited the project again, more than a year after he had launched its construction. Alvord reported to his boss that 'outlet gates should be installed where people under each Head or Kraal divert water to their blocks of irrigated lands'; and that some system of lateral furrows, branching off from the main canal, should be followed. Apparently, farmers had been 'taking out . . . lateral furrows . . . to individual lands'. Alvord ordered that 'all furrows should be taken out at right angles and at proper contour intervals'.¹⁸ These remarks strongly suggest that so far the project had merely consisted of constructing the main furrow. No thought had been given to how the water would reach the fields.

The project experienced difficulties in constructing lateral furrows and putting sluice gates in the manner suggested by Alvord, prompting the native commissioner to request help. The assistant agriculturist, Palmer, visited the project at the end of 1935. He found that only 35 acres were irrigated. Palmer wrote an incisive report to his superior:

In about six different places . . . water was running to waste and causing erosion. . . . More than half the land under the furrow is owned by Natives who will not make use of the water and will not allow others to do so Another complaint from the demonstrator was that quite a number of the furrow owners had pushed their ownership certificates into his face and told him to keep the Government furrow. This was done because he had asked them to come and do some repair work on the furrow. . . . From what I can gather there is no charge made for the use of the water with the result that every time any repairs, etc. have to be done the expense is met by the Reserves Trust Fund. This is rather a pity as it does not encourage the owners to take a real interest in the furrow, and think that is why it is referred to as the Government furrow.

Having made these observations, Palmer suggested a solution to the above problems: 'if all the land best suited for irrigation which comes below the Nyachowa furrow were to be re-distributed among the plot-owners, so all would have an equal chance to use the water to advantage.' But Palmer remained sceptical about the project's viability:

This land, however, is well suited for growing summer crops with ordinary rainfall and is largely used for this purpose. . . . At present the Natives of this area are simply playing with the water by growing a little wheat and vegetables to sell.¹⁹

Alvord received this letter and sent it on to his superior. But Alvord had to explain a few things, which he did in an accompanying note:

The impression that this is a Government furrow should be corrected . . . A Water Furrow Committee of Shareholders was appointed at first to control matters, but since a Government paid irrigation supervisor was put in charge this committee does nothing and poor co-operation with the supervisor has resulted. . . .

I wish to . . . recommend that the Nyachowa furrow be turned over to the shareholders and their committee under the guidance of the Native Commissioner, Untali, as before the appointment of [the irrigation supervisor], and that it no longer be regarded as a government furrow but as belonging to the local shareholders who did the work of digging it. Under this arrangement these shareholders can continue with their little gardens of wheat, vegetables, strawberries, etc. and under their local committee run the furrow to the mutual benefit of all.²⁰

This letter, however, did not go down well with the native commissioner. He seemed to fear that central government would withdraw support; putting in jeopardy the fate of the Scheme in which he himself had put so much effort. He therefore wrote Alvord:

Last year 29 plottolders grew 127.5 bags of wheat two thirds of which they kept for their own consumption. Might I therefore beg you to re-write your report and make the following recommendations: The furrow is urgently needed and must be developed to its full capacity . . . The lateral furrows should be completed as soon as possible and the necessary sluice gates inserted. The good land under the furrow must be re-distributed in reasonable quantities among Natives who are willing to irrigate. Once the furrow has been put in order there will be no need for any further contributions from the Native Reserves Trust Funds. The Natives themselves will finance it.²¹

In a reply Alvord softened his position,²² but by then it was clear that responsibility over the scheme would be handed over to the native commissioner. The native commissioner, in the meantime, requested assistance from the Irrigation Division, Department of Agriculture. With it came in a technocratic approach to irrigation development. The chief engineer recommended that 'The present system of idly scattered plots is both wasteful of land and water and the system used by Mr. Alvord in the Mutema reserve should be put into operation as soon as possible.'²³ The chief engineer further suggested 'that the first portion of 25 acres of irrigable land should be commanded by a lateral furrow controlled by one head gate only.' Apparently, there had been problems with these most upstream users of the furrow; problems which have persisted up to the present day.

Government withdrawal

By then, Alvord had unceremoniously withdrawn from this project, a project for which he had suggested a new approach to irrigation development. This approach differed from how he worked in the Sabi irrigation schemes. Sixty years later, this suggested alternative approach sounds surprisingly modern in some ways. The term 'shareholder', ideas about ownership, and about turning over responsibilities from government to the irrigators are cases in point. But Alvord had not much time to spend in Nyachowa. His involvement was 'quick and dirty', and his homework had been remarkably sloppy: his estimates of available water and irrigable area were extremely naive and optimistic, based as they were on superficial reconnaissance work. Added to this was a lack of interest in inventorising the existing uses of Nyachowa water, and irrigated gardens already present; this he wilfully ignored despite a report by the chief engineer in 1932 [that is before construction on the Nyachowa furrow started] who had visited Nyachowa stream in 1922, which said that 'at that time isolated small areas of land were being irrigated by the natives.'²⁴ The native commissioner and Alvord had adopted the typical *tabula rasa* project approach, perceiving the project area as virgin, empty, without a history, and subsequently parachuting in 'development' (Adams, 1992: 104; cf. Long and Van der Ploeg, 1989: 4).

Despite a fresh approach to smallholder irrigation, Alvord failed to elaborate a consistent technical design, nor did he follow through the project to its full consequences. He merely assisted the native commissioner with the launching of the latter's cherished project. All this back-fired in a curious way. The advice of the Irrigation Division of the Department of Agriculture was to follow the Mutema example, for once explicitly recognizing Alvord's accomplishment.²⁵ The Division further insisted on the need for a design fully elaborated up to plot level, with a view to having complete water control in the scheme. However, this is not what happened. Government withdrew itself from the scheme. The last entry in government files about Nyachowa is dated 1938, only to reappear in 1954 (cf. Roder, 1965: 108).

This last entry, however, points to a problem that has continually re-surfaced down to the present day. In that sense, there is more continuity in the Nyachowa scheme than the archival silence suggests. Native Commissioner Bazeley optimistically wrote to the chief native commissioner to say that the Nyachowa irrigation area 'has now been organised and is in working order. There were 61 plotholders in 1937 with a total of 120 acres under the canal.'²⁶ Mr Bazeley then explained that

40 were original shareholders under the agreement by which they or their representatives dug the canal without pay except £1 for their tax. Of the other 21, 13 are new male plotholders who have agreed to pay an entrance fee of 30/- each, and 8 are widows who have promised to pay an entrance fee of 10/- . Payment was postponed pending the construction of sluice gates and the re-arrangement of the lateral furrows which are now complete.

It is not clear whether this re-design towards full water control was ever completed. It is therefore doubtful, especially if the current situation is taken into account, that 'the other 21' ever paid to become shareholders.

THE PROBLEM

The river

Let us now turn to the other main 'actor' of this chapter: the Nyachowa flow, the thread which draws various players together. Like all perennial rivers in Zimbabwe, the Nyachowa sometimes carries a lot of water, and sometimes it carries little. At least since 1917, there has been an increasing desire on the part of various persons to use this flow for agricultural purposes. As time has passed, the Nyachowa river has found it more and more difficult to honour the increasing demands made on it during the dry winter months because its base flow has tended to diminish, especially during prolonged periods of low rainfall (for example, 1963–1966, 1991–1995). So, it faced a distribution problem: how much to divert into the furrow of the Shigodora commercial farm, how much for the Scheme, and how much to allow to flow to the five intakes further down? And how to distribute the flow once it had entered a furrow? In case of the Scheme's furrow: how much should the upstream abstractors get of the limited flow, and how much to let through to the Scheme proper?

The other actors in this play have, in various ways, tried to assist, impose, or harness the flow in different ways: *physically* by building weirs, pipes, a night storage dam, an annual dam, gauges; *socially* among people by agreeing or not to take turns; *culturally* by assigning to flows and furrows names, codes, quantities and dimensions, but also by putting spells on places where water finds it hard to pass or too easily departs its original course, or by translating these flows into paper claims which would travel to and from offices and courts, ending up bound together in the safe repositories of the archives; and *practically* by an endless combining and re-combining of the flow with a number of other elements: the river bed, debris, stones, pipes, bailiffs, padlocks and gates.

Nyachowa flow springs upstream of Shigodora commercial farm, and once it flows into the farm, there is an intake to bring the water through a pipe to the irrigated fields. A storage dam, built in the 1980s, captures the floods during the rainy season for use in the dry season. At this point in the river bed, the catchment area is about 4 km². By the time the river has reached the boundary between this farm and Zimunya communal land, its catchment measures approximately 12 km². It is here where the Department of Water Development constructed a water gauging station (known as EGP 59). Somewhat downstream is the intake of the Scheme, and immediately below is another intake for a garden furrow. One kilometre further down, the river is joined by the Nyerutimba stream with a catchment area of nearly 5 km². Here at least four other garden furrows take out Nyachowa water.

Rainfall is notoriously variable in the Nyachowa catchment, though still generous compared to other areas in Zimbabwe. At the top of the catchment, at an altitude of 1 550 metres, rainfall averaged 1 260 mm per year in the period 1951–1966. Further down the catchment rainfall is less. At the base of the mountains near Chitakatira (altitude 1,200 m) rainfall averaged 890 mm. Somewhere in between these two extremes is located the homestead of the commercial farm, at an altitude of 1 400m. Rainfall records collected here, covering the period 1985–1995 (including the very dry years of 1991 and 1992), give an average of 860 mm (Figure 8.1).

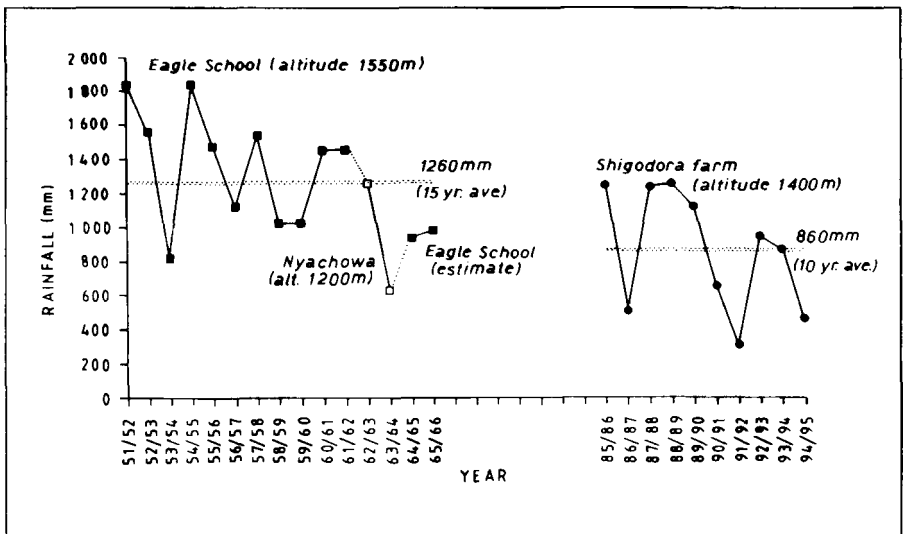


Figure 8.1: Rainfall in Nyachowa catchment (1951–1966 and 1985–1995)

Source: Data for 1985/86–1994/95 from Shigodora farm; other data from Agritex and Department of Water Development files; our elaboration

Minimum flow figures in the river at the commercial farm's intake and dam are scanty, but reveal that the water right WR 101 granted to the farm, that is, 80 litres per second, will normally not be available during the dry season. Hence the efforts of the farm to construct storage facilities. But even the maximum permitted volume to be diverted, 960,000 m³, is more than the mean annual run-off at this point.

The minimum flow, as measured at the boundary between the commercial farm and the communal land, varies between 5 and 30 litres per second (lps), averaging 20 lps for the period 1981–1994. This is water available to Nyachowa irrigators. It clearly is less than the flow granted to them in water right WR 888, that is, 57 lps continuously. Figure 8.2 provides relevant rainfall and runoff data for the period 1985–1994. The figure seems to indicate that the catchment is gradually yielding less water.²⁷ If we take these data to be accurate, then two possible conclusions can be drawn: (1) the series of subsequent drought years have depleted the aquifers so much that only after several years of good rainfall might a ‘normal’ catchment regime be expected; (2) interference by water users upstream of the gauging station (at the commercial-communal boundary) has affected discharge data to such an extent that establishing a mathematical relationship between rain and runoff figures becomes meaningless; other factors such as upstream storage facilities and use have to be included.

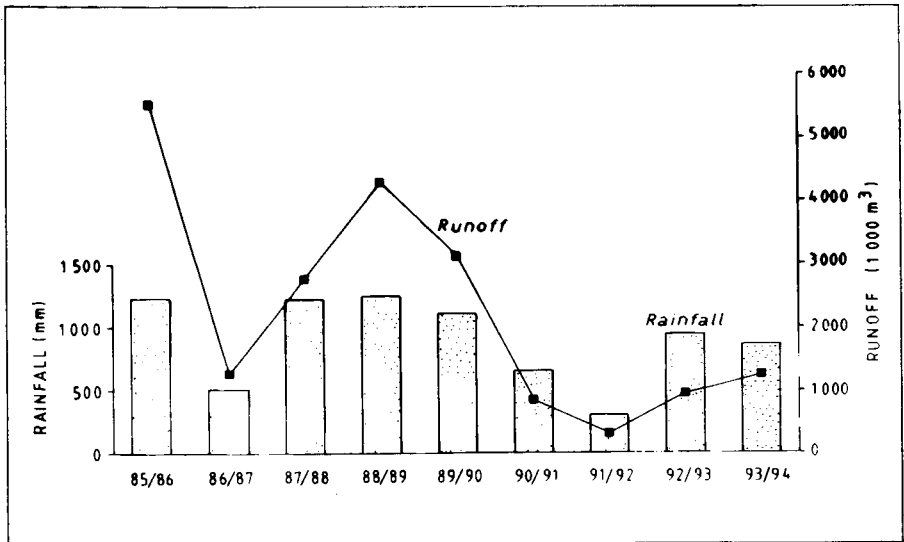


Figure 8.2: Rainfall at Shigodora farm and Nyachowa runoff (1985–1994)

Source: Rainfall data from Shigodora farm; runoff data for Nyachowa river from Department of Water Development, file EGP 59)

Despite the above obstacles, Nyachowa flow manages to reach some scattered gardens where it waters tomatoes, cabbages, wheat, bananas and other garden crops.

The problem

Nyachowa river is over-ruled and requests for new water rights continue to be submitted. Yet, in spite of the catchment's limited yield, we argue that there are opportunities to enhance water availability during the dry season. This would require cooperation between the players involved. Before introducing in more detail these players, first a recognition is needed that 'the problem' is not new.

As we have seen, the first references to water problems in the Nyachowa date back as far as 1934, when Alvord wrote that 'there is much wrangling and quarrelling'. Twenty years later, on 3 November, 1954, the acting provincial agriculturist required a 'full investigation' into Nyachowa. Five days later, the irrigation officer in the Native Agriculture Department, Mr Watermeyer, had his report ready. "It appears", observed Watermeyer, "that plottolders are listed as "shareholders", and that those not so listed have had to pay an 'entrance fee' to the committee before being allocated irrigable lands."²⁸ He went on to note,

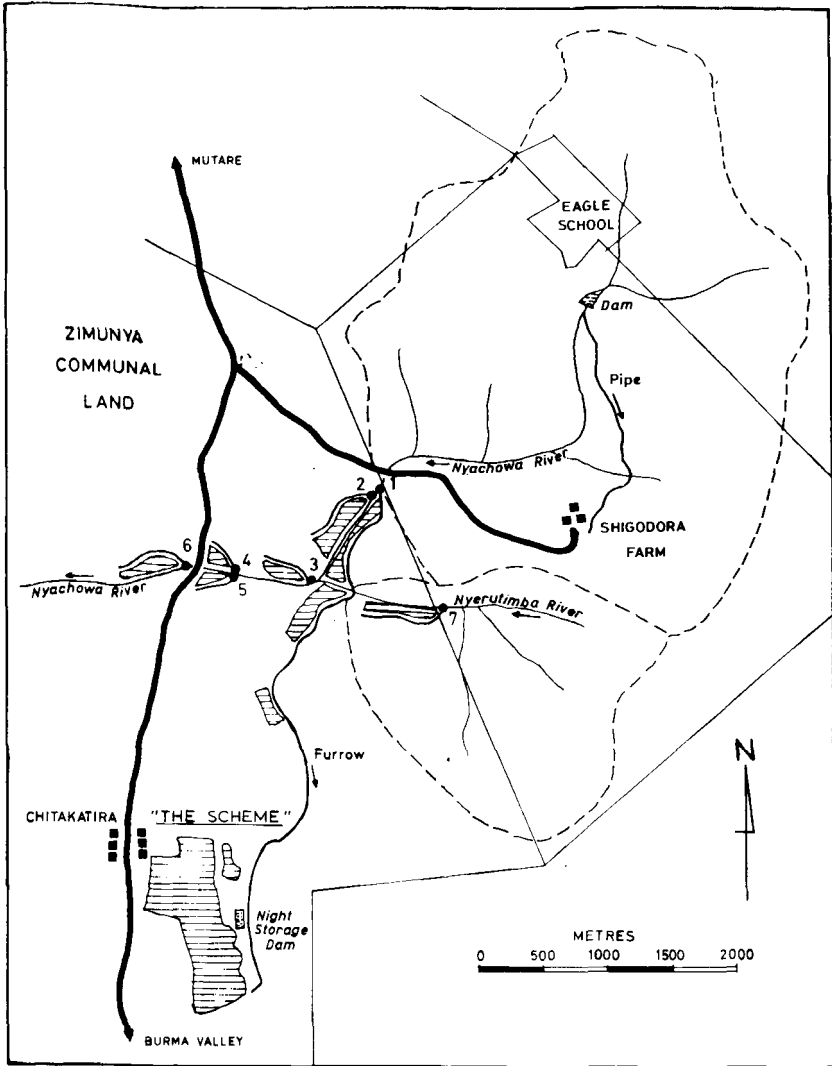
Along the length of this furrow, various natives have dug their own subsidiary furrows and abstract water for irrigation of their gardens and lands. Some of the gardens are situated a distance away and a wastage of water results, whereas others would be economic units under proper control.

Between the point of abstraction for the main furrow and the confluence of the Nyachowa and the Mupudze Rivers, there are a host of illicit furrows used by people of the reserve to irrigate gardens and wheat lands. These lands are generally too steep for normal irrigation practices, but are of fertile soil and suitable, if terraced, for growing vegetables and fruit trees.

Mr Watermeyer had the following recommendations: 'Sufficient water is available to operate this furrow to irrigate approximately 50 acres of vegetable gardens before the furrow drops down the escarpment and a further 150 acres below the escarpment could be run on the same lines as the irrigation schemes elsewhere in the Province'. With respect to the 'other users' with intakes below the main furrow, Mr Watermeyer remarked: 'As it would be against the economy of the Reserve to prohibit the illicit users of the Nyachowa water, it would be advisable to approach the Water Court to legalize these points of abstraction. . . . As these six abstraction points are for small furrows only, no permanent diversion weirs are necessary'.

Mr Watermeyer is the first to take a perspective which goes beyond that of the narrowly defined 'Scheme', supposed to irrigate 150 acres. But he omits to mention the water user upstream, Shigodora commercial farm. Figure 8.3 portrays the catchment area under study. In the following section we introduce the various players in it, and we describe some of their perceptions and practices.

Figure 8.3: Sketch of Nyachowa catchment



Key of river intakes legally recognised by Water Right 888:

1. Left bank Nyachowa, immediately below upper boundary (Scheme intake);
2. Right bank Nyachowa, 65 m below boundary, 30m below Scheme intake;
3. Right bank Nyachowa, 1 100 m below boundary;
4. Right bank Nyachowa, 2 000 m below boundary;
5. Left bank Nyachowa, 2 000 m boundary;
6. Right bank Nyachowa, 3 800m below boundary;
7. Left bank Nerutimba, 100m upstream from upper boundary (Matiengani Garden)

THE MAIN ACTORS

The commercial farmer

There have been three generations of Harry's on Shigodora commercial farm, and all three have been pre-occupied by water.²⁹ From the start, the furrow (later a pipe) which took water from the River to the homestead and fields was the farm's life line. The current farmer, Mr Jack Harry, is putting a lot of effort into understanding and harnessing the water, and getting it nearest to where it is required, the roots of his vegetables, in adequate amounts and at proper intervals. He has installed state-of-the art drip irrigation on part of his farm. In accordance with Shigodora commercial farm's water right, the farm takes all the water from Nyachowa at a point approximately 300 metres below the upper boundary of this farm. Together with his wife, Mr Harry monitors rainfall, water use, and dam level on a daily basis, and keeps computerized records. He is careful to maintain the original vegetation in the catchment, aware as he is that his fortune depends on the limited capacity of his catchment to yield sufficient water. The Harry's are aware that their fortune also depends on good relationships with their communal neighbours. The farm employs large numbers of people. In times of crisis people from the communal area will find work there, even though local irrigators agree that you can make up to four times as much money working on your own vegetable garden than for Mr Harry. The Harry's started the local primary school, and Jack sits on the Board of St Werburgh Secondary School and has personally constructed its piped water supply. During the war, the Harry's are said to have lived on the farm without problems, although whites were killed at neighbouring Eagle School. As proof of their acceptance, grandfather Harry was once an acting chief. Jack Harry was asked to become a councillor, which he declined. It seems that local people still come to the farm for mediation of conflicts.

From interviews it appears that the Harry's are respected by their communal neighbours. When the latter have a problem, the Harry's will help. For funerals they provide firewood and vegetables and attend the ceremonies themselves. As one kraalhead explains: "We are afraid that Harry will stop helping us. His dam is a source of life for everyone. People without gardens are dependent on Jack." The Harry's careful cultivation of relationships with the communal farmers has been quite effective. Most communal water users leave the farm out of the catchment equation when thinking of their water problem and considering solutions.

The 'legal plottolders'

The original irrigators of the Scheme have not seen water flowing to their fields for many years now. They are well aware of one of the reasons why the water never reaches Chitakatira: the upstream water users along the Scheme's furrow (the so-called 'illegal abstractors') take all the water. The main factor which inhibits them from taking remedial action against the head-enders is that they fear their leader, Headman and self-appointed 'Chief' Hamilton Shigodora.

The rehabilitation project funded first by Plan International, and later by the DDF, which started around 1988, may have given the plottolders a glimmer of hope: re-lining the furrow would help the water to run smoothly and without leakages through the 5 km stretch to Chitakatira. But in the early 1990s it became apparent that this was not enough to get the water effectively flowing, and the plottolders lost hope. Mr Matondo, chairing the irrigation committee of the 28 or so Chitakatira irrigators, now accepts that they may never get the volume of water needed to revive the original Scheme concept of irrigating 45 hectares, with each irrigator having 1.6 hectare plots. They now appear to understand that the best they can bargain for is a modest consolidated vegetable garden, much the same as the other intake groups have, with each getting a 1 acre plot at most; the 'little gardens' prophesied by Alvord in 1936 (see above).

Mr Matondo, understandably, is bitter about the obstruction by the headman. Yet, he recognizes the need for a negotiated solution. He is careful to stay on talking terms with the headman. Recently, he discussed with him the construction of a new dam upstream of the furrow's intake, at the boundary with the commercial farm.

The 'illegal abstractors'

Upstream along the Scheme's furrow lie a number of plots irrigated by the so-called 'illegal abstractors'. Although there are no official gated intakes which would guide the water into these plots, these irrigators have dug and drilled holes in the canal bed, or are siphoning off the water to facilitate the water getting to where they need it. This group's claim to irrigation water dates back to the time when the furrow was first constructed. Kraalhead Ghangai remembers how he worked to dig the furrow. The government paid for vegetables and mealie meal. The work lasted a biblical 3 months, 3 weeks and 3 days. Oxen were used to loosen the soil so that the furrow could be dug. The furrow was constructed up to Matondo's plot (Chitakatira Township) in 1933, mainly by the farmers upstream. Farmers gradually started to irrigate the plots in the Scheme proper. By 1940, the people below Matondo had completed the rest of the furrow. So, 13 irrigators upstream of the Scheme proper were the first to use the water from the furrow. This gave them a credible claim to irrigation water. This was first recognised by a ruling of Judge Hoffman in 1968, later confirmed by the district administrator in 1989.

The users of the upstream part of the Scheme's furrow have in Headman Shigodora a strong leader.³⁰ The headman effectively acts as a gate-keeper in more than one sense: politically but also geographically and hydraulically. He is the most downstream of the head-enders.

Headman Shigodora's strategy is double-edged. At the upstream end of the furrow he must make sure enough water is diverted into its intake, which means checking that none of the other garden groups down the river is tampering with the inlet. At the downstream end of his furrow he must make sure that the Chitakatira plottolders

simply rescind their claims to furrow water. His plot borders Nyerutimba river, which is in fact a vlei. The furrow has to cross this vlei before it continues further down to Chitakatira. At any one moment the headman may shut off the water, or make it 'disappear' in the swampy vlei where some of his people have developed vegetable gardens and welcome this water. Headman Shigodora cunningly uses metaphorical language, clothed in traditional, mythical wording, to further his mundane interests. The following are two examples.

Crossing boundaries

Headman Shigodora, who according to custom is not allowed to cross the Nyerutimba, has symbolically created a boundary between his people and Chitakatira. Most recently, he objected to the furrow cutting across this vlei and capturing all its waters. Technically speaking this crossing has always posed problems, as the foundation of the canal tends to subside in the boggy soils. A new initiative by the extension officer in conjunction with the DDF and the Department of Water Development was intended to re-capture as much water as possible from Nyerutimba and lead it into the furrow. Obviously Chitakatira plotters agreed, as their water right includes the whole of the Nyerutimba flow. But due to ill-conceived hydraulic laws and pressured by the headman, the extension officer and Mr Matondo had to negotiate until the whole project was watered down to what in fact became an aqueduct with asbestos pipes across the river, leaving the Nyerutimba flow untouched.

Headman Shigodora, aware of the importance of the project, instructed the masons, employed by DDF, to scratch the following words *Sadza Igona* in the wet cement of the pipe structure on his side of the Nyerutimba: *Sadza Igona* seems to imply that the flowing water has already been transformed into sadza (maize porridge) and 'allows people to survive', but literally it refers to a witch doctor's gourd with medicine and might also seem therefore to imply the headman's claim to have supernatural powers. On the outlet of the aqueduct he instructed the masons to write *chipo*, a gift. These inscriptions convey a clear statement: those along the upstream part of the furrow, including the headman, are entitled to the water; those along the downstream end should be grateful for whatever water flows to them.

The drums and the rainbow

Headman Shigodora has taken up a new project, to construct a new dam in the Nyachowa, some 100 metres upstream of the present intake, right under the small water fall which marks the boundary between the commercial farm and the communal area. According to him, this project will pond water where there used to be much water, and hence will ensure that the "water spirits which once lived there would return, and again play the drums, and make the rainbow" (referring to the sound of the falling water, and the visual effect of the sun shining through it). At another level of discourse, the headman believes that the ponded water behind the dam will enhance

the pressure of the water and thereby increase its volume. The headman, however, could have yet another motive for this project. By constructing this weir he makes a claim to all Nyachowa water, and might use this in his fight with the other claimants to this water, that is, the downstream garden intakes.³¹

The garden intakes

Some of the garden intakes downstream along the Nyachowa river are very old and may pre-date 'the Scheme' (see above). In the 1950s 'the little gardens were producing some beautiful gladioli, chrysanthemums and sweet peas'.³² At present, there are some thriving gardens with carnations, tomatoes, cabbages, onions, lettuce, bananas, wheat and strawberries. In some cases gardeners market their produce cooperatively. These gardens, however, face serious water shortages. These shortages are caused by distribution inequalities at three levels: (1) between irrigators sharing the same intake; (2) between the various intakes along the Nyachowa within the communal area; and (3) between the commercial and communal farmers.

- (1) Along each of the garden furrows, the shortage of water has induced agreements about distribution, and in some cases, to agreed reductions of the areas irrigated. Along two of the garden furrows the irrigators have organised themselves in A and B groups, irrigating by turns. This organisational arrangement, however, is not rigid or stringent. People say that "if your vegetables are wilting, and water passes by your garden, you are not going to let them die". The fact that garden committees exist indicates that some form of organisation exist at this level.
- (2) These garden committees, however, seem weak when it comes to taking action when people from upstream intakes try to take all the water. According to one female farmer, "our husbands get involved in this, then they discuss the issue as men." A male irrigator added: "If a problem occurs we go up there to talk. Last year there was a lot of trouble from May onwards. Some people grow wheat using a hose pipe. I do not think it is fair. It will damage us in our gardens. We went to the individual. He agreed and disconnected the pipe, but a few hours later he connected it again. So we went back. But we did not go the kraalhead. Our communication is not too strong, we are weak". A local kraalhead said: "You need very strong conversation, but that has never happened. It has never been discussed among kraalheads. There is very little water in the Nyachowa now. And Hamilton stops the water".
- (3) When asked about the little water in the Nyachowa river and how they cope with it, most people limit their analysis to the failing rains and the other intakes in the communal area and do not mention the commercial farm upstream. One woman, though, was more critical: "Jack helps a lot. He contributes to funerals. But when it comes to water, there is a problem. If he could release water on certain days to the people downstream, then we would not mind".

In all, there seems to be no agreed way for dealing with the problem of water distribution among the furrows, although it is a source of much conflict and makes vegetable gardening risky. Crops dry up as a result of the unsettled situation. Perhaps this explains the great diversity found among the gardens. Some are excellent, while other fields only show the odd cabbage or are left fallow altogether. Some irrigators appear to be more effective in getting the water to their plot than others. What is striking, though, is that the irrigators emphasise the need for 'talking', for 'strong conversation', which is as yet lacking.

INSTITUTIONAL ACTORS

The figures³³

While farmers are trying to cope with the lack of water, other outside actors from government agencies have their own way of dealing with it: they have been busy measuring flows, juggling with data, creatively interpreting figures, and in this way trying to harness the river's behaviour and to mould it to a formal legal model.

Watermeyer, in 1954, concluded that the Scheme's furrow required 70 lps, while the remaining six intakes required 25 lps, totalling 95 lps. 'Several gaugings of the flow of the Nyachowa and the furrow were made in July 1954 when it was found that the Nyachowa was flowing at 115 lps.' 'From general observation it is doubtful whether the flow at the intake ever drops below 85 lps and even if the entire flow is abstracted at this point, there is sufficient seepage to provide for the six additional points of abstraction'.

Twelve years later, on August 12, 1966, Mr Metcalf wrote a long letter to his superior, the provincial water engineer, about the Nyachowa. He measured the Nyachowa flow at various points in the catchment, and concluded that 'Following average summer and winter rains in amount and distribution, there is likely to be between 57 to 80 lps from the Nyachowa and the Nyerutimba catchments (11.8 km² and 4.6 km² respectively) towards the end of the winter. The position can be regarded as significantly worse than this in two out of three years'. This is much more pessimistic than Watermeyer's conclusion of 1954.

The hydrological engineer of Manicaland, Engineer Johnston, in 1970 reported that minimum flows in 1968 and 1969 at the boundary between the commercial and communal land were 16 and 30 lps respectively. Given the minimum of 85 lps which Mr Watermeyer had expected at all times at the same point, this is a sharp reduction. Johnston wrote: '1968/69 were bad years for stream flow at Vumba, and since Mr Harry took over the farm that year, abstraction of about 28 lps will have affected minimum flow records as most gauge post readings have been done in the afternoon when irrigation is in progress'. The fate of the Nyachowa Scheme was now sealed, since the figures provided by Johnston showed that the 57 lps granted by water right to the Nyachowa Scheme and the other intakes (WR 888) were no longer available by 1970.

The interpretation of these flow measurements attempted to make river flows comply with the formal-legal model of the catchment. However, there were continuous discrepancies between the hydrologic laws on the one hand, and the legal and political reality on the other. As the latter was real enough we should perhaps confer agency also to the water rights involved: water rights seem to act. In the following section we define more precisely the two water rights that play such an important part in the Nyachowa catchment.

The water rights

WR 888

Water right (WR) 888 grants 57 lps continuous flow of the Nyachowa River and total flow of the Nyerutimba River to the communal farmers of the area. This right has a priority date of 13 February, 1933, and defines the six intakes that have to share this water:

- (a) immediately downstream from the upper boundary of Zimunya communal area [the take-off for the furrow which is supposed to irrigate the Scheme];
 - (b) 65 yards downstream from the upper boundary;
 - (c) 1 100 yards downstream from the upper boundary;
 - (d) 2 000 yards downstream from the upper boundary;
 - (e) 3 800 yards downstream from the upper boundary.
- From the Nyerutimba,
- (f) 100 yards upstream from the upper boundary.

When in the 1960s Shigodora commercial farm applied for a revision of its water right WR 101, the district commissioner was worried about the consequences for the African farmers downstream. The provincial water engineer calmed his fears: 'No additional acreage or amount of water to be abstracted will be authorised by the Water Court and the position of the Tribal Trust Lands and the Nyachowa Scheme in particular will be unchanged'. This, however, is not what happened.

WR 101

By 1966, WR 101 of Shigodora commercial farm with a priority date of 2 October 1918, authorised the farm to divert, impound, take and use the whole flow of the public water in the Nyachowa river, at a point 300 yards below the upper boundary of the farm, for irrigation of riparian land. Ever since, WR 101 has been the subject of revisions and amendments. This reflects the increasing awareness among commercial farmers of the value of water, and of the importance of 'legalising' their claims to it. It also reflects the conducive political environment of the time which was sympathetic to the needs of the white farmers.

WR 101 originally had an interesting but somewhat puzzling clause 3: 'This Grant is issued subject to the right of others to whom use of the water may be lawfully granted to obtain the right to use, and thereafter to use, a reasonable share of the

water in the said river'. In other words, even with a right to the total flow, downstream users were, in principle, allowed access to an unspecified 'reasonable share'. This clause seems to discard the concept of priority dates. In 1970, Judge Pittman suggested to Mrs Harry to revise WR 101 'because the present Grant has a provision in it for a reduction of the flow to be abstracted as and when other applicants for water from the Nyachowa River come forward'. He asked the Hydrological Branch to advise how WR 101 should be revised 'so as to eliminate this unusual and detrimental feature, bearing in mind the irrigation needs of Shigodora commercial farm and the allocation already made'.

When the provisional revision was ordered by the Judge on 16 September 1970, the concept of 'the whole flow' was changed into a flow of 20 lps with a limit of 345,000 m³, and clause 3 was removed. However, Mr Harry now felt that the 20 lps was not enough for his plans. He hired a consulting engineer, and applied for an increase in the flow to 40 lps. The district commissioner, again, was worried about the African farmers' interests. He wrote the provincial water engineer on 30 May 1973: 'It is my opinion that any increase in abstraction from the Nyachowa above the intake would affect the amount of water available for the Scheme. . . . Please comment.' The acting provincial water engineer responded: 'Regarding your concern: our hydro branch will report on Mr Harry's application and the interest of the Nyachowa Scheme will be taken into account'. But he was wrong. The judgement passed by the Court on February 15, 1974 reads: 'It is ordered that Mrs Harry with 1067 ha be given a provisional right to abstract each year 80 lps (!). The abstraction is to take place at the upper boundary, and the priority is to be 2/10/18'. The final right was granted in April 1977.

After independence, Mr Harry applied for the right to construct a storage dam at the point of abstraction. The acting chief hydrological officer wrote on 31 January 1986, 'Although the proposal will not increase the theoretical burden on the river, in practical terms it will obviously allow the applicant to take more water than he is at present, which will have an averse effect on other right holders'. The provincial water engineer answered the query from the Court whether the Water Department would have any objection in view of WR 888 with a pencilled note: 'No objection, normal flow is to be passed down the stream'. And thus it was ordered on 23rd December 1986 that Mr Harry could have his dam of 10,000 m³. A year later an application was submitted for enlarging the dam's capacity to 30,000 m³ which was granted in April 1988.³⁴

In conclusion of this section, we observe that both WRs 101 and 888 provided a legal context for the use of Nyachowa water. These water rights are used as resources in a struggle to access more water (cf. Von Benda-Beckmann and van der Velde 1992). Shigodora commercial farm has consistently updated WR 101 to its needs. WR 888, formally speaking, has not been affected by it. But as the farm's irrigated lands increased, obviously less water became available for Nyachowa communal

irrigators. The communal farmers, on their part, are not conversant with legal models, and their struggles are battled out at other levels, as for instance was shown by the headman's symbolic mastery.

Government departments involved in the Nyachowa scheme have tended to reify the 57 lps mentioned in WR 888, and sometimes act as if this water is actually there and available. It is not, nor is the 80 lps to which Shigodora commercial farm has a right. The issuing of water rights does not seem to be informed by a systemic understanding of the catchment. But the water rights, once they are granted, do act and exert influences. In a context of dwindling water flows, the present Water Act exacerbates the inequalities laid therein, for the rights to water are defined in absolute volumes. With it, the discrepancy between what people perceive to be fair and reasonable and what actually happens also increases.

The officials

As can clearly be seen, the Nyachowa has been subject to many outside interventions. One of the most intrusive interventions has not yet been mentioned. The Land Husbandry Act in Nyachowa was enforced to its full extent around 1960, which must surely have affected the way local people perceive outsiders.³⁵ In present day Nyachowa, three departments, a donor and local farmers have spent a great deal of money and devoted years of serious activity to rehabilitate a Scheme which is unlikely ever to operate again. There is also evidence of a lack of coordination between the various departments involved, and this goes back as far as the 1930s. At the root of this 'passing the buck' lie (a) segregationist policies resulting in different departments being responsible for commercial and communal farming, and (b) disciplinary segmentation, with different departments in charge of agriculture and water. Correspondence during 1965 between the extension officer, the district commissioner and the provincial water engineer may serve as an example. The letters concentrated on funds needed to maintain the Scheme, which was apparently experiencing difficulties and was in disrepair. However, the problems were not solved satisfactorily. The provincial water engineer appeared glad when he wrote 'the Scheme, being under 200 acres, is scheduled for handing over to the Ministry of Internal Affairs for complete operation'.³⁶ In 1973, attempts were still being made to get money out of the Department of Water Development for the repair of a flume and of the night storage dam. But the government suspended all subsidies to the Scheme around 1975, after the irrigators apparently stopped paying fees.

Recent attempts to revive the old Scheme have been marked by a lack of consideration of the long history of the Scheme and its interdependency with other water users. Government departments tend to take a formalistic approach; one department focuses on the Scheme with its legal plottolders, since it is responsible for small-scale irrigation, and leaves out the gardens; another department, concerned with water, apparently did not do its homework and failed to appreciate that not only the Scheme but also other garden intakes are legally entitled to Nyachowa water.

Such official myopia is evidenced by a map produced by Agritex in 1992 sketching the location of the Scheme, that is, the plots near the Chitakatira Business Centre and the '13 illegal abstractors' near the crossing of the furrow and the Nyerutimba. Missing are the six other legal intakes and small-scale irrigation schemes. Revealingly, the figure is entitled 'Water Right No. WR 888 Nyachowa Irrigation Scheme'.

Most recently (1988–1993), Plan International (an international non-governmental organisation) offered to finance the lining of the furrow to the tune of Z\$50,000 with a view to revitalising the Scheme, 'which had not functioned since the war'. At the end of the project in 1993, there still was no water in the Scheme. By then, Plan had identified 'social/organisational problems' and 'technical problems'.³⁷

With respect to social/organisational problems, Plan observed that 'the existence of social conflict between upstream and downstream users is very obvious. The exclusion of the upstream users from the scheme by the downstream users has resulted in 'water pirating'.' With respect to the technical problems, Plan writes:

In general, the canal design is no longer suitable for the project. . . . The lack of properly designed irrigation structures and social conflicts has resulted in a haphazard manner of operation using sandbags, siphoning and drilling the canal.

Plan's project could, however, not solve these problems. In fact, the project committee representing local interests operated with lots of problems. Lack of clarity about payment for labour persisted, the members of the project committee found it difficult to organise work sessions, the upstream irrigators did not understand why their part of the furrow was not equipped with intakes for their gardens, and others. With the project, farmers' sense of 'ownership of the canal' became more obscure than ever. Irrigators continued to drill holes and siphon off the water where they deemed fit, and 'leakages' remained.

Significantly, Plan's project did not consider the downstream intakes along Nyachowa river. Plan followed the official departments' bias in favour of the formal Scheme. This is surprising because Plan International was very much aware of the presence of the irrigated gardens. Plan, in fact, financed the fencing of these gardens.

In sum, the case of Nyachowa catchment seems to show that a catchment perspective is lacking in all intervening institutions. Official tasks are segmented according to sectors and disciplines; some deal with water, others with small-scale agriculture, still others with commercial agriculture. In this total, no one takes on the responsibility for regenerating let alone developing the resources of the catchment.

IMPLICATIONS

The project

The Nyachowa story reveals some striking similarities between the perspective taken by outside intervenors at different times. Both current government departments as

well as those in the early 1930s take a narrow perspective when dealing with Nyachowa. Alvord, in the 1930s, failed to take into account the possible repercussions for downstream users of Nyachowa furrow 'taking out' all river water. It appears that officials of all times have tended to ignore the small, farmer-initiated vegetable gardens. This is what many years later created so many problems. At present, institutional actors find it difficult to bridge the by now deeply entrenched contradictions between the 'official furrow' and the 'informal garden intakes' downstream; and between the 'official ploholders' and the 'illegal abstractors'. Also, Alvord's concern about farmers perceiving the furrow as being owned by 'government' is very similar to Plan's concern with the 'lack of farmers' sense of ownership' nearly 60 years later. In both cases, one wonders to what extent the intervenors themselves were (at least partly) responsible for the emergence of these images.

This chapter has attempted to understand the Nyachowa Scheme, both in terms of it being a 'project' with all its discontinuities, and in terms of the persisting and re-constructed continuities between 'the project' and its physical and social environment. To arrive at this wider, socio-technical catchment perspective, we did some 'travelling' across time and space. Despite the fact that outside intervenors singularly focused on the Scheme and attempted to create clear boundaries between the Scheme and its surroundings, we saw that farmers found it more difficult to ignore the wider context of which they were and still are a part. A case in point is the way communal farmers stressed the importance of the presence of the commercial farm in terms of employment opportunities and safety net.

To Nyachowa farmers, a limited 'project' perspective apparently is irrelevant and unhelpful. This is not to say that farmers do not adopt and use some concepts derived from the project language. At times they find it useful to translate their own concerns, sometimes quite complex ones, into terms intelligible by project staff, adopting development discourse with a view of making claims on (outside) intervening institutions. Physical structures, for instance, a canal crossing, a dam or a fence, appear to easily qualify for such translation processes; and donors often seem willing to respond positively. But behind such physical structures often lie social and political struggles. And these are often consciously shielded from outsiders; local farmers not being prepared to go into any process of translation and negotiation at that level. Water problems, however, can hardly ever be solved by physical infrastructure alone.

The Nyachowa case also reveals an emerging parallel between upstream and downstream users at two different levels within the catchment. At the level of the Scheme's canal, its upstream users claim a right to the water flowing therein in terms of 'the right to survive', while re-defining the tail-enders' right in terms of a gift. Importantly, the downstream users appear to acquiesce, and grudgingly accept the head-enders' geographic advantage, symbolic power play and the artefact of the aqueduct. At the level of the entire catchment, it is the commercial farmer who

claims a priority right to Nyachowa water, symbolically backed up by the legal institutions of the state and materially embodied by the farm's dam; while many communal irrigators down the catchment seem unwilling to question the (small) amount of water flowing to them, viewing the water used by Mr Harry as 'that which makes us survive'! One could conclude from this that communal farmers seem to have internalised the status quo, and that their perceptions and practices seem, at least in the eyes of the outsider, 'colonised' by it (cf. Comaroff and Comaroff 1992). One should, however, also appreciate that the commercial farm does indeed provide some concrete and tangible benefits to the communal farmers. This seems to point to a need for a pragmatic approach to catchment development: the role of the commercial farm, with its benefits and costs to the communal population, should be explicitly negotiated between both parties; the status quo needs re-negotiation at catchment level.

Turning now to policy implications, the Nyachowa case makes clear that a catchment perspective to land use should override sectoral and disciplinary principles. This situation is urgent since Zimbabwe's water resources are fast becoming the most limiting factor in agricultural development. A catchment perspective should inform project design, institutional development and the legal-administrative set-up. The remainder of the chapter seeks to elaborate on some implications for a reform of the Water Act.

Legality and reality

The water problems in Nyachowa point to a discrepancy between reality and legality, and call for ways out of the inherited dualistic situation. Two characteristics may lay at the root of this discrepancy.

First, *water* does not blindly follow the rights granted according to the Water Act. The Act may state that so and so is entitled to 57 lps continuously, but in 8 of the 12 months this amount simply may not be there. Of course, the Act is smart enough to have a clause defining that in such cases some rights are more equal than others: some have a higher priority. But imagine the year 1917; which Reserve African could have possibly applied for a water right, would have known the procedures, where to go, would have known the concept of water right in the first place?

Second, *people* do not blindly follow the rights as granted according to the Act. They simply take whatever is in their might to take and use usefully. For, in the end, the water may be owned by the state, but it is flowing there and then, or not, circumscribing the possibilities and opportunities open to people. And, of course, some have been in a more favourable position to exploit opportunities than others.

It is now clear that water 'acts' in the Nyachowa catchment, as much as the Water Act itself. A revision of the Act may bring the legal model more in line with existing practices. Only if this is accomplished may we expect efforts to improve irrigation practices to take effect.

The Water Act

A reformed Water Act should be more in accordance with the actual behaviour of rivers and irrigators. The hydrologic model of a river shows that discharges naturally fluctuate, whereas the legal model conveys a static picture of absolute volumes of water. An Act based on rights to proportions of a river's flow seems to be a step towards bridging both models, and making it more in line of real-world problems. Once water rights are defined in terms of proportions to the total flow running at a certain point, the entire concept of 'priority' becomes superfluous and can simply be abolished. And with it its discriminatory connotations.³⁸

At present, the Department of Water Development uses measuring weirs to compute and monitor river discharge and flows diverted from rivers. For many people it is difficult to check whether irrigators indeed take water in accordance with their formal rights: you need readings and tables before you can compute discharges. This is important, because any legal system relies on lay people being able to 'read' whether other people observe or infringe the rules; with such transparency may come a sharing of the values laid out in that legal system; and with this may come a belief that such a system is legitimate and fair. But the Water Act has never been designed to be 'read' by ordinary citizens, nor have the gauging stations been designed in such a way that measurements are verifiable. Many people have never shared the values reflected in the Water Act in the first place. In short, many people have never considered the Water Act, and the principles upon which it is based, to be legitimate.

Even the Department of Water Development itself would find it hard to arrive at straightforward conclusions. Extensive data sets on river discharge are not enough to fully analyse a catchment's water regime: that would require equally detailed data on water *use* of each and every water user and precise data on (private) storage facilities and dam levels. Such an analysis would be required before any new application for a water right be granted. Moreover, the Department is supposed to enforce a law which hinges on the concept 'normal flow'. Under changing climatic conditions, and given the measurements that are currently taken, this figure is in fact very tricky to establish for any given site in a river. In effect, then, hydrological data always need careful interpretation, and hence easily become the subject of social or political struggle, as the above has already shown. Hydrological reports submitted to the Water Court with any new water right, should be considered constructs, even if the Court, with the granting of a right, seems to elevate such reports to the status of simple and plain fact.

Proportional rights to river flows would imply re-designing diversion weirs, which would now be equipped with notches, each with widths corresponding to the proportion of the flow the various users are entitled to. Such a technical design of weirs would be transparent, easy to 'read' and verifiable by lay persons. It would at any one time precisely define users' entitlements; also, and importantly, during times when river flow is low. It would furthermore convey the central tenet of the legal

system: that water resources within a catchment have to be shared. We believe that such a reform, from alienating water to sharing it, would connect up with communal farmers' practice and perception of what is fair and just.

Basing water rights on a sharing principle as suggested here, will have wide-ranging ramifications, the full extent of which we cannot foresee. For instance, how would one define proportions of a flow to water-right holders when the river's catchment gradually increases down stream? To be more concrete, on what basis can proportional flow be assigned to the water rights we now know so well, WRs 101 and 888, where the first has a catchment area of 4 km², and the latter 12 km²? How would one apply for a new water right?³⁹ What would the reform imply for existing storage rights? Would it do away with the present distinction between water rights and storage rights, and with it the distinction between 'water-right water' and 'ministerial-agreement water', ill understood by many people? Would this effectively imply a redistribution of ownership of existing storage facilities? We have to admit that we do not have the answers. As a thinking exercise, in an effort to temporarily break out of the reigning paradigm of absolute volumes and priority rights, our suggestion may have a role to play in on-going discussions.

Having said this, the existing Water Act provides opportunities which have not been fully exploited (Chatora, 1995, Matinenga, 1995). To give a concrete example with respect to WR 888 of Nyachowa, there is scope for change within the present legal framework: Nyachowa water users could declare themselves a 'combined irrigation scheme' in accordance with Part X of the Water Act. This would in effect mean that Nyachowa irrigators would fall back upon the old concept of being 'shareholders' of a 'private furrow', or, in terms of the 1976 Act, an Irrigation Company.

Nyachowa Company

It should first be recognised that the flow to which Nyachowa Company would be entitled is not available. This is due to historical factors and perhaps also to environmental/climatological changes. With severe and chronic water shortages, it would be difficult to get Nyachowa Company off the ground. There is, however, a technical fix to this lack of water: an annual dam located just above the boundary between the commercial and communal areas could capture flood waters during the rainy season for use during the dry season. A storage facility of some 250,000–500,000 m³, could make available an extra flow of about 30–40 lps during 100 days in the dry season on top of the minimum flow (10–20 lps). With it, the original grant of 57 lps continuously could be honoured. This storage facility for Nyachowa communal irrigators should therefore be justified not economically, but politically as it redresses historically entrenched inequalities in access to water. The funds needed for additional storage facilities country-wide could possibly come from a water tax, very similar to the land tax now proposed by the Land Tenure Commission (Rukuni, 1994).

Let us now explore the implications of considering Nyachowa as a combined irrigation scheme. For the sake of clarity we limit the discussion to the six intakes of the communal farmers along the Nyachowa river. *Once the intakes entitled to water are clarified, an accepted sharing principle of the water should be found. This involves a negotiation process between the parties affected. All parties should recognise that without such an explicit principle the majority will lose out. One principle of distributing the scarce water could be to allocate to each intake a certain specified proportion of the water, a share. The particular magnitude of an intake's share will be an outcome of negotiations, but may be informed by, for instance, the number of irrigators, acreage of garden, seniority of the intake relative to other intakes.*

Once shares are defined, the water can be distributed in two ways: (a) total flow can be subdivided according to the shares, each intake receiving (little) water continuously; or (b) total flow to be rotated among the intakes, the duration of the turns corresponding with the shares. When river flow is low, as is often the case in the winter season, it will be impractical to subdivide it into yet smaller flows. In such cases, it seems most appropriate to keep the flow intact and rotate it among the intakes, as was practised in earlier times.

As an example, the following sharing principle could be established:

- (1) a one-third share in the flow for 'the original Scheme ploholders' (left bank Nyachowa);
- (2) a one-third share for 'the illegal abstractors' (left bank Nyachowa) *and* the nearby intake on the right bank (intake 2 in Figure 8.3 above), each having in effect a one sixth share;
- (3) a one-third share for the remaining intakes along the Nyachowa (intakes 3 to 6 in Figure 8.3); each one sharing this water equally, that is, each of these intakes having a one-twelfth share.

The example groups the intakes in three. Each group shares total flow on a given day. Thus, let 1 receive total flow on first day, 2 share total flow on second day, and 3 share total flow on third day. On the fourth day let 1 irrigate again, and so on. In such a set-up, the intakes grouped together would have to make additional arrangements how to share the water among themselves. In this simple example, an irrigation turn lasts 24 hours, and the irrigation interval is 3 days. This should of course be adapted to local needs.

The example purposely does not base the sharing principle on a juggling with data on acreage of the respective gardens. The important thing is to arrive at a sharing principle of water, recognising that water, not land, is the limiting resource. Once the sharing principle is clarified and agreed upon, each intake will be able to judge the amount of water available, and hence to estimate the acreage irrigable. It will be up to the respective intake groups to anticipate low flows and ensure that all members of the group decrease their acreage when water scarcity is expected, for instance, because of a bad rainy season.

Once rights to water have been clarified, irrigation committees for each garden could be formalised, and each garden elect a representative to check and guard the river intakes, ensuring that other groups adhere to the established sharing principle. Once such garden committees are established, an overarching Nyachowa catchment committee could be instituted, of which all these garden groups would be members, as well as other users of Nyachowa water: Shigodora farm, but also Eagle School (primary rights) and Zimunya Town (primary rights) and possibly others as well. In case of conflict over water among different garden groups, this catchment committee should have the authority to take appropriate measures. Such a committee could also be the moving force behind a storage dam project, and once there, take charge of it. It should also stimulate other activities enhancing water-use efficiency and water availability.

Given some entrenched animosities between the various groups of users, appropriate physical measures could enhance the cooperation between these groups. A special physical measure seems appropriate for the original Nyachowa scheme 'plottolders'. Now they are still tied to the upstream users, through the shared use of the furrow. One such measure could be to construct a separate intake in the Nyachowa river for these plottolders, with a separate conduit (preferably a pipe), very similar to a suggestion made by the chief engineer in 1936 (see above). This would enhance transparency, as well as solve the huge water leakages. This group could furthermore negotiate a special arrangement with respect to the use of the Nyerutimba waters, to which they, formally speaking, are legally entitled.

The initiative by Headman Mr Hamilton Shigodora to construct a new 'dam' (weir) upstream of the present intake could be a good opportunity to make transparent in physical form the sharing principle which people would agree to, by means of a broad-crested weir with different widths, for instance, with widths corresponding to the shares of the respective intakes. This proportional division of flow could be used if river discharge is still appreciable, for instance, in the months immediately after the rains. Some intakes may then wish to construct a pipe from this division structure to their garden. Also, each intake could consider constructing their own night storage dam to capture the river's night flow.

Whichever physical arrangements might be made, there should be agreement over the established sharing principle. Each group, then, should be confident that indeed it will receive its rightful share in a reliable (that is, predictable) manner.

NOTES

1. We would like to thank the following persons for their kind cooperation, their critical guidance and valuable support. First of all the district administrator for Mutare District, Mr C. Chingosho; Agritex: Mr B.B.S. Madondo, Mr J. Chivizhe, Mr F. Sitole, Mr M. Chitima, Mr Mwapaura, Ms E. Shambare, Mr F. Vengai, Mr P. Bako, and Mr R. Thondlana; Department of Water Development: Eng. D. Kagoro, Mr Z.P. Katzande and Mr B. Munyame; Plan International: Mr D. Chikodzore and Mr S. Mashumba. In the

Nyachowa catchment: Mr A. Samakomva of Werburgh Secondary School, Headman Mr H. Shigodora, Mr O. Waziweyi and Mr E.D. Matondo, and to the owners of Shigodora farm. We also express our gratitude to Ms T. Matiza of IUCN, Mr J. Watermeyer, Mr W. Luxemburg, and Mr R. Visser. Finally, we benefited from discussions with and detailed suggestions from Emmanuel Manzungu, Jeff Mutimba, Alex Bolding and other members of the ZIMWESI team.

2. The Nyachowa river drains into the Mpudzi river, which eventually flows into the Odzi and Save rivers.
3. The Water Act of 1976 as published by the Government Printer, Bulletin No. 41, pp.479–587; and amended by the Water Amendment (No. 2) Act of 1984, as published by the Government Printer, Bulletin No. 21, pp.189–191.
4. Roder, 1965: 132; this yield figure, average for 1958–61, compares disappointingly with those of other smallholder schemes in Manicaland; Nyanyadzi, for instance, obtained nearly three times as much over the same period (*ibid.*). Unfortunately, Roder does not provide yield data of winter crops for Nyachowa.
5. Pazvakavambwa (1981) maintained that 45 ha of the 200 ha gazetted area, was developed. He possibly based this figure on Roder (1965).
6. The downstream boundary of a catchment area is arbitrary. Here we have opted to study a micro-catchment area, and limit our analysis to the Nyachowa river.
7. We refer here to the concept of 'project' in terms of 'a discrete set of activities that take place within a defined time-space setting involving the interaction between so-called 'intervening' parties and 'target' or 'recipient' groups' (Long and van der Ploeg 1989: 4).
8. NAZ file S160/IP (Native Agriculture); letter from native commissioner, Umtali to agriculturist, Native Development Department, dated 20 October 1932.
9. NAZ file S160/IP (Native Agriculture); letter from native commissioner, Umtali to chief native commissioner, dated 3 November 1932. The native commissioner noted that 'It is difficult to estimate the cost but it should not be excessive. The Natives doubtless will agree to do most of the work without wages but they should be given food and an occasional beast for meat.'
10. The native commissioner estimated that 500 acres could be irrigated, a figure which the chief engineer of the Irrigation Division (Department of Agriculture) considered 'excessive' [NAZ file S160/IP (Native Agriculture); letter from native commissioner Umtali to Agriculturist Native Development Department, dated 16 December 1932]. Alvord, however, was convinced that 1 000–1 200 acres could be irrigated, with possibilities of adding 200 acres at a later stage [NAZ file S160/IP (Native Agriculture); letter from Agriculturist, Department of Native Development, to chief native Commissioner, dated 22 December 1932].
11. Alvord reckoned on 6 cusecs (170 lps) [NAZ file S160/IP (Native Agriculture); letter from Agriculturist, Department of Native Development, to chief native commissioner, dated 22 December 1932]. The Chief Engineer, however, estimated that only 2 cusecs were available (57 lps) [NAZ file S160/IP (Native Agriculture); letter from chief engineer [C.L. Robertson], Irrigation Division, Department of Agriculture, to chief native commissioner, dated 7 December 1932].

12. Alvord's initial idea was to locate the diversion structure within the confines of Shigodora commercial farm. This location would enable the furrow to command the largest possible area. Two visits (of 14 October 1932 and 31 March 1933) of Alvord and the Native Commissioner were needed to negotiate with the commercial farmer. In the end they had to settle to 'take out' the furrow at a much lower site, located within the Reserve. This was 'in view of the decided opposition' by the commercial farmer. [NAZ file S160/IP (Native Agriculture); letter from Agriculturalist, Department of Native Affairs, to Chief Native Commissioner, undated; letter from native commissioner, Umtali to chief native commissioner, dated 3 November 1932]
13. In total, the work supposedly lasted 4_months [NAZ file S160/IP (Native Agriculture); letter from Native Commissioner, Umtali, Bazeley to chief native commissioner, dated 18 February 1938].
14. NAZ file S160/IP (Native Agriculture); letter from Agriculturist [Alvord] to chief native commissioner, dated 30 May 1933.
15. NAZ file S160/IP (Native Agriculture); letter from Assistant Agriculturalist [G.R.R. Palmer] to Chief native commissioner, dated 9 September 1933.
16. NAZ file S1542/A4/Vol2 (Chief Native Commissioner, Agriculture 1933-1939); letter from Agriculturist [Alvord] to chief native commissioner, dated 16 February 1934. We thank Alex Bolding for drawing our attention to this source.
17. NAZ file S1542/A4/Vol2 (Chief Native Commissioner, Agriculture 1933-1939).
18. NAZ file S160/IP (Native Agriculture); letter from agriculturist, Department of Native Affairs, to chief native commissioner, 1 August 1934.
19. NAZ file S160/IP (Native Agriculture); letter from Assistant Agriculturist [Palmer], Department of native affairs, to agriculturist, dated 31 December 1935. Cf. Roder, 1965:108.
20. NAZ file S160/IP (Native Agriculture); letter from Alvord to chief native commissioner, dated 4 January 1936.
21. NAZ file S160/IP (Native Agriculture); letter from native commissioner Umtali to Alvord, dated 23 January 1936.
22. NAZ file S160/IP (Native Agriculture); letter from agriculturist to chief native commissioner, dated 25 January 1936.
23. NAZ file S160/IP (Native Agriculture); letter from Chief Engineer [Robertson], Irrigation Division, Department of Agriculture, to secretary for Native Affairs, dated 17 April 1936.
24. NAZ file S160/IP (Native Agriculture); letter from Chief Engineer [C.L. Robertson], Irrigation Division, Department of Agriculture, to chief native commissioner, dated 7 December 1932. The native commissioner of Umtali had already in 1917 made reference to irrigated gardens and the existence of farmer initiated furrows in the Vumba (Roder, 1965: 95).
25. The Department of Agriculture was mainly concerned with commercial agriculture: it was notorious for the disdain with which it viewed staff working on Native Agriculture within the Department of Native Affairs. Alvord (n.d.: 30) remarked that 'the Department of Agriculture .. was organised and operated chiefly for the agricultural information of European Farmers and, for political reasons, took little or no interest in the development

of Native Agriculture'. When he reaches the year 1931 in the chronological account of his life, Alvord wrote: 'The ever growing opposition from European farmers toward my work became more pronounced. Many remarked that I ought to be hung. . . . Under improved tillage methods, natives were producing more and more maize. There was a growing apprehension among Europeans regarding Native development in its seeming conflict with European development. The logical conclusion seemed to be that the African should learn no skills which the European offers in the labour market, and that his soil should yield no food which the European could sell him' (p.35–36).

26. NAZ file S160/IP (Native Agriculture); letter from native commissioner, Umtali [Bazeley] to chief native commissioner, dated 18 February 1938.
27. We attempted to establish a mathematical relationship between rainfall and runoff; and computed the following relationship: R (runoff) = P (rain) * 0.40 - 145 (with R square = 0.62). This equation does not appear to make sense (though see Bullock, 1995). A 'normal' mathematical relationship between rain (P) and runoff (R) of the type $R = P * a + b$, would give b a positive value (meaning: without rain still some discharge occurs), and a having a value in the range of 0.05-0.20, provided P and R are expressed in the same units. These assumptions appear to be supported by data given in Kabell (1984). For the Odzi river system a Mean Annual Runoff of between 100 and 125 mm is given (Appendix 1E, p.16); with average rainfall being in the range of 600 to 1200 mm.
28. Agritex file "Nyachowa"; letter from Watermeyer to acting provincial agriculturist, dated 8 November 1954.
29. Harry is a pseudonym for the family who own Shigodora farm.
30. Headman Shigodora derives political power from his lineage, and from his contesting the chieftaincy of Zimunya communal area some time back. Although Hamilton Shigodora was not chosen, he gained respect among his people when the newly installed Chief died shortly thereafter.
31. By taking the initiative and hence being seen as the initiator of the project, and by implying that he himself is providing the cement bags needed, he will have some powerful arguments to claim the weir to be his, and with it all its waters. The cement bags are the property of the DDF, and were donated for the project of crossing the Nyerutimba. Headman Shigodora was the guardian of the bags, and kept them on his premises. He wanted to use the balance of 45 bags for the new weir.
32. Watermeyer, pers. comm. August 1995.
33. For ease of interpretation, all figures related to volumes and discharges have been converted to metric units. Unless indicated otherwise, all citations in this section are from Department of Water Development files WR 888 and WR 101.
34. This storage right, known by no. 12830, has a priority of 19 June 1984 for the first 10,000 m³ stored, and 27 December 1987 for the remainder. At the time of writing, an application has been made to heighten the dam wall, increasing its storage capacity to 60,000 m³.
35. In 'Nyachowa . . . cattle numbers have been reduced to about two heads per family. Farmers . . . complain bitterly about these limitations . . . Discontent among Africans is enhanced by the situation of Zimunya Reserve, which is surrounded on three sides by white land. . . . Africans are aware of the under-used land nearby, and so the inequities of Land Apportionment take on a special poignancy.' (Roder, 1965: 184–85)

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36. Agritex file "Nyachowa"; letter from Provincial Water Engineer to Director of Water Development, dated October 14, 1970.
37. Plan International, Baseline study report; Nyachowa irrigation scheme. Mutare, April 1993.
38. In the present context, most river basins are over-riighted. These basins are thus in fact shortage areas. River boards in commercial areas have long understood that a certain sharing principle of water needs to be applied in such circumstances and priority rights not ruthlessly enforced. This is, however, not to say that there are no conflicts between commercial farmers within any one catchment. In fact, quite a number of cases are fought out in court (Pers. comm., Mr Wim Luxemburg, Dept. of Water Development, October 1995).
39. Zimbabwe could benefit from experiences of countries such as Spain, where a proportional system of water rights has persisted in some places. Here people could gain water rights through investing in storage facilities. They would be granted the right to the extra water made available (during the dry season) because of the storage works.



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