

The Practice of Smallholder Irrigation

Case Studies from Zimbabwe



Edited by
Emmanuel Manzungu
and
Pieter van der Zaag

© Emmanuel Manzungu and Pieter van der Zaag 1996

ISBN 0-908307-51-9

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

112750

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

7	Juggling with land, labour and cash; Strategies of some resilient smallholder irrigators <i>Rekopantswe Mate</i>	148
8	The water acts in the Nyachowa catchment area <i>Pieter van der Zaag and Niels Röling</i>	161
9	Farmer-initiated irrigation furrows; Observations from the Eastern Highlands <i>Alex Bolding, Emmanuel Manzungu and Pieter van der Zaag</i>	191
	Conclusion	219
	References	226

9

Farmer-initiated irrigation furrows

Observations from the Eastern Highlands

Alex Bolding, Emmanuel Manzungu and Pieter van der Zaag

As pointed out in Chapter 1, both literature and policy making in smallholder irrigation in Zimbabwe have tended to focus exclusively on 'formal' irrigation, that is, schemes initiated and constructed by government, which are either government or community managed. The picture that emerges from all this is that irrigation systems initiated and run by smallholders themselves do or did not exist in Zimbabwe. On the contrary, and similar to other parts of Africa,¹ indigenous (African) irrigation furrows existed in Zimbabwe before the arrival of Europeans. Historical evidence has given weight to this assertion:

There is also something interesting which used to be done by Manyika people in the north. They used to hoe their fields early in winter, in places where they knew water could reach easily. The fields were hoed along the rivers, and from these rivers they dug small furrows, which aided them in leading the water to their fields. Some of the furrows came a long distance to their fields. Thus irrigation began before the coming of Europeans. They carefully irrigated their fields in which they sowed these crops: peas, beans, pumpkins, mealies and other roots. (Machiwenyika, 1923, cited in Beach, 1995)

Important for the contemporary debate in relation to irrigation development in Zimbabwe is the realisation that during colonial times and after independence, informal irrigation furrows were constructed and operated by smallholder farmers. This is in spite of active discouragement by government apparatus for the greater part of this century. This chapter provides some evidence of the worth and spread of 'informal' irrigation furrows in the Eastern Highlands. Such furrows should be recognised for their important productive capacities, and for the pool of managerial experience to which they give rise. We argue here that a lot can be learnt by a close examination of these furrows. The preliminary findings presented in this chapter,

though limited to the Eastern Highlands, hint at their potential, and have relevance for the impending changes of the Water Act, the de-centralisation of the water sector embodied in the new Zimbabwe National Water Authority (ZINWA), and for the turning over of financial and water management responsibilities in government-initiated schemes to farmers.

Farmer-initiated irrigation furrows

The development of smallholder furrows in the Eastern Highlands is described by focusing on three river catchments in Chimanimani district (see Figure 9.1).

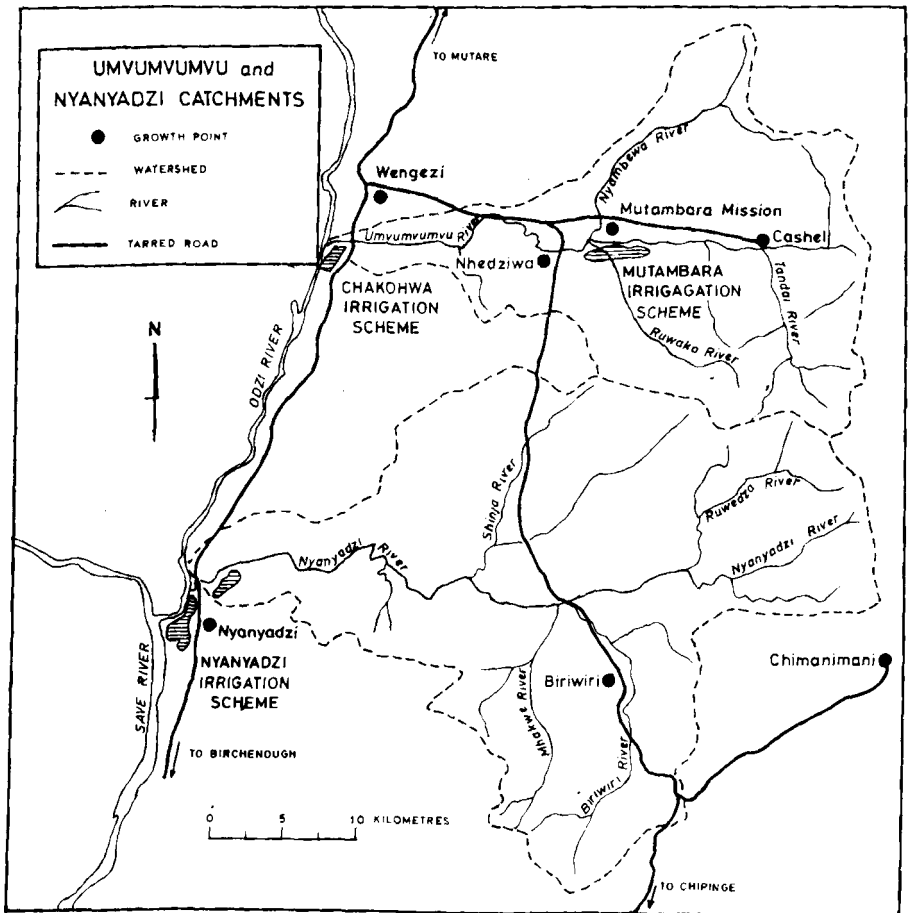


Figure 9.1: Umvumvumu and Nyanyadzi catchment areas (Mumvura catchment not shown)

Nyanyadzi, Umvumvumu and Mumvura catchments are all characterised by White settler farming in the wet upper parts of the river and Black smallholder farming in the dry downstream areas. As early as 1893 irrigation furrows were dug for use not only by White settler farmers, but also by African resident tenants on White farms as a trade off to maintain African labour at hand. White missionaries at Mutambara promoted African furrows in order to advance African agriculture and avert starvation due to drought. The development of African-owned furrows then continued in a relatively undisturbed way in both the white commercial areas upstream and the black-inhabited reserves downstream until the end of the 1930s, when government intervention on two fronts curtailed their further development and severely limited the operations of existing furrows. The first section of this chapter deals with this period of intervention, which ends with the entering of Mr E.M. Alvord on the irrigation scene.

In both Nyanyadzi and Umvumvumu catchments the colonial authorities constructed a 'formal' smallholder irrigation scheme. The numerous African-owned furrows now had to compete for the same water with the 'formal' government schemes. In order to secure success, government started to view these small indigenous furrows along the river as undesirable. At the same time a more sophisticated administration and legal framework to monitor use of natural resources thwarted development of African-managed furrows. In the early 1950s the Departments of Conservation and Extension (Conex) and Water Development, in conjunction with the Water Court, introduced legal procedures and technical criteria for existing and new irrigation furrows. This structure favoured irrigation development on white commercial farms and government irrigation schemes. African irrigation practices were regarded as wasteful and illegal (section 2).

However, as this chapter will show, not all indigenous irrigation furrows were weeded out. In a White commercial farming area called Ruwedza valley, furrows built by tenant labourers mushroomed (section 3). In Mumvura valley in the Chinzara communal area,² a relatively remote area, the so-called squatters developed a whole system of furrows after the commercial farmers left the area in the 1940s (section 5).

Between 1978 and 1984 many new farmer-initiated furrows were built, with Agritex covertly promoting the development of 'informal' furrows on land vacated by white commercial farmers. Yet despite their significance in terms of irrigated area and contribution to local food security and rural wealth, smallholder furrows have remained 'informal'. This makes them prone to being pestered by raids from government officials and downstream irrigators who view these furrows as 'illegal'. Decreasing river flows and the growing demands for water have not helped, and an unmanageable situation has emerged (section 4). In the concluding section we argue that there is a tension in the relationship between a number of principles operating in the informal furrows and existing legal and institutional principles and practices. We single out five important principles that can no longer be ignored by the formal

system. Some suggestions are offered that may bridge these two different worlds. Bridging both worlds is a prerequisite for managing water in Zimbabwe's catchment areas.

LABOUR-HUNGRY SETTLERS AND MELLOW MISSIONARIES

The first thing that Dunbar Moodie did after his trek's arrival in 1893 in present day Chimanimani district was to set workers to draw a furrow and lay out gardens even before houses were built (Roder, 1965: 94). Moodie was not the only one doing so. One Native Commissioner observed in 1895:

On arrival of a farmer on his farm, he informs the natives that he has bought the farm from the Government and they must work for him when called upon. He then calls upon them to build huts, make kraals, fence in lands, [take] out water furrows...And during all the time they work at these several [tasks] they get no pay but have to feed themselves besides. No wonder the natives come to the N.C. and ask to be located elsewhere.³

The portrayal of irrigation as an important feature of nascent settler agriculture in the district is confirmed by the first agricultural report of 1898–99:

Irrigation is very easy as the country is well watered and all that is necessary to bring the water on to the lands is to make a small furrow. A few of the furrows had to be made a long distance, about a mile, but generally a strong stream is to be found running in close proximity to the lands. There is no necessity to conserve water.⁴

The White settler farmers of Melsetter (the name the settlers gave to the area now known as Chimanimani) welcomed resident African labour on their newly acquired farms and, being mostly of South African origin, held the belief that Africans should pay for the privilege of staying on their farms by acting as a labour force for their new landlords. Rennie (1973: 182–192) describes how several native commissioners in Melsetter District tried to enforce paid labour arrangements for resident African labourers, to no avail. The White settlers preferred to practice 'kaffir-farming': making land profitable by allowing Africans to live on it as rent-paying tenants.

Resident African labourers were allowed to take out irrigation furrows of their own to provide for their subsistence needs. The lack of nearby markets to Melsetter for irrigated produce was a factor rather than settlers' concern for the wellbeing of their labourers. White settlers soon resorted to cattle ranching and were thus not very much concerned about the water which was abundant in most years anyway. Allowing and sometimes even supporting resident labourers to take on irrigated farming remained a characteristic feature of some White commercial farmers in the area (see below).

Missionaries had much nobler objectives in promoting irrigated farming among Africans, for instance, in Mutambara as described by Roder (1965: 94-99). During a severe famine in 1912, people in Mutambara became inspired by the irrigation furrow that had been laid out by the missionaries upon their arrival in 1908. They started constructing furrows themselves and were actively encouraged by the missionaries. Similar initiatives were taken by missionaries at Chikore and Mount Selinda. The latter mission saw the arrival in 1918 of Emory Alvord, who took it upon himself to teach Africans improved farming methods. One of the first things he did was to take out an 11 km long furrow to irrigate the nearby tea estate.⁵ This was not the last irrigation canal that Alvord constructed.⁶ Alvord was also responsible for the training of demonstrators, African agricultural extension agents. The demonstrator for Mutambara, however, had more important business to take care of than showing other people how to practise proper farming by nurturing demonstration plots. Alvord, in his capacity as agriculturist for the natives, was soon to discover for himself:

Upon arrival in the Reserve I found the Demonstrator absent from the Reserve and was informed that he is at his farm. I was also informed that he has spent a good deal of his time during the past three months at this farm where he has employed other natives to take out a water furrow . . . it is obvious that our only course is to discharge him.⁷

Irrigation was taken up readily by Africans and spread fast throughout the Eastern Highlands in places where small perennial streams were readily available. Roder (1965: 95) reports that irrigation spread fastest around Mutare where the urban market absorbed winter vegetables produced along the small furrows. Some native commissioners actively supported this development. Rice, maize and wheat were taken up as irrigated subsistence crops. By 1934 at least 200 indigenous irrigators commanded at least 150 acres with 20 furrows in Mutambara area alone.

In short, this initial period of irrigation development can be characterized by a 'free for all' development of furrows by both White settlers and Africans. The spectacular growth of the indigenous irrigation sector was rooted in pre-colonial irrigation tradition but 'unlocked' as a combined result of missionaries and native commissioners driven to 'improve' African agricultural practices, and of White settlers needing to bond their labourers. Knowledge and skills spread fast through mission students working at schools, former civil servants and tenant labourers at White farms. Near markets, irrigation furrows were used for production of commercial crops, in more remote places for subsistence.

THE EMERGENCE OF CONTROL AND COMPETITION

Roder (1965: 99-100) observed that smallholder farmers experienced managerial limitations so that they could not expand the scale of their own irrigation development

beyond a certain point. However, in other areas, where traditional leaders were involved in smallholder irrigation, they did succeed in coming up with workable concepts of water distribution (see below). Lack of agreement between different indigenous irrigators was not the major cause for the slow-down in development of further furrows. It was more a combination of factors emerging by the end of the thirties that put a temporary end to widespread indigenous irrigation development after 1950. This will be illustrated with the cases of Nyanyadzi and Umvumvumu.

Nyanyadzi

In 1934, the agriculturist for natives, Alvord, succeeded in opening up a furrow at the bottom of the Nyanyadzi catchment. The government-run Nyanyadzi Furrow project soon became a dominant factor on the Nyanyadzi water scene. It had an irrigation potential of over 1 000 acres. The project was started to provide food security in the drought-prone Lowveld, introduce proper agricultural methods and encourage a movement from subsistence to a cash economy.⁸ In 1938, a dry year, the low flow in the Nyanyadzi river threatened irrigation operations in the project. A British South Africa Police trooper from Melsetter reported in October that year that he had discovered that 'The natives up the river have dug a number of small furrows to irrigate their gardens with'.⁹ Alvord, concerned about his brainchild, was quick to write to the chief native commissioner with the request to stop this:

A few small furrows along the river will make a decided difference in the water in the river, even if, as stated, the water in these furrows flows back into the river. This playing around with small private furrows should be prohibited as no water rights have been granted to the individuals using these furrows and a priority right has already been granted to the Nyanyadzi Furrow project. If any Natives in the Reserve wish to do irrigation they should be required to take plots on the Nyanyadzi project.¹⁰

Alvord here referred to the Water Act of 1927, and this had the intended effect: the chief native commissioner decided that 'it is undesirable that natives should be permitted to interfere with the flow of the river.'¹¹

The Water Act had been devised to regulate water abstractions for agricultural purposes with a view to control and to planning the efficient use of a precious government resource. Only water users that owned land could request a water right. To avoid disputes over water distribution in times of scarcity a priority system was developed, based on the date of application for an abstraction right. The colonial state also assumed responsibility for the control of the use of other natural resources as reflected in the Natural Resources Act of 1941 that prohibited cultivation within 30 metres of a river bank. The latter was considered to affect negatively river flow and contribute to river siltation.

Both Acts had a stifling effect on the further development of irrigation furrows and what's more, with one stroke of the pen, the existing irrigation furrows and indigenous agricultural practices like *matoro* (vlei or dambo cultivation) could be labelled as unauthorised. Whereas before, water had belonged to God only and was open for use by anyone, water users had now to apply through government agencies for rights to use the water. Furthermore, prospective water users had to prove that they would use the water in an efficient, productive way, not interfering with existing water interests (drinking, mining and existing agricultural water use) or overcommitting available water resources. Agricultural and hydrological reports were required for the application of a water right to the Water Court.

Initially, the impact of both Acts was limited, but with the gradual growth of an administrative structure the results came to be felt: towards the end of the 1940s White settlers started to apply for water rights *en masse*. They were in a better position to apply, as in most cases they were the land owners, literate, and familiar enough to see themselves through all administrative hassles. This did not apply to the indigenous Africans. Furthermore, the Department of Native Agriculture was imbued with a patronising attitude towards the development of African agriculture. Indigenous agricultural practices had been identified as wasteful and harmful to the environment and therefore African farmers had to be taught improved agricultural practices in a controlled and planned manner, as in the Nyanyadzi Furrow project. In addition, the Water Court had a similar bias in favour of 'European' agriculture. How the court 'fiddled' with the priority system in the Nyanyadzi catchment may serve as an example. In its ruling on the water right of the Nyanyadzi irrigation project, the Court decided to limit the project's priority right to water that flowed from the upper boundary of Muwushu and Mutambara Reserves downstream:

This means that an allocation of water may be made in the future to a farmer above the Reserves which will not be subservient to this right [of Nyanyadzi scheme].¹²

In the Nyanyadzi catchment, application for water rights for existing irrigation furrows on White farms between 1949 and 1952 (148 acres in application and 123 acres already granted upstream of the Nyanyadzi scheme) was mostly granted by the Water Court quoting the above passage. At the same time, African farmers in the same catchment were treated differently. When, for instance, the Native Department applied for an increase of the Nyanyadzi project's water right, a thorough hydrological report was ordered. Engineers from the Irrigation Department in 1952 found at least five unauthorised African irrigation furrows along Biriwiri and Mhakwe tributaries of Nyanyadzi river.

The amount of unauthorised irrigation being practised by natives in the Biri Wiri Division and the Muwushu Reserve, certainly has a substantial effect on the availability of water for the Nyanyadzi

irrigation project . . . If these 'permanent' schemes are to be allowed to continue, their position should be regularised by making formal application to the Court for the necessary rights. Further if this course is adopted, control and supervision of the schemes by the local L.D.O. [land development officer] or some other official will be essential to ensure that the schemes are run satisfactorily and that water is used economically.¹³

The report effectively sealed the fate of most African-owned irrigation furrows in the Nyanyadzi catchment. By the mid-1950s most furrows in Muwushu reserve had been forced to close down.¹⁴

Umvumvumu¹⁵

In Mutambara, the colonial government, under vigorous leadership from the agriculturist for natives (Alvord), forcibly took over the running of some of the African-owned furrows. This did not go without protest, and resulted in a prolonged battle between local irrigators and government departments. The African irrigators asked for monetary compensation for the fact that they had constructed the furrow infrastructure. For a proper understanding of the status of informal irrigation versus formal, it is important to spend some time on the ill-fated attempts to 'transform' some locally initiated furrows in Mutambara into a formal scheme. Alvord observed the following about the existing furrows in Mutambara in 1936:

there is no properly constructed weir at the Umvumvumu river and there is no head-gate at the out-take. This furrow was dug privately by a group of Natives with little or no outside help and survey methods used in establishment of the line of furrow were very crude. In fact, no instruments were used. They told me that they did it with their eyes and head. . . . In connection with any survey made I would suggest that the main furrow be put right; that lands for irrigation be properly laid out with lateral furrows on gradient; that 'plots' for irrigation be assigned to Natives and that irrigation be prohibited on lands outside the area laid off into irrigation plots. . . . The development of the proposed irrigation scheme on the Umvumvumu river in the Sabi valley will probably relieve the congestion in this area to some extent.¹⁶

Some months later work on the project started under the direction of the soil conservation officer. The project was financed by the Native Reserves Trust Fund given for the purpose of 'taking over this furrow from private owners, [for the sake of] putting it right and redistributing plots to people under Chief Mutambara.'

A number of 'improvements' were made. The main furrow was re-constructed, a head-gate was installed, 'proper' lateral furrows were dug and division gates made for 'proper' distribution of the water, 'complete' works for erosion consisting of

contour ridges and storm water drains were laid down and the land was divided into plots.¹⁷ Materials were acquired with funds from the Native Reserve Trust, while labour was provided by natives who 'worked without pay'.¹⁸ But the furrow was never 'put right', contrary to Alvord's assertion. From 1936 to 1974 when the scheme closed down, which also marked the end of the role of the colonial state, the technical infrastructure was a subject of concern. In fact the poor infrastructure contributed to the close down of the scheme (see below). Two reports made in the post-colonial era both found the technical infrastructure to be poor.¹⁹ Danby critically assessed the origin of the technical infrastructure as follows:

The Scheme was one of the original irrigation schemes started by Mr E.D. Alvord. His criteria for the need for, and the siting of irrigation schemes was very different from the criteria used today. . . . The efficient use of water and the degree of the "need" for the schemes were of minor importance in those days, there being an abundance of water that was not being put to good use. . . . The layout of the old irrigation scheme was appalling when judged by modern standards. . . . Due to the antiquated layouts and inefficient earth furrows that still exist on seven of our schemes, it is only possible to achieve irrigation of 18 to 31 days. This would be unacceptable to any commercial irrigation farmer, or irrigation officer.²⁰

One of the earliest signs of protest came from people who declined to give their labour and personal enterprise as a gift to the community. As a result Alvord was forced, in 1942, to pay 'all plot holders who worked without pay when we took this furrow over in 1936.'²¹ This amounted to £26.5.0 to be shared between the 50 'original plholders'. A similar complaint was brought before Alvord by five men whose canal from Ruvaka river had been taken over by the government. The men demanded a compensation of £109.17.9, but Alvord recommended, on the basis of estimates by the *Irrigation Department*, a payment of £40. There is no record of the actual payments.

Despite these monetary settlements, irrigator protest continued in Mutambara. The claims seemed to have unleashed further protests until the scheme was closed in 1974. It appears that the people did not want to co-operate with the officials. One official came to the conclusion that punitive action was doing very little:

I today sentenced 7 plholders for contravening section 11 S/S (b) chapter 176 as read with GN 42/38, but doubt whether this disciplinary measure will do much good. After court was over the natives in question complained to me that the Native Supervisor Sibiya was as much an offender as they were.²²

The stance of the plottolders exasperated government officials at the national, provincial, district, and scheme levels. From the office of the Secretary of Internal Affairs came the advice that all irrigators could be removed if necessary.²³ At the provincial level 'drastic action' was considered even in respect of Chief Mutambara.²⁴ Higgs wrote about the 'prospect of action to be taken towards eviction of recalcitrant or non-cooperative plottolders.'²⁵ The history of the forced take over by Alvord in 1938 of Mutambara furrows culminated in a dramatic way: the scheme was closed down in 1974, only to re-emerge after independence.

Meanwhile, White settler farmers in Cashel, upstream of Mutambara, where easy accessibility had resulted in a ready market for irrigated produce, also started to change their attitude towards African irrigators. At a (White) farmers meeting in Cashel 'it was stated that certain natives were irrigating large tracks of land and were entering into unfair competition with Europeans in the sale of produce'.²⁶ The assistant native commissioner for Melsetter censured this in consideration of the then shortage of agricultural produce in the country. He, however, agreed that rent paying tenants at upstream farms did

indulge in some unauthorised irrigation to grow a winter wheat crop. These farms are in rugged inaccessible country and it is extremely difficult to control the agricultural activities of tenants . . . LDO [Mr Ken] Law . . . will interest himself in this area and bring control measures into being.²⁷

Just how difficult it was to control the irrigation indulgences of tenant labourers on remote White farms is shown in the next section.

THE TENANT LABOUR FURROWS: THE CASE OF RUWEDZA²⁸

The Ruwedza river is one of the two upper arms of the Nyanyadzi river. It originates in the mountains that form the border with Mozambique and is supplemented by a number of tributaries streams and springs before it passes through a rocky formation, impossible for humans to pass, joining the other arm of the Nyanyadzi river. Four farms cover its catchment area, of which Hendriksdal was the first to be carved out by a settler farmer in 1895. However, when Hendrik Steyn arrived he found some Chikukwa people living on his acquired farm. The Maigiri family was allowed to stay, on condition that they supply free labour for one week each month. They thus helped in the construction of the first furrows in the area in 1896. Over time, all farms in the upper Nyanyadzi and adjacent Umvumvumu catchment were dished out to other family members of the Steyn clan. Thus Camperdown, at the inaccessible downstream end of the Ruwedza river, came into the possession of George Steyn, who lived at the adjacent Pietershoek farm.²⁹ He entered into an agreement with his labourers, who stayed at Camperdown looking after his cattle, that they could

construct and use irrigation furrows on condition that they would pay an annual fee of three shillings for it. Sekuru Maigiri, born in 1900 at Hendriksdal farm, recalled that the four furrows in Camperdown were started on the initiative of the Matseketes. George Steyn, their boss, came in only later to improve the furrows. Maigiri now lives at Goeie Hoop farm as the owner: he bought it from Mr De Bruin of Hendriksdal farm in 1982. The furrow at Goeie Hoop farm was constructed in 1952 by Maigiri and other 'boys' working for the then owner of the farm, Mrs H.J. De Bruin. They used a spirit level to lay out the route of the furrow. By 1953 there were two furrows at Hendriksdal used for irrigating approximately 20 hectares of fruit trees and a portion of maize for the African labour force, and providing domestic water for the white farmer; one furrow at Goeie Hoop farm irrigating 10 hectares of fruit trees and maize and four furrows at Camperdown farm irrigating 5 hectares of maize and wheat, run by five tenant-labourer families paying for the privilege of irrigation.

Operating principles at Camperdown

Owing to the many springs and tributaries to the Ruwedza river in its upper run, there were no water problems experienced on Hendriksdal and Goeie Hoop farm until 1992. The Camperdown irrigators at the downstream end experienced occasional water shortages during winter. According to Kenneth Matsekete, in such a case the owners of the four furrows would meet and draw up a schedule of '*maduties*' or water turns to share the available water. Headman Matsekete explained that the normal schedule would be three days of water for each intake, making a rotation of 12 days. In case of a conflict over the water, Headman Matsekete (the most downstream water user) would rule on the matter. If the need arose, Chief Chikukwa would be asked to pass the final judgement. Later on, two more furrows (constructed after independence) were included in the rotation schedule (Table 9.1).

Crops that have been grown over time are maize, wheat, beans, peas, vegetables, tomatoes, millet and groundnuts. Kenneth Matsekete explained that the dominant growing pattern would be early maize intercropped with groundnuts or beans during the summer season. Some supplementary irrigation was used during dry spells in the rainy season for these crops. Then in June the furrow would be cleaned in earnest for irrigation of the winter wheat crop. Surplus production of maize and wheat is transported to Biriwiri for sale by means of donkeys over a steep footpath. The young Maigiri indicated that after independence peas and tomatoes were grown under contract for a canning factory in Mutare. The factory would supply transport for collection of the produce over the rudimentary road from Cashel. Headman Matsekete used his surplus production for handouts amongst the needy people of Camperdown. Up to the present, people have been flocking into the area with the permission of the headman. Matsekete feels not only responsible for the well being of these people, but also rules over the use of gardens and vleis along the riverbanks.

Table 9.1: Ruwedza valley furrows, upper Nyanyadzi catchment

Property	Present designation ^a	Furrows (no.)	Command area (ha)	Irrigated area (ha)	Furrow initiated (year)	Furrow abstraction (lps)	Water right status
Moodie's Nek	RA	4	3.2	3.2	>1980	no	none
Hendriksdal	LSCF	4	40	20	1896	8.5	1966-77, lapsed
Goeie Hoop	ELSCF	1	24	7.2	1952	7.1	1966-73, lapsed
Camperdown	RA	6	10	10	1932	3	1966-present

^aRA = Resettlement Area; LSCF = Large-Scale Commercial Farm; ELSCF = Emergent Large-Scale Commercial Farm

Source: Farm files, Dept. of Water Development; Bolding's observations, 1994-5.

Government interference in Ruwedza: 1966–1977

Probably due to the inaccessibility of the valley, no mention of Ruwedza irrigation furrows was made in an extensive hydrological investigation carried out by Government in 1952. Only in 1966 did George Steyn apply for water rights for the four furrows of his African tenant labourers. This marked the start of a long administrative process involving 21 different communications ultimately resulting in a final grant of water in 1976, 10 years after application. After a spot visit, Conex officer Petheram noted in his agricultural report of 29 March 1967 that the furrows were old and used by African tenant labour looking after Steyn's cattle. During a Water Court session in August 1970 the district commissioner withdrew his earlier objection³⁰ and a provisional grant was given of 0.10 cusecs (2.8 lps) 'for irrigation of as much land as can be served thereby'. The grant would lapse in September 1972 if the holder failed to 'provide, install, maintain and operate any measuring devices' as the Director of Water Development deemed necessary.³¹

However, the hydrological engineer for Manicaland deemed the lining of the furrows and installation of measuring devices 'uneconomic' as there were too many intakes for too small an irrigated acreage. The Conex officer, who at first disagreed with the engineer, changed his mind after he visited the area and found that seepage from the furrows actually served a purpose: it gave opportunity for more reeds and riverine scrubs to establish in the vleis. As a result, it was decided that no furrow lining or concrete take-off weir were required.

Meanwhile the provisional water right lapsed, but the Water Court gave an extension of one year to install measuring devices. A year later, in December 1973, the river inspector observed a 'measuring device of sorts' on the first furrow, but no gate to control the water flow into the furrow. Furthermore, the off-take points were changed. Mr Steyn finally submitted a revision of the water right abstraction points in April 1974. In March 1976, an inspection was made by the river inspector: V-notches (a type of measuring weir) with gauging plates had indeed been installed. The final grant was given on 23 March 1976.

The Steyns of Hendriksdal and Goeie Hoop farms were less persevering in their applications for water rights. Requests from the water engineers to line furrows, provide measuring devices and build night storage dams were met with slack reactions from the applicants and after a number of years their provisional water rights lapsed.

Comparison of formal and informal principles of irrigation

The case of Camperdown points to the existence of two different sets of principles in irrigation water use. According to all interviewed, smallholder irrigators believe water in streams belongs to God. The installing of the measuring devices at Camperdown in 1975 was interpreted by all smallholder water users as an additional legitimization of their entitlement to water. Neither of them indicated that the V-notches could also be used as measuring devices to monitor whether they were actually

sticking to allocated water volumes as described in their water right. Despite being the only persons in the valley having a legal water right, none of the Camperdown water users deny upstream water users like Mr De Bruin of Hendriksdal or Mr Maigiri of Goeie Hoop the right to irrigate with Ruwedza water. Nor do they deny water to the new water users in Camperdown that have no water rights either, as is shown by the latter's inclusion in their water scarcity rotations. Neither do they consider the 'informal' irrigating resettlement farmers in the most upstream farm, Moodie's Nek, to be part of their growing water-shortage problem. Since 1992, the Ruwedza river has given less water for irrigation. In the winter of 1995, the situation had reached the stage where no one in the valley was irrigating any more, due to lack of water.

The water engineers in the Camperdown saga acted completely in line with the legal framework, the Water Act. The Conex officer tried to comply with stipulations laid down in the Natural Resources Act. However, somehow their actions seem to bear more relevance in the administrative realm than in the real-life situation of the Ruwedza valley. This is not only testified by their conspicuous absence since 1977, but also by a number of aspects that question the legitimacy and suitability of the legal framework they tried to administer.

First of all, the priority righting system on the basis of the date of the first application for a water right does not pay due respect to historical claims to water. In Ruwedza, this led to a situation where water users that had put in furrows earlier, ended up having later, and consequently lower, priorities. The resulting priority situation tells us more about the history of penetration of the administration in the area than the actual historical development of irrigation furrows. Furthermore, the Ruwedza case reveals certain administrative 'fixations'. Despite the fact that the Conex officer identified furrow seepage as not harming river flow, furrow lining remained a recurring feature of Water Court orders. A certain preoccupation with insignificant detail is displayed in the Water Court's insistence on a renewed water application in 1974 stating the exact position of the points of abstraction on Camperdown farm. This might seem sensible from the perspective of legal correctness, but considering that the water application was for all four furrows in one water right, it doesn't. Again the insistence on the installation of water measuring devices was not matched by an equally committed interest in monitoring actual water abstractions. Water records were never sent to the provincial water engineer, nor requested on his behalf. Acknowledging the difficulties that the river inspector faced in visiting the area, one is left wondering what would have happened if mediation from the river inspector were to have been sought in drought years. Instead, Camperdown irrigators resorted to searching, and finding, solutions on their own terms. Lastly, the actual water users of Camperdown were never informed or enlightened about the Water Act or the decisions of the Water Court. This is in line with the Act's regulations: only land owners can apply for water rights. So the tenants were never required to appear in Court, nor were they ever considered to be really there, as persistent references to 'squatters' reveal.

This section has demonstrated the emergence of two different sets of irrigation principles and the inappropriateness of the legal framework to address water scarcity problems. In the next section we take a closer look at the post-independence 'boom' in informal irrigation and the associated merits and problems at catchment level. In doing so we also try to assess what strategies the post-independence administration and some indigenous irrigators have devised to manage Zimbabwe's water resources in a beneficial way.

POST-INDEPENDENCE 'BOOM' IN INFORMAL IRRIGATION: NYANYADZI³²

Shortly before and after independence most catchments in Chimanimani saw an explosive 'boom' in indigenous irrigation furrows. A number of factors contributed to this sudden increase. Smallholder farmers in Chimanimani were eager to take over the land that the commercial farmers had left. They had fought the war to get access to their ancestral lands and against a prohibitive colonial administration trying to exclude Africans from irrigation water. Because of intensive war activities in the Chimanimani district many White farmers had left the area. Between 1976 and 1978 the number of functioning commercial farms in Chimanimani dropped from 105 to 8 (Alexander, 1995: 180). The ZANU(PF)³³ steering committee in Chimanimani, that was popularly elected to form the District Council in 1980, started then to issue temporary permits to Africans to stay on vacated commercial farms.³⁴ Two criteria were used to select prospective settlers who were permitted to stay until official resettlement took place: ability to take care of the land; and supportive of the party. Many people used this opportunity to settle on the former commercial farms. Others did not wait for permission, but simply moved in. Most of them re-opened and re-laid the many irrigation furrows they found. When resettlement plans had been produced in 1984 most 'squatters' became legalized settlers, though some had to share their irrigated acres with fellow settlers.

Smallholder farmers were not only eager to take over, they were also ready for it. Many former labourers on White farms had acquired experience with irrigated farming and did not hesitate to start their own furrows. Many did not have to move very far to look for ready infrastructure to satisfy their ambitions. Furthermore, Agritex extension workers in their quest to transform smallholder farmers from subsistence into commercial farmers were very supportive. Irrigated farming stood as a model of the modern, innovative, commercially oriented farmer, and many smallholder irrigators hosted field days. It is not a coincidence that many 'informal' irrigators are master farmers.

Furthermore, it was not until 1983 that a powerful state bureaucracy was re-established in the district, that could actually plan and control land and water use development (Alexander, 1995: 183). This means the period 1978–1983 implied a

'free for all' era. No one was bothered with tedious procedures to acquire a water right, or with technical criteria concerning land suitability and cropping patterns. This boom in 'informal' irrigation development was further fostered by the drought years at the end of the 80s and beginning of the 90s. More and more desperate communal and resettlement farmers resorted to irrigation furrows and gardening along the river beds to at least provide some food for their families.

In Nyanyadzi catchment these developments have resulted in over 100 small furrows tapping water from the river by means of temporary stone weirs, through mostly earth furrows (Table 9.2). In addition, numerous gardens along the river bed are irrigated with buckets and a number of light pumps, and gravity tubes have been put into operation to irrigate other portions of land. The scale of these irrigation undertakings varies from 0.05 to 25 hectares, with one to nine water users drawing from the same abstraction point. Some furrows are also used to replenish fish ponds, provide water for dip tanks, domestic water, and drinking water for livestock. A variety of crops is grown, the main crops being maize, wheat, tomatoes, cotton, beans, peas and various fruit trees and vegetables. The produce is used not only for home consumption and distribution amongst family members, but also much of it is marketed locally, to schools and to the markets in Chimanimani town and Biriwiri. From 1985 to 1993 at least eight irrigation furrows with road access were involved in contract farming for two companies in Mutare (Lemco and Tomango).

Considering that water is a finite resource and the fact that Nyanyadzi river has become a less reliable source over the years due to the changing hydrological behaviour of the river and a decrease in rainfall in the upper catchment, it is important to look into the management strategies that developed to cope with this situation in the face of increasing water demands.

The Nyanyadzi raids

In the Nyanyadzi catchment an interesting situation emerged in 1984, when the Nyanyadzi irrigation scheme ran into water problems due to a lack of water from the Nyanyadzi river. In February 1984, some officers from the Agritex head and provincial offices toured all communal area irrigation schemes to 'discuss problems'. They noted that at Nyanyadzi 'illegal use of water upstream of the take-off canal had reduced the water available to the scheme'.³⁵ A decision was made at the provincial office to embark on an 'all out effort' to stop illegal abstractions.³⁶ This set the scene for some decisive action by the irrigation manager for the Nyanyadzi irrigation scheme:

There was a shortage of water in the Nyanyadzi river itself. So, one time, I went to the police and inspectorate and said: What has been taken up there? What are we going to do about it? The law states that this water is for the scheme. This area has been earmarked for the

Table 9.2: Some characteristics of farmer-managed irrigation furrows along the Nyanyadzi river^a

Sector	Furrows ^b (no.)	Area ^c (ha)	Water ^d users (no.)	Furrows with water right ^e	Measuring device ^f
Large-Scale					
Commercial	> 9	> 73	> 6	5	> 3
Communal Area	> 10	> 51	> 10	1	1
Resettlement Area	> 30	> 67	> 43	14	6
Total	> 49	>191	> 59	20	> 10

a Farmer-managed irrigation furrows along tributaries of Nyanyadzi river (ca. 50) were excluded.

b Gardens irrigated by hand, pumping schemes, and hose-pipe schemes were not been included. Not all furrows included here are operational at present.

c Area estimated on the basis of aerial photographs. Not all of it is irrigated in a single year.

d The number of water users along one furrow varies from 1 to 5.

e Some water rights cover four furrows, other water rights apply to one plot out of five along one furrow.

f Only V-notches were observed, most without gauges. Gauges are needed to measure the flow.

Source: Aerial photographs, 1986; Bolding's observations (1994–95); Water right data supplied by Department of Water Development, Harare, in March 1995.

scheme. And the law says that water should come here, and these people [Nyanyadzi irrigators] pay what is called a maintenance fee. And really they must have water. So as a manager I am asking you to accompany me there. We destroy their weirs and what have you, unless they have clearly applied for water to the Ministry of Water. Water rights, okay, those we will not disturb. But the other ones, let's go and destroy them. We had the inspectorate from Mutare. We had the policemen from Nyanyadzi, my committee, my gang. I informed the provincial office [Agritex]. We went up there. And destroyed the weirs. .. But there was a lot of *hanahana*.³⁷

Twenty-eight weirs along the Nyanyadzi river were destroyed by the irrigation manager and his gang in September 1984.³⁸ And there was a lot of confusion indeed. The gang met angry farmers with sticks on its tour of destruction. As one affected smallholder irrigator recalled:

They came here on my farm. They shouted all sorts of things at me. And they removed the wire fence I had constructed along my land. Afterwards I went to see the member in charge. The police in Nyanyadzi apologised to me for what they had done. The District Administrator phoned to Nyanyadzi police station to inquire about what they had done. They also apologised to him You know, before the drought of 91/92 there was really no water shortage in the river. It was simply because the Nyanyadzi people were jealous. They said that we did not have to pay for the water so that was unfair. But we do pay for it. This furrow has cost me a lot of money. Whereas the Nyanyadzi irrigators get their canals for free. Government supports them in the operation of their scheme. . . . You see, even if we refrain from taking water here the water will not reach their intake. A lot of water is lost through seepage. So we could as well take it They told us that we should acquire water rights. I was simply using the water just as the White man before me had been doing. I did not know about water rights. Water is owned by nobody, only by God. Everyone who wants to use it can have a share.³⁹

The irrigation manager and policemen were reprimanded after the raid by the district administrator and top officials. And within a couple of weeks the weirs had been re-built. That frustrated the irrigation manager:

The destroying of weirs was made known to the District Administrator. I asked the DA about the permits [provisional water rights] he was issuing to the illegal cultivators to abstract water from Nyanyadzi river. Of this the DA said the permits were temporary. . . . May I suggest that the top officials should make a decision whether to have the existing irrigation scheme or legalize the 80 ha along Nyanyadzi river.⁴⁰

However, the issue was not resolved. On the instigation of Nyanyadzi irrigators from Block C, the Nyanyadzi Agritex office organised more raids in the years after 1984 (Table 9.3). These were not always very effective. Upstream irrigators learnt to quietly accept the coming of the raiders, only to reconstruct their weirs after the gang had left. Most raids were organised during water scarcities occurring in October (first summer irrigation gift) and May (middle of winter bean season). When the river dried up before these two peak periods, no raids were organised as this would not result in a lasting water improvement.

Table 9.3: Overview of upstream raids and years of water shortage at Nyanyadzi

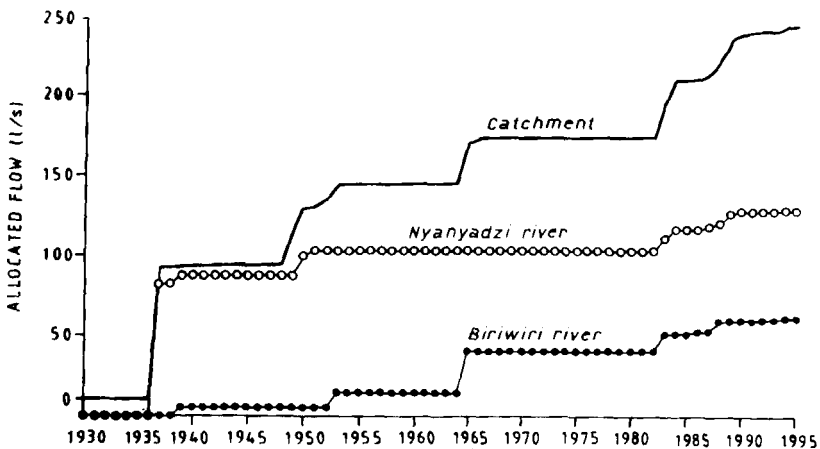
Year	Water shortage	Upstream raids	River falling dry
1983	yes	no	no
1984	yes	yes	no
1985	no	no	no
1986	no	no	no
1987	yes	yes	no
1988	yes	yes	no
1989	no	no	no
1990	no	no	no
1991	yes	yes	August
1992	yes	no	January
1993	no	no	no
1994	yes	yes	May
1995	yes	no	March

Source: Interviews by Bolding; and hydrological records (E119), Dept. of Water Development

The raids show the persistence after independence of the two different sets of water principles applied by informal and formal irrigators. The legal frame that the irrigation manager and Nyanyadzi irrigators were referring to had not been replaced or adjusted to accommodate other upstream water users.⁴¹ Instead, the actions of the Nyanyadzi management resulted in an ill-conceived attempt to impose the legal frame on the situation then current. This resulted in more water rights being applied and issued in the raided areas along the river (Figure 9.2). Smallholders applied for water rights through the district administrator and with help from local extension workers. Still the number of water rights issued has never lived up to the actual number of water users on the ground. By March 1995, 69 water rights⁴² had been issued, some of which had simply not been repealed after the original owners had left, some applied to 460 water users in one right and others to one water user out of 11 different water users benefitting from the same irrigation furrow.⁴³ The fact that the river inspector of the Department of Water Development has sole responsibility for the whole of Manicaland province and has no regular access to transport, has not improved matters in this respect. More than anything else, the hikes in issued water rights in Figure 9.2 reflect the attempts of the water administration to impose the legal framework in the areas they moved into. According to 'informal' irrigators

water belongs to nobody but God, making them as much stakeholders as the formal irrigators. The irrigation manager acted on his conviction that only legally recognized water users can claim the water. However, the situation is such that the priority righting system is not enforced, ultimately resulting in the irrigation manager trying to take care of the rights of Nyanyadzi irrigators himself. He, however, realises the fragility of his actions in a political climate where some of his superiors and some local politicians may back the 'illegal' irrigators.

Figure 9.2: Water rights granted in the Nyanyadzi catchment, 1937–1994



Source: Elaborated from Dept. of Water Development files.

Another argument for denying 'illegal' irrigators water is that they are unproductive, wasteful water users. This argument is voiced most clearly by the irrigation manager. However, as one informal irrigator, practising contract farming, objected:

Down at Nyanyadzi irrigation scheme they spill a lot of water through their unlined canal. On top of that the water will hardly reach their point. It can be used better here . . . we bring in the money for the country. The yields are higher here than down there.⁴⁴

The suggestion is that water which would not reach the Nyanyadzi irrigation scheme anyhow (particularly in water scarcity situations), could be used to better avail in the river's upstream run. Some 'informal' irrigators do indeed achieve twice or three

times as high yields as do irrigators (from block C) in the Nyanyadzi scheme.⁴⁵ The argument that Nyanyadzi irrigators pay for their right to water is easily discarded by the 'informal' irrigators on the grounds that they have actually paid themselves for the construction of their furrows.

With the Water Act not being administered properly and the Nyanyadzi irrigators organising ineffective upstream raids, a deadlock emerges in water-scarce years. The district administrator acted twice as a mediator (in 1988 and 1991) in the conflict, facilitating a water-sharing arrangement between upstream and downstream water users. The arrangement implied that for one week upstream irrigators would use the water, letting the water flow to the Nyanyadzi scheme during the next week. However, this arrangement has remained a temporary one and only applied to upstream water users along the Nyanyadzi river (excluding those in the remote upper catchment and along the tributaries of the Nyanyadzi river) and the Nyanyadzi scheme irrigators. Somehow, this arrangement has not resulted in a permanent institutional arrangement that is recognized by all stakeholders, as is testified by the 1994 raid.

It might now be opportune to study some indigenous irrigation concepts that might provide the building stones for a legitimate irrigation management framework. What can we learn from an area like Chinzara, where relatively undisturbed development of irrigation furrows has taken place?

SOME PRINCIPLES OF CHINZARA IRRIGATION⁴⁶

People have constructed many furrows in Chinzara, the first being constructed around 1900. Three furrows stand out in length and command area: one comprises a main furrow which bifurcates into two subsidiary furrows with a total length of some 1600 metres, irrigating 10 hectares; another, with a length of 1200 metres, irrigates 15 hectares, and the third, measuring 900 metres, irrigates 8 hectares. The current system of furrows along the Mumvura river seems well adapted to local conditions. An estimated 36 hectares were irrigated during the 1995 winter season along the Mumvura furrows, and another 12 hectares in tributary valleys. In addition, there are many gardens near Mumvura river which do not need irrigation. Crops irrigated include wheat, yams, sweet potatoes, potatoes, peas, maize, beans, sunflower, onions, cabbages, tomatoes, sugar cane, coffee, bananas and fruit trees, such as oranges, lemons, naartjies, avocado, peach and mango.

Irrigation along the Mumvura river within Chinzara communal land is firstly characterised by a lack of formal water rights, but a strong sense among irrigators of an historical user right to river water for irrigation. Secondly, the furrows are used for multiple purposes. Besides providing water for irrigation of various crops, they provide drinking water for livestock, water for domestic use and water for brick making. Another important feature is the absence of a centralised 'main system', or a single main canal. The three main furrows are spaced between 1150 and 1450

metres from each other. Hydrologically this set up makes a lot of sense: in between, the river is re-charged by additional catchment areas, and at each intake the base flow available is hardly affected by intakes upstream. In Chinzara, therefore, there is no evidence of conflicts between upstream and downstream furrows.

Technically speaking, the furrows are simple and straightforward earth constructions. The adequately laid out furrows, nicely meandering along the hill slopes, reveal that Chinzara irrigators have sufficient knowledge of topography, contours and hydraulic laws. Furthermore, there are some ingenious structures such as stone paths or road crossings and an aqueduct. Furrows that are upstream and serve as drains may cunningly transform into irrigation furrows lower down. Clearly, the use of local knowledge and skills and of local materials implies that at any moment irrigation structures can easily be repaired and maintained without outside technical assistance. Also, the intakes are not permanent, and hence are flexible. However, they all 'leak', as they do not divert all water from the river. To the engineer this may seem inefficient, and even so to the irrigators themselves who cry for more water. This state of affairs was explained by one woman irrigator: "the Chief doesn't allow us to take all the water". The deputy chief later confirmed this: "We can't take all the water at the intake because it may kill water creatures (*magadzemvura*)". Similarly, there appears to exist a taboo on making intakes in the river from concrete.

The individual furrows are not known by 'names', nor do they have a formalised management structure, nor do acknowledged leadership positions exist. On occasions when conflicts need to be mediated, the village leaders play an important role. In Chinzara, then, no specialised irrigation roles developed. This in itself is a striking feature. It may possibly be because up until recently there was sufficient irrigation water most of the time, so there was little reason for operational rules, management positions and mechanisms for conflict resolution. Since the 1991/92 drought, however, water has become more scarce and competition over it has increased. Hence the need expressed by many irrigators to institute some kind of formalised management for each furrow.

Currently, the individual furrows experience head- and tail-problems; that is, irrigators located near the intake of a particular furrow may find it more easy to access the now scarcer water than colleagues with plots at the tail-end. This situation sometimes may cause open conflict but is mediated by the simple fact that tail-enders often initiate repair and maintenance activities along a furrow, as this will likely result in an increase of flow available to them. As a consequence of this, head-enders would find it difficult to deny their downstream colleagues 'a chance'. However, during the 1995 winter season, water shortage along the Mumvura furrows was not serious; there was still enough water at the point of intake of most furrows, and there were still opportunities to increase the water taken out.

Irrigation along the two main tributaries of the Mumvura river have the same characteristics as the above. However, one major difference is that here water shortage

has become a more serious phenomenon. Some old furrows even dried up. As a result, irrigators drawing water from old and established furrows and often located at the tail-end of such a furrow have embarked on 'hose-pipe projects' which they finance individually or in small groups. The investments may be hefty, as it may involve 500 metres or more of 1" to 1.5" pipes. They locate the pipe intake upstream of their original intake and by doing so 'jump the queue' for water. This appears to be a fairly recent phenomenon and the village leadership had to devise new strategies and rules in order to find socially acceptable solutions to the potential conflicts these hose pipes may create. This is compounded by the fact that only wealthy farmers have the financial means to embark on hose-pipe projects, exacerbating existing differences in wealth and power among Chinzara people.

From the above it becomes clear that like Nyanyadzi irrigators, Chinzara irrigators are now facing an enormous challenge caused by decreasing water availability in recent years and increasing numbers of irrigators and dry-land users. The principle of giving each other 'chances' seems limited in its scope: it works only on a small informal basis. To make it work on a catchment-wide scale a number of principles have to be agreed upon that acknowledge individual rights to water, guarantee transparency in amounts of water used so as to enable easy monitoring and establish an overall mediating authority that is recognised by all users.

TOWARDS A RECOGNITION OF FARMER-INITIATED IRRIGATION FURROWS

On the basis of this preliminary enquiry into the development of farmer-initiated furrows a number of tentative conclusions can be drawn.

Farmer-initiated furrows: history and practices

The number of farmer-initiated and managed irrigation furrows in the Eastern Highlands is substantial. Their contribution to food security and rural wealth cannot easily be underestimated. Their emergence seems to be based on an indigenous irrigation tradition and further supported by missionaries and White settlers. Most furrows have a simple infrastructural set-up with temporary stone weirs diverting water from the river and earth furrows to convey the water to the fields. This puts no heavy demands on required construction and maintenance skills. In most cases the flow of water under gravity is used as a means to level furrows and locally available materials are used to construct aqueducts, bridges and canal lining at vulnerable places. The furrows serve multiple purposes of which irrigation is the main one. Agricultural produce is, where possible (easy access to markets), sold on a commercial basis. Regarding the operation of the informal furrows a number of observations can be made:

1. The furrows are spread in most cases along the river so as to ensure water supplies and catch run-off from catchments in between water abstraction points. This

limits the possibility of conflicts over water between different furrows in times of scarcity.

2. In some valleys water rotation schedules have been developed to cope with water scarcity and ensure equitable distribution. The involvement of traditional leadership appears to have enabled and sustained these water scarcity measures.
3. Within multiple user furrows labour contribution for maintenance of the canal sometimes works as a water distribution principle along the furrow.
4. Water is perceived to be owned by no-one. Everybody who has taken the trouble to bring the water to his/her land is considered to have a 'water right'. This principle is in times of scarcity translated into the principle of giving each other chances and leaving certain parts of the command area fallow.

The decreasing river flows during the first half of the 1990s has demonstrated the fragile nature of these water concepts on a catchment-wide scale. Some furrows stopped functioning because of lack of water.

Water administration

The emergence of two different sets of irrigation development in the Eastern Highlands, that is, the 'formal' and the 'informal', can be partly attributed to the fact that the Water Act applies exclusively to land owners, and that tenants and communal farmers were hardly ever involved in the administrative process. A majority of water users in fact never thought that the legal frame concerned them (foreign concepts of water use, not engrained in practices on the ground), nor did they consider the Act legitimate. Furthermore, the slow penetration of the water administration and its deliberate discarding of local irrigation concepts is in part responsible for the emergence of a large sector of 'informal furrows'. The often used rhetoric of wastefulness, unproductivity and subsistence orientation of smallholders-owned irrigation enterprises in the pre- and post-independence, can easily be disproved:

1. Some informal irrigation furrows are and have been quite productive, even surpassing performances of formal irrigators in government schemes. Yet, most of them have never benefited from government subsidies as have the formal smallholder schemes.
2. Water conveyance losses are higher in some government schemes than in most informal furrows. Furthermore, because of the proximity of informal furrows to the riverbed most leakage losses flow back into the river benefitting downstream water users.
3. Where informal irrigators have proximity to markets and accessibility by road, they have succeeded in marketing some of their produce in a commercial manner.
4. The multi purpose use of informal furrows conflicts with the Water Act's clear denomination of water abstraction purposes (primary, secondary, mining rights).

Recommendations on the future of 'informal' irrigation

The future of the numerous farmer-initiated and managed irrigation furrows in the Eastern Highlands depends very much on the status they will be accorded by future administrative and legislative organs. It is not up to us, researchers, to decide on this politically informed decision. However, considering their contribution to food security and rural wealth, and their historical claims to water, it might be a good idea to utilize at least part of the recently released (backdated) water rights for these indigenous irrigators. This would not only re-dress the historically grown inequality in access to irrigation waters, but at the same time acknowledge the importance of this large irrigation sub-sector. However, careful consideration should be given in cases of already heavily over-riighted rivers like some tributaries in the Nyanyadzi catchment. In such cases one has to embark on careful weighing of a number of principles that are considered important in deciding who has a claim to the water:

Principle of 'first come, first served'. This principle is engrained in the present Water Act. However, to satisfy legitimate claims by 'informal' irrigators one would have to change the emphasis on formal application dates. Many smallholders did not have access to the legal framework in the early days of the Act.

Principle of productivity. Only those irrigators proving capable of achieving high production levels are allowed to draw water. This principle is very popular with Agritex. However, as it stands now, it is in some cases assumed that formal irrigators are more productive than informal irrigators (in other cases it is not). There is no simple system to compare production levels at the moment. Informal irrigators stress the multi purpose character of their water operations. This conflicts with the single purpose water righting system implied by the Act.

Principle of efficient use of water. This principle favours those water users that manage to convey water efficiently from the point of abstraction to the root zone of the crops. This principle is not easy to operationalise. Water losses in most informal furrows flow back to the river, consequently not affecting downstream water users negatively.

Principle of state ownership of water. It has to be considered whether the (anonymous) state is the most appropriate body to be vested with the formal ownership of water in public streams. There is a lot to say in vesting ownership in all stakeholders in a particular catchment, organised in a legal body, such as a catchment authority now being proposed, and arbitrated by the Water Court.

Principles of water scarcity management. At the moment the 'first come, first served' principle stands in black and white. However, the priority system of water rights has never been enforced on a catchment-wide scale in times of water scarcity in the three catchments described here. Informal principles of dealing with scarcity of water seem to be based on giving every stakeholder 'a chance'. The district administrator mediated arrangement along the Nyanyadzi river in 1988 and 1991 was also based on this principle. The scope of such operational mechanisms is limited

at present. Water is finite and for such mechanisms to work an efficient measuring structure⁴⁷ and a transparent monitoring apparatus needs to be agreed on.

The enormous reservoir of 'positive energy' encapsulated in indigenous irrigation practices could be tapped to come up with a legal and legitimate framework that could result in efficient, beneficial management of Zimbabwe's scarce water resources. One could think of setting up micro-catchment management groups that involve all local stakeholders charged with devising new strategies to cope with water scarcities while guaranteeing a continued water supply in future by means of conserving natural resources in their area.

NOTES

1. See for East Africa, among others, Adams and Anderson, 1988; Fleuret, 1985; Grove, 1993; Sutton, 1984; Moris and Thom, 1990: 341-359.
2. Mumvura is a fictitious name, as is Chinzara communal area. Mumvura valley and Chinzara communal area are also not shown on the map. This we have done to protect the users of un-righted water.
3. Native Commissioner Hulley to the chief native commissioner, 3 October 1895. National Archives of Zimbabwe [NAZ] file NUE 2/1/1 (cited in Rennie, 1973: 181).
4. Agricultural Report for half year ended 30 September 1899; by acting civil commissioner, dated Melsetter, 10 October 1899: p8. NAZ file DM 5/1/2: Melsetter: Agriculture.
5. Interview with Mr Mhululi, Mt Selinda, who was a schoolboy during Alvord's days at Mt Selinda mission (Field notes Bolding, 1995).
6. In fact Alvord is known in the Sabi valley as the father of irrigation. Under his guidance Mutema (1931), Nyachowa (1933), Nyanyadzi (1934), Mutambara (1936), Chakohwa (1936), Chibuwe (1940), Deure (1947), and many more government irrigation schemes were constructed.
7. Letter from Agriculturist E.D. Alvord to the chief native commissioner requesting discharge of Samuel Dhliwayo. Native Affairs Department, Chief Native Commissioner, Correspondence on Agriculture. 1933-39. NAZ file S1542/A4/Vol2.
8. Nyanyadzi project report, socio-political aspect, by R.D. Maclean, dated 1971. District Commissioner, Melsetter.
9. Letter from British South Africa Police Melsetter to assistant native commissioner Melsetter, October 20, 1938. NAZ file S 1729 78/1942.
10. Letter from agriculturist for natives to chief native commissioner Salisbury, 31 October, 1938. NAZ file S 1729 78/1942
11. Letter from the chief native commissioner to the native commissioner, Chipinga, November 10, 1938. NAZ file S 1729 78/1942.
12. Engineering report for water right application 2485, Nyashama farm, 22 July 1950. Dept. of Water Development. NAZ file F/MELS/N-5.
13. Nyanyadzi irrigation scheme: engineer's report on application for water rights. Hydrographic branch, Irrigation Department. Salisbury.

14. One farmer along the lower run of Nyanyadzi river indicated that he was forced to close his canal that had been dug in 1946 and was irrigating 25 hectares. His son managed to re-open it in 1978.
15. This section is based on field work by Manzungu from 1993 to 1996. Adapted from Manzungu (1995c).
16. Letter from agriculturalist, Department of Natives, to chief native commissioner dated 25/1/36. NAZ file SP 160/IP.
17. Sparrow gives details of the construction of the technical infrastructure. The (main) canal was completed in 1945; in 1947 two night-storage dams were completed; between 1957 and 1963 the inverted siphon on the Ruvaka river and the lining of the new canal was completed. (Mutambara Irrigation Scheme, by Mr. Sparrow. Agritex file. Mutare.)
18. Letter from Alvord to CNC dated 7 August 1939. NAZ file SP 160 IP.
19. Government of Zimbabwe, Ministry of Lands Resettlement and Rural Development, Department of Rural Development. 1985. Feasibility Study Mutambara Irrigation Scheme Final Report. And: Mutambara Irrigation Scheme - Melsetter District, by E.P. Danby, undated. Agritex file, Mutare.
20. Mutambara Irrigation Scheme - Melsetter District, by E.P. Danby, undated. Agritex file, Mutare.
21. Agriculturalist, Department of Native Affairs to the chief native commissioner, dated 7 December 1942. NAZ file SP 160/IP.
22. Anonymous letter to the Department of Native Agriculture, dated 21 January 1947. NAZ file S 160/M1.
23. Letter by L.J. de Bruijn to the provincial commissioner, Manicaland, dated 26 April 1972. Agritex file, Mutare. Compare with letter by Noel A. Hunt to the Provincial commissioner, Manicaland, dated 4 May 1972. Agritex File, Mutare.
24. Letter by G.A. Barlow to the secretary of Internal Affairs, dated 28 June 1972. Agritex file, Mutare.
25. Letter from B.R. Higgs to the secretary of Internal Affairs, dated 18 July 1972. Agritex file, Mutare.
26. Letter from H.F. Child, assistant secretary Native Economic Development, Office of the Chief Native Commissioner, Salisbury, to secretary for Native Affairs, Salisbury, 7 January 1950. NAZ file S 160/M1.
27. Assistant native commissioner, Melsetter to provincial native commissioner Manicaland, December, 28, 1949. NAZ file S 160/M1.
28. This section is based on field work by Bolding, during three visits to the valley in December 1995 and January 1996, and from farm files at the Provincial Water Development office. A limited number of people were interviewed and no actual irrigation was observed due to a lack of water in the river. The presented findings are therefore of a preliminary nature.
29. Pietershoek farm was originally owned by P. Steyn, the father of George. The title deed was issued on 13 December 1901. NAZ file L2/2/110/2; Melsetter: land settlement.
30. During an earlier Court session the district commissioner had lodged an objection to granting of water rights, because it would affect primary water use downstream and the winter flow for Nyanyadzi irrigation scheme. Later this objection was discarded because Ruwedza tributary was not considered to make a substantial contribution to Nyanyadzi winter flows.

31. This also includes 'such returns of measurements or other information as the director may require'.
32. This section is largely based on field work by Bolding from 1993 to 1996, and is adapted from Bolding (1996)
33. The ruling party in Zimbabwe since the April 1980 elections.
34. However, some commercial farms in the upper Umvumvumu and Nyanyadzi catchments were shielded from being handed out, because the White chairman of the Cashel ICA put cattle on the farms of some of his friends. This effectively protected Camperdown irrigators from administrative later interference (Field notes Bolding 6-12-1995).
35. Letter from P. Ivy, assistant director, Agritex, to director, Agritex, regarding communal area irrigation schemes, dated 10 April 1984.
36. Letter from J.P. Horsefield, principal irrigation officer, Manicaland, Derude, to director, Derude regarding communal area irrigation schemes, 7 May 1984.
37. Field notes. Van der Zaag, 28-07-94.
38. Confidential report on illegal cultivators who take water at Shinja, by irrigation manager Nyanyadzi, Derude, 23 October 1984.
39. Field notes, Bolding, 10-9-1994.
40. Confidential report on illegal cultivators who take water at Shinja, by irrigation manager Nyanyadzi, Derude, 23 October 1984.
41. Ever since the last amendment of the Water Act in 1984 there has been talk of changing the Act, but as of March 1996 it has not materialized.
42. These cover at most 40 per cent of the total number of water users in the catchment.
43. The provision in the present Water Act to apply for a water right as a group of irrigators (irrigation company) has never been realized in the Nyanyadzi catchment.
44. Field notes, Bolding, 16-5-94. The statement on excessive seepage in the main canal for the Nyanyadzi irrigation scheme is supported by a water study performed from 1983 to 1988. Along the unlined canal up to 70 per cent of the water entering the intake is lost (Pearce and Armstrong, 1990).
45. Two informal farmers got maize yields of 10.9 and 6.8 tons per ha respectively in the 1993-94 growing season. This compares favourably to the 1.5 tonnes per ha achieved in the Nyanyadzi irrigation scheme [CSO data]. For beans, one informal irrigator recorded 1.1 ton per ha in 1993-94, whereas Nyanyadzi on average produced 0.5 ton per ha [CSO data]. However, more research would have to be done to prove the point beyond doubt. The data presented here do not really suit comparison.
46. This section is based on fieldwork by van der Zaag in September 1995, and adapted from van der Zaag (1996).
47. It is questionable whether the measuring device most widely used (the V-notch) is the most suitable for this purpose.



This work is licensed under a
Creative Commons
Attribution – NonCommercial - NoDerivs 3.0 License.

To view a copy of the license please see:
<http://creativecommons.org/licenses/by-nc-nd/3.0/>

This is a download from the BLDS Digital Library on OpenDocs
<http://opendocs.ids.ac.uk/opendocs/>