

# Water for Agriculture in Zimbabwe

Policy and Management Options for the  
Smallholder Sector



*Edited by*  
Emmanuel Manzungu, Aidan Senzanje and Pieter van der Zaag

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**September 1998**

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## CHAPTER 10

# Water allocation principles in catchment areas

## Some notes on constraints and opportunities

P. VAN DER ZAAG

In order to use water from a catchment area, one has to have water at the right *place* at the right *time*. Technical and institutional arrangements are geared towards harnessing water across these two dimensions of space and time. Obvious examples of technical arrangements are: canals that divert water from a river and transport it to a farm; and dams that store water from the wet season for the dry season. Institutional arrangements include: unwritten rules and agreements between water users about turn taking; tacit or explicit agreements about the priorities of different uses of water, for instance water for domestic use being given priority over water for irrigation; formal rights to specified quantities of water at specified times and places.

The premise of this chapter is that the technical works and the legal-institutional arrangements need to be in accord. The chapter will first present experiences from two different catchments. The situations in these catchments differ with respect to (a) the rights to water the respective users hold, and (b) the physical infrastructure with which water is diverted from the river and put to agricultural use. In the discussion section I will attempt to draw lessons from the two case descriptions, the guiding question being: are the present ways of allocation (by means of formal or informal rights) and distribution (by means of hydraulic structures) of a river's water the best under the prevailing climatic, hydrologic and socio-political conditions?

### CHINZARA: FARMER-INITIATED IRRIGATION

The valley of Mumvura<sup>1</sup> river is located somewhere in the Eastern Highlands. Mumvura's catchment of some 75 km<sup>2</sup> is occupied by a number of commercial farms in the upper catchment (approx. 40 km<sup>2</sup>) and by Chinzara<sup>1</sup> communal lands in the lower parts. As the catchment is in Natural Region I, it is well watered, and up to very recently, there was enough water for all those who irrigated. The commercial farms hold, in total rights, some 16 litres per second (lps) of water continuously. The communal irrigators, for long, have built and used furrows, and did not bother to apply for formal water rights. This is

probably because there used to be sufficient water in the lower parts of the river. At the boundary between the commercial and communal lands the base flow of the river is around 80 lps in normal years, provided the upstream users abide by their formal water rights. This flow of 80 lps is slightly more than the estimated amount required for the communal irrigators. In recent years the base flow has decreased dramatically, as a consequence of lower rainfall and hence lower recharge of the aquifers. At the same time there is some evidence of overgrazing and erosion in the catchment area, which may have exacerbated the low base flow (but itself partly caused by the lower rainfall levels). Another factor which may have contributed to a decrease in the river's base flow is a possible increase in water use by upstream commercial farms. However, this last point has not been investigated.

In Chinzara some 20 furrows exist, of which eight take water from the central Mumvura river, and the others from tributaries. Between them, these furrows irrigate some 50 hectares. The eight furrows taking water from the central river irrigate some 35 hectares. 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 1,600 metres, irrigating 10 hectares; the second has a length of 1,200 metres and irrigates 15 hectares; and the third one measuring 900 metres irrigates eight hectares. These three major furrows irrigate the bulk of the river plain. It must be borne in mind that these furrows are no recent creation: there is some scant evidence (oral and archival) that the first mentioned furrow was built around 1945, and the second one possibly around 1900 and extended in 1932. The third furrow is believed by farmers to be 'old', and probably dates back to before 1945.

Irrigation along the Mumvura river in Chinzara communal land has certain characteristics:

1. No formal water rights, but a strong sense of a historical user right to river water.
2. Absence of a centralised 'main system', or one single main canal. The three main furrows are spaced between 1,150 and 1,450 metres from each other. Hydrologically this set up makes a lot of sense: in between the river is recharged 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.
3. Technically speaking, the furrows appear simple and straightforward earthen 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. 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 appear to 'leak', as they do not divert all water from the river. To the engineer this may appear inefficient, and even so to the irrigators themselves who cry for more water. This state of affairs was explained to me 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 (*mhukadzemvoura*)'. Similarly, there appears to be a taboo against using concrete to make intakes in the river.

4. 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, it appears that 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 explained because up until recently there was sufficient irrigation water most of the time. So there was little reason to institute 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.
5. Currently, the individual furrows experience head- and tail-problems; i.e. irrigators located near the intake of a particular furrow may find it easier to access the now scarce 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 their labour investment, tail-enders were not easily denied 'a chance' by their upstream colleagues. However, during the 1995 winter season water shortage along the central river furrows was not very serious; there was still enough water at the point of intake of most furrows, and still there were opportunities to increase the water taken out.

In sum, water allocation in Chinzara is based not on an 'Agritex system' but on a 'cultural' system, as a Chinzara irrigator once put it. People say: 'Along a furrow people just share the water.' In case of conflicts, the traditional village leaders mediate. But no authority positions are derived from the furrows themselves. As one farmer explained:

We work together to construct the furrow, every year we reconstruct it in April. We are from the same village. Nobody is in charge of distribution. We give each other chances.

In times of water shortage, people anticipate low flows and consciously leave some of the irrigated plots fallow. Irrigators at the tail-end of a furrow seem to derive some leverage from their initiatives to repair leakages, clean the furrow,

and provide labour for the annual repair of the furrow intake. No hierarchy appears to exist between the various furrows, although they were constructed in different years: the oldest furrow does not appear to have precedence over furrows constructed later.<sup>2</sup>

It is important to observe that in Chinzara the physical works dove-tail with the institutional set-up. The taboo against furrows taking out the entire river flow goes along with a taboo against using concrete for the intake structure. This not only ensures that downstream furrows also 'are given a chance', but also that social cohesion exists among users of the same furrow through collective repair and maintenance works.

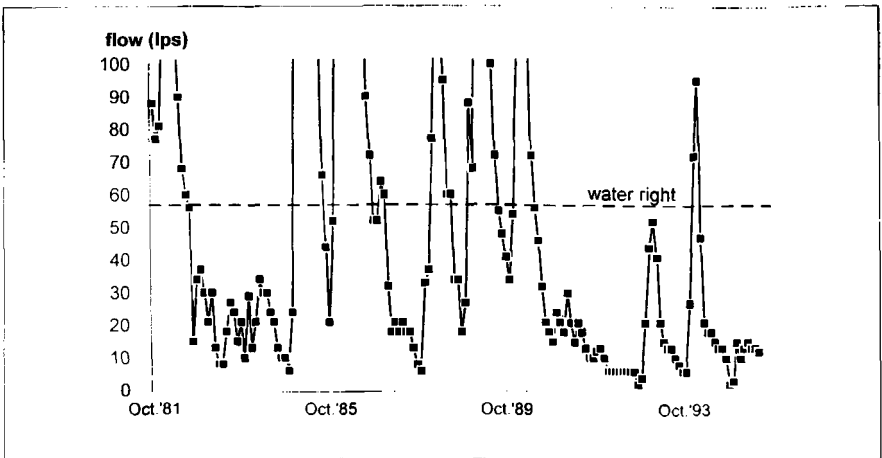
### **NYACHOWA: FORMALISED RIGHTS DO NOT HOLD WATER**

Nyachowa stream, in Mutare district, connects the commercial farm located at the higher end of the Nyachowa valley, with the downstream communal furrows located in Zimunya communal land. This situation resembles the set-up found in Mumvura valley. The difference is that here the communal furrows do have a formal water right. Another important difference is that Nyachowa stream is over-righted: the catchment yields significantly less than the holders of formal rights are legally entitled to.

The commercial farm has the oldest water right with a priority date of 1918, which entitles it to divert 80 lps continuously out of Nyachowa stream. However, such a flow hardly ever goes through the farm. Most of the time it is much less. The farm also holds a storage right for its dam. The above practically means that the farm legally diverts all water during the dry season and most of the water during the rainy season.

Turning to the communal furrows, these share one water right entitling them to divert 57 lps continuously from Nyachowa stream, with a priority date of 1933, i.e. later than the commercial farm's priority. Flow data from a gauge in the stream at the boundary between the commercial and communal areas reveal that from 1985 to 1994 the lowest mean monthly flows recorded were mostly less than the flow specified in the water right. Nyachowa communal irrigators, then, face a situation of severe water shortage (Figure 10.1.)

The final grant of the water right specifies the six furrows that have to share between them the little water there is. This has proven to be practically impossible for two main reasons: (1) the most straightforward reason is that the flow simply is too low to make for meaningful sharing; and (2) government agencies involved in agriculture have since the 1980s consistently acted as if the first of the six furrows is the sole holder of the water right. This is in spite of the fact that during the early 1970s the Water Department designed and constructed intake structures for all the six furrows. Irrigators from the various furrows continuously interfere with the river's flow, by putting stones in

**Figure 10.1: Monthly minimum flow in Nyachowa river, 1985–1995**

(Based on discharge data at gauge EGP59, provided by the Department of Water Resources)

strategic places in the river bed near an intake, or by removing them, by 'remodelling' intakes or removing plates from gates, and by digging or drilling holes in one or another furrow.<sup>3</sup>

In all, water allocation between the six furrows within Zimunya communal land is characterised by prolonged battles over water. Government interference has contributed to the confusion. Most communal irrigators do not know the details of their entitlements to water, nor that of the commercial farm upstream. They simply see the little water as their destiny, and take the little they can get hold of.

It is important to observe here that in Nyachowa there are discrepancies among (a) the physical works present, including intake structures and the furrow, (b) the legal set-up, (c) the perceptions of irrigators about their entitlement to Nyachowa water, and, finally, (d) interventions carried out by government (and non-government) institutions. It appears obvious that in such a situation water use can never be optimal, and that struggles over water allocation will persist.

#### DISCUSSION: OPPORTUNITIES FOR REFORM

We should not discard communal irrigators' perceptions of rights to water. There seems a tendency to do just that when problems encountered in smallholder schemes and in so-called 'informal' furrows are addressed, or in discussions relating to the technicalities of the Water Act. The case of Chinzara irrigators shows the positive nature of a sense of community. A sense of community also

helps commercial farmers to overcome water problems in a River Board Area, as appears to be the case in Middle Manyame.<sup>4</sup> Whereas Chinzara irrigators 'give each other a chance', the commercial farmer community in Manyame 'help each other out'. The point to derive from this is simple: the institutional set-up should be in accord with what people perceive as just and reasonable, and the physical infrastructure should be conducive to implement any rule or regulation that would follow from legal and institutional arrangements. But in many situations in Zimbabwe to-day there appear to be discrepancies between the legal and normative frameworks, between the institutional reality and the practical reality on the ground. This at least holds for Nyachowa.

One way to go around the problem is simply to follow through the existing legal rulings. Chinzara communal irrigators should apply for a formal water right; and the final grant of Nyachowa communal irrigators should be enforced. Such an approach would indeed solve some problems, but cannot be relied on entirely to bridge the gap between what the legal book affirms and what farmers perceive to be fair. Bridging this gap is necessary if the law is to become legitimate in the eyes of the majority. This is a prerequisite for a successful water reform.

The present Water Act states that water rights be defined in absolute volumes. This seemingly innocent technical condition tends to widen the gap between the legal and the practical.

Consider gauging station EGP59 in Nyachowa. With this gauge, in principle, it is possible to measure the discharge of Nyachowa flow into the communal land. This is being done by the Department of Water Resources. But the 'ordinary' irrigators do not have the tables with which they can compute discharges. As a result they cannot check whether other water users are taking more than their share. The Water Act, it appears, has never been designed to be 'read' by ordinary citizens, nor have the gauging stations been designed in such a way that measurements are easily verifiable. Many people have never shared the values reflected in the Water Act in the first place. In short, most people do not consider the Water Act, and the principles upon which it is based, as legitimate. And, we should add here, even the Department of Water Resources itself would find it hard to collect all the data required to enforce the Act, let alone to arrive at straightforward conclusions by interpreting these data.

Having highlighted this particular shortcoming of the Act, the present Water Act does provide an interesting feature which has not been fully exploited.<sup>5</sup> This feature may provide an opportunity to clarify and operationalise the water right held by the six Nyachowa furrows. There is scope for change within the present legal framework: Nyachowa communal 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 become 'shareholders' of an Irrigation Company (in terms of the 1976 Act). Also,

Chinzara irrigators could organise themselves into a similar company when applying for a formal water right.

It would be important for such a 'company' to arrive at an agreed principle of sharing water. Appropriate physical measures could enhance the cooperation between the various shareholders/furrow groups: for instance by designing hydraulic structures in such a way that they, as it were, are 'encoded' with the sharing principle. And this sharing principle could well be based on proportional rights to a river's flow. This would mean designing diversion weirs 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, in 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. I believe that such a reform, changing from alienating water to sharing it, would connect up with communal farmers' practice and perception of what is fair and just.

Such a proportional division of flow could be used if river discharge is still appreciable, for instance in the months immediately after the rains. When river flow becomes low during the dry season, water allocation could follow a time-sharing arrangement based on rotation of turns. Whichever physical arrangements are 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 (i.e. predictable) manner.

### **Reform of the Water Act**

If members of an Irrigation Company (in terms of the present Act) could benefit from proportional water distribution, then it would be worthwhile to at least consider such sharing principles as alternative bases for a revised Water Act. A minimum requirement of the revised Act should, in my view, be that it is in accord 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 with the 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.

### **A scenario for redress**

Once the basis of the Water Act is reformed, there is need to effectively deal with the inequitable distribution of water rights in Zimbabwe's river basins. For the Nyachowa case, this could mean the following.

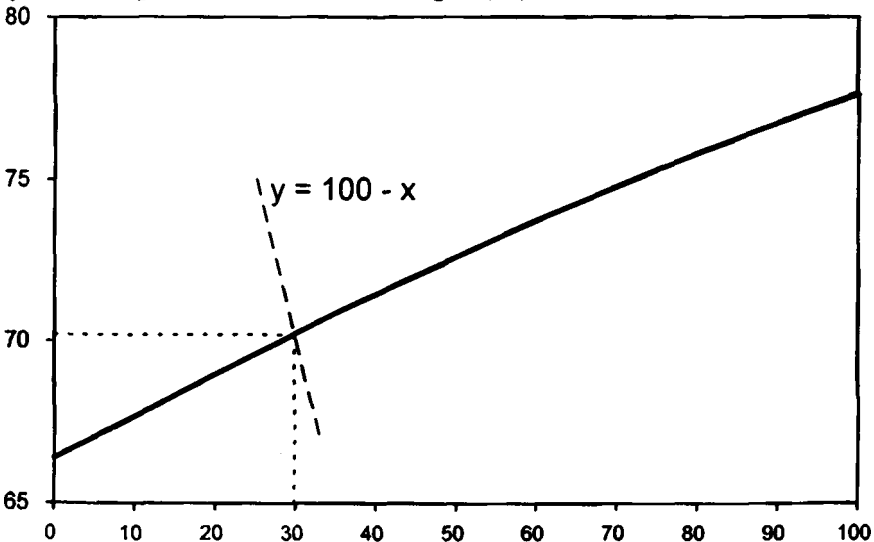
The commercial farm was originally granted the total flow in the Nyachowa at a specified point in the river (only in 1977 was this right 'translated' into an absolute volume of 80 lps continuously). This was thus a water right formulated in proportional terms. In 1997 the commercial farm's right, in its original sense, is still satisfied to the full. The communal farmers, however, have received less than their original water right of 57 lps. Calculated per month over the period 1981 to 1995, they received only 66% of this amount.<sup>6</sup>

One possible criterion for redress, applicable to the Nyachowa catchment area, could be defined as follows: both the commercial and communal water rights should be satisfied in exactly the same proportion. After some juggling with data, a balance at approximately 70% is reached. If the commercial farmer takes 70% of the water flowing at his diversion site, surrendering 30% to the Nyachowa communal farmers, the latter's right is also satisfied for 70% (Figure 10.2.)

This may seem a straightforward proposition, but it is not: the commercial farmer will be upset. Production will be affected, and with it, the employment

**Figure 10.2: Effect of transfer of water from commercial farm on communal water right**

y: coverage communal water right (%)

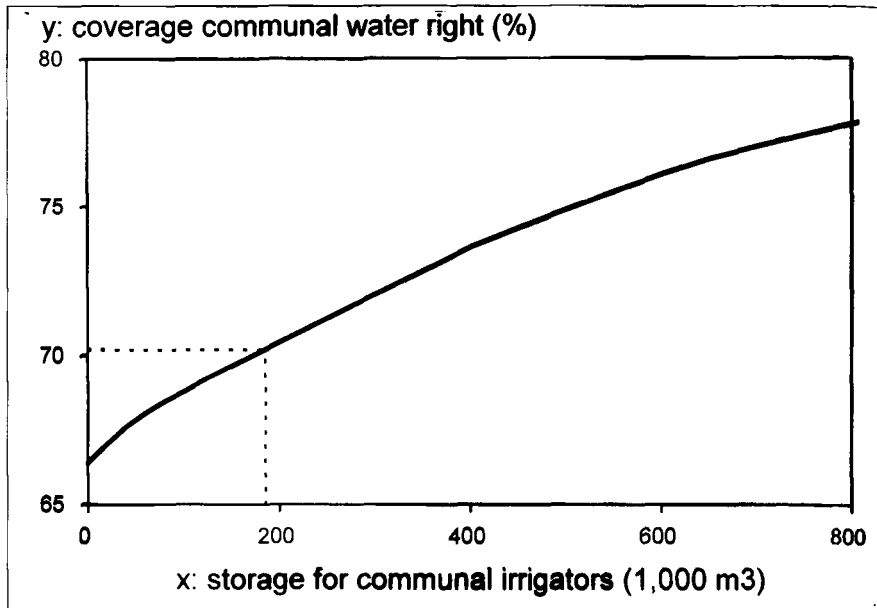


x: transfer from commercial farm (%)

he generates. However, there is an alternative that may be more acceptable to him: he could finance the construction of a dam for the exclusive use of the communal farmers. The capacity of the dam should be such that it would result in an increase in water availability similar to a 30% transfer of water. According to my simplified calculations, a dam with a capacity of some 200,000 m<sup>3</sup> would be sufficient (Figure 10.3.)

In this scenario, a new dam would be built, and both right holders would have the right to divert 100% of all Nyachowa water at their respective diversion points. Still, the commercial farm would be relatively well-off as it retains its full (original) right.

**Figure 10.3: Effect of storage capacity on Nyachowa communal water right**



(Calculated from discharge data 1981–1995 at gauge EGP59, Dept. of Water Resources)

There are other alternative scenarios, based on other criteria. One alternative criterion is to base redress on the subsidies given out to commercial farms in the past for storage works (see Chapter 15).

First, government could re-appropriate part of the waters stored in farm dams built with subsidies in the past. This can be in proportion to the investment subsidy given out. The water would then be availed to smallholders who can either use it, or temporarily lease it while constructing the necessary irrigation

infrastructure with the funds generated by the lease agreement. Alternatively, the government could sell the re-appropriated water and put the proceeds into a central trust fund. This trust fund could finance macro-based solutions to the development of the smallholder sector.

## EPILOGUE

The suggestions for a reform of existing (re-)allocation principles proposed here will have wide-ranging ramifications, the full extent of which I cannot foresee. But it is important to consider some alternative routes to a more equal and sustainable solution to the reality of any catchment in Zimbabwe: that of unequal access to capricious water flows.

## NOTES

1. Both Mumvura and Chinzara are fictitious names to protect the users of un-riighted water.
2. See for further details on this and other cases of 'informal' irrigation, Bolding *et al.* (1996).
3. See for further details, Van der Zaag and Röling (1996).
4. Personal communication, water bailiff Middle Manyame, 1995.
5. See Chatora (1995) and Matinenga (1995).
6. These and following figures were calculated on the basis of a spreadsheet which models Nyachowa river. This spreadsheet model was developed along the principles proposed by Savenije (1995).

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