

Water for Agriculture in Zimbabwe

Policy and Management Options for the
Smallholder Sector



Edited by
Immanuel Manzungu, Aidan Senzanje and Pieter van der Zaag

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the smallholder sector

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CHAPTER 15

A realistic approach to water reform in Zimbabwe

A. BOLDING, E. MANZUNGU AND P. VAN DER ZAAG

INTRODUCTION: ELEMENTS OF A SUCCESSFUL WATER REFORM

Current water reforms that are underway in Zimbabwe, by design or default, seem to be completing the country's agrarian and rural development history. After an exclusive focus on land reform for a greater part of the 17 year post-colonial period, the issue of access to and control over water is now high on the agenda. Bringing water into the agrarian equation in a country characterized by periodic and seasonal droughts, and huge seasonal variations in water resource endowments (Cleaver, 1995: 314-315), can only be described as timely. It must, however, be noted that, due to historical reasons, access to water resources is skewed along racial lines: a minority white commercial farming community has access to the bulk of the country's resources to the disadvantage of the majority black farmers. Acknowledging that water is a vital element in the social and economic development of the country is one thing and instituting effective measures in support of this fact another. In this chapter we suggest that effective measures in water reform come from the application of a realistic approach to the subject. By realistic we mean identifying the essential elements of water reform. This involves answering the *whys* and *hows* of water reform. One crucial aspect of a realistic approach, we suggest, is that it must be both systematic and pragmatic. Water reform must proceed along a well-defined transparent path in order to avoid adhocery and concealed favouritism. It must also be pragmatic in relation to both the envisaged water use and the present beneficial use of water in some sectors of the economy (Matinenga, 1996).

From the ongoing water reform debates in Zimbabwe, we distil a number of underlying objectives. For our purposes we shall assume that Zimbabwe's agricultural water reform is about:

- (a) redressing past injustices in water access to the benefit of historically disadvantaged smallholder farmers and upcoming indigenous commercial farmers without unnecessarily prejudicing existing individual large scale commercial and estate concerns;
- (b) financial devolution of responsibilities from the state to the user domain. This is reflected in government pronouncements that many aspects of the reform, as far as is possible, should be self-financing in order to reduce public expenditure;

- (c) decentralisation of operation and management of water allocation by involving user organisations;
- (d) formulation of a legal framework that befits present day societal norms on what is just and fair and what is practically feasible.

Using these assumptions as a background, we, in the following paragraphs, explore and present possible options for water reform that we believe are implementable. It needs to be pointed out that we almost exclusively focus on agricultural use of water. Primary, urban, industrial and mining water uses are outside the scope of this chapter.

A successful water reform depends on resolving four basic issues. Firstly, ownership and usership of the water must be well-defined. In this chapter we do not stop at the fact that all water belongs to the state as already enunciated by government. Instead we explore property relationships between the state and the users, who it must be noted, are not homogenous (Manzungu, 1997). Specifically, the question is; to what extent does or should the state cede its sovereign rights to its citizens and what arrangements should exist between the various actors? Secondly, what principles of water allocation are best for the intended reforms, given the fact that the present principles are felt to be illegitimate and biased? Third is the issue of equity, given the historical context which resulted in smallholder farmers having poor access to water of reasonable amounts, what arrangements should be in place to redress this situation? Related to the above is the issue of sustainability — are the proposed reforms robust enough to last a generation or do they have to be revisited time and time again? Under sustainability we look at economic and environmental aspects. In the concluding section we summarize our arguments by putting forward some recommendations.

In broad terms we argue that it is undesirable for the state to completely disengage from the water sector. Instead the state must play a facilitative and regulatory role and not assume the day-to-day role of administrator as is the current practice. We propose allocation based on a variable permit system that takes account of different sources of water and financial investments. There is also a need to ensure that the water rights of whatever description are secure. The state must also leave sufficient leeway for right holders to exercise some freedom over their rights. For example right holders should be able to trade their rights in cash or kind, subject to adequate conditionalities. This arrangement particularly suits smallholder farmers who may be recipients of water but may not be able to utilise it in the short term because of a lack of financial resources to instal the necessary irrigation infrastructure. In relation to the principle of water allocation we advocate proportional shares of the available water. With regards to equity, we propose that the historical dimension needs to be accounted for as present realities were heavily influenced by past events. Particularly important to note is the role 'development subsidies' played

in the large scale sector [even after independence in the form of the National Farm Irrigation Fund (NFIF), a post-colonial low interest financial facility]. To guarantee future equitable access to water, effective institutional and legal arrangements with a sound local base, are crucially important. We suggest that the setting up of catchment boards must include enough safeguards to prevent marginalized communities from becoming marginalized again. On conflict management, we endorse Manzungu's assertion of simplified and inexpensive mechanisms (see Chapter 11, this volume).

Once choices at the basic level are made, attention may turn to the more practical questions of operationalisation of water allocation, which may include issues such as water pricing, as discussed by Zimconsult (1996) for instance.

In summary, this chapter can be seen as seeking answers to these questions:

- (a) Ownership and usership: will ownership 'in the corpus of water' and user rights to water be held by separate bodies?
- (b) Principles: in what terms will (user) rights be defined in relation to the physical properties of river regimes and to societal norms?
- (c) Equity: on what basis can historical imbalances in the distribution of water rights be redressed?
- (d) Sustainability: in which ways can a water legislation foster sustainable use of catchment areas, safeguard and promote their yield while stimulating users to economise their water use?

Before sketching the possibilities we preface this discussion by pointing out the physical characteristics of water that have relevance to many aspects of the water reforms.

WATER'S PHYSICAL IMPERATIVE

Any water reform venture must take cognisance of some fundamental attributes of water. Because water is a liquid, it presents challenges from a number of perspectives. Discharges are naturally highly variable making monitoring of water quantities difficult. It has been observed that minor fluctuations in rainfall result in exponentially more excessive fluctuations in resultant river run-off. Any piece of water legislation worth its salt must adequately deal with this attribute. For example, defining water allocations in absolute volumes, as is done in the Water Act of 1976, creates problems in water scarcity situations when most water demands cannot be met by the available supply. The rigid overlay of absolute entitlements over a highly dynamic water supply calls for tedious and almost continuous re-adjustment of actual water allocations. Administratively it would be a lot easier if water allocations were defined in terms of (proportional) shares to the available water.

Another important fact to note about water is that it is fugitive. To put water to use, it must first be captured ('reduced to possession'). This requires

investments in storage facilities, pumping equipment and conveyance infrastructure. Such investments frequently transcend the investment capacity of the individual irrigator. The use of the water for irrigation, then, draws the various users into a web of relationships in relation to the infrastructure; fellow users, and outside agencies, such as financiers. This complexity of relationships requires a straightforward and clear definition of rights, entitlements and duties, not only with respect to the water itself, but also with respect to the infrastructure (cf. Coward, 1986). Another implication of the fugitive character of water is that the concept of 'opportunity cost'. Associated pricing options for a water market, fall or stand with the fact that water needs to be captured and its movements controlled (for elaboration see a later section).

One other important attribute is that usable water can take (at least) three forms: rainfall, surface water and ground water. These three forms interact with each other. Use of water in one form influences the availability, in time and space, of the other forms. Unfortunately not much is known in Zimbabwe on this interplay, neither qualitatively nor quantitatively. However, the current legal and monitoring system that concerns itself exclusively with regulation of *de facto* abstracted water suffers from a number of flaws. First of all it provides users with an escape option by capturing water before it enters a regulated shape. Secondly, sustainable aquifer management cannot be undertaken. Thus those parties that undertake beneficial husbandry practices which result in improving the availability of (abstractable) water downstream cannot be rewarded. Neither can those agents responsible for increasing storm run-off and, by so doing decrease base flow, be brought to book. One way of dealing with this attribute of water in legislation, we suggest, is to depend on reliable social arrangements (see Moore, 1989). However these arrangements should be complemented by local knowledge of water's physical-technical characteristics. These issues will be addressed in more detail in later sections.

OWNERSHIP AND USER RIGHTS

The existing situation

As a background, it is important to note that there are basically three options to water ownership: water can be owned by (1) the state, (2) decentralised public bodies or (3) individuals and private bodies.

The Water Act of 1976 is an interesting mixture of the above possibilities. It is the state which owns all public water (private water is the exception; its quantity is however negligible, besides this concept is likely to be discarded in the future, see WRMS, 1997). Land owners, such as those in commercial farming areas, with a water right have a right to use water. This user right has one major limitation: the water right itself cannot be sold other than through selling the land to which that right pertains. On the other hand, a water right is, in principle, granted in perpetuity. In this latter sense, a water right is as good as any title

deed (see Matinenga, 1996: 2). The situation in communal and resettlement areas is very different. The people therein do not have title to land and as such, cannot apply for water rights in their individual capacity. To obtain water rights these depend on the good graces of civil servants who apply on their behalf (Manzungu and Senzanje, 1996). It is only those few small scale and indigenous commercial farmers who have title to land who can apply for water rights. However, this advantage counts for nought since most of the water has been spoken for under the appropriation system (see below). The situation in formal smallholder irrigation schemes seems better as these have water rights. But there are also severe limitations. Irrigators get a usufruct right to land. The Minister of Lands and Agriculture holds in trust the water right for the irrigators. A formal smallholder irrigation scheme thus normally has one water right for the entire scheme. Individual plottolders merely have the right to that amount of water adequate (in most cases it is inadequate) to irrigate their plot. Crops to be irrigated are approved by the scheme's management. This 'right' of the individual is not explicitly defined nor quantified. This may have contributed to organisational and managerial flaws found in smallholder schemes (see Coward, 1986; compare with Makadho, 1994).

Under the present legislation, it is a requirement for the judiciary, in the form of the Administrative Court, to issue or nullify water rights, and judge in case of conflict. The role of the government is to monitor water use and bring to book those who infringe the law. The present water legislation accords the government many powers with respect to water allocation. Moreover, government itself owns at least 20% of all righted water in the country. We briefly indicate how government has fared in both roles.

The Minister of Rural Resources and Water Development may suspend established water rights in those areas which he has declared water shortage areas. He/she may accept or reject outline plans for given catchment areas thereby changing established priorities between rights. Chatora (1995) and Matinenga (1995, 1996) have concluded that the government has not fully exercised some of the opportunities offered by the present Water Act to implement progressive government policies (such as allocating water to indigenous Zimbabweans). The representative smallholder farmer groups, for example the Zimbabwe Farmers Union, have not fared any better in (re)presenting their clients' case, according to Matinenga (1995).

Government has water rights, i.e. storage rights for those dams which it financed. The estimate is 1,880 million m³ of water annually (Zimconsult, 1996). Government now owns as much as 45% of all water stored in the country, while the remaining storage rights are in the hands of private individuals and companies. The latter also hold most of the flow rights (Zimconsult, 1996: appendix 2.1). The water in government dams is called 'agreement water' or 'ministerial water'. Government allocates this water to agricultural, industrial,

urban and mining users. Users pay the so-called historical blend price for it currently fixed at Z\$185 per 1,000 m³. (This is the 'administrative' part of the water allocation system.) As this water has tended to be under-priced, the government has a powerful instrument to influence water allocation in such a way as to achieve its developmental objectives. The question to be asked is: what criteria are used by the Minister of Rural Resources and Water Development when deciding whom to allocate ministerial water? We have not come across publicly available reports that shed light on this question. The Zimconsult report is not very clear on how government disposes of this significant 1,880 million m³ of water annually. In theory at least, inefficiencies may creep into the allocation of ministerial water.

Some pertinent questions

Should the role of the state in water affairs be limited to using the water rights it already owns (and perhaps allocate these to smallholder farmers?), to instituting de-centralised authorities who administer water allocation, and to monitoring these bodies? Alternatively, should the state formally own the water and issue user rights?¹ If so, would user rights be granted in perpetuity, or would the state issue permits with a limited period of validity? At the moment, the debate on these questions is blurred by the existing unequal distribution of water rights across society. But what would be the answers once this imbalance has been satisfactorily corrected?

PRINCIPLES OF WATER ALLOCATION

There are two issues to be discussed in this section. First, there is the Zimbabwe experience that requires a review: what are the strengths and weaknesses of the foundations upon which the 1976 Water Act is based? And second, what alternative set-ups are known in the world. The latter point will be limited to a brief discussion of the USA water laws and that of Chile. From these two discussions we draw some conclusions as to what would be a firm foundational principle for a new Zimbabwean Water Act.

The Zimbabwe experience

Glick, an historian of water rights systems, once observed that 'There is a subtle interplay between rights and practice, between the ideal and the real . . . there has been a tendency to overstress the importance of rights in the overall picture.' He further argued that

At best the legal structure provides a framework in which arrangements are worked out. If subsequent practice proves, however, that the idealized assessment of resource utilization was incorrect, or inappropriate to the situation, the rights are altered — often with resistance — to meet the exigencies of the environment (Glick, 1972: 50-51; cited in Meyer, 1984: 161).

Glick's observation applies to the Zimbabwean water situation where there appears to be a discrepancy between reality and legality. Two characteristics may lie at the root of this discrepancy. First, water does not blindly follow the rights granted according to the Water Act. The Act may state that so and so is entitled to a certain number of 'litres per second' continuously. However, this amount may simply not be there. Second, people do not always follow the rights as granted according to the Act. They simply take whatever is in their might.

There are two practical problems regarding the Act. Monitoring of water use is an example. As water rights are currently granted in volumetric terms one would need to produce complete data sets of discharge based on regular readings from gauging devices in order to arrive at definite conclusions. At the minimum, one would require two gauging weirs per water right to monitor arriving and departing flows, which would, again at the minimum, be read twice every day (since water use at night may differ substantially from water use during the day). This exercise alone would generate 60,000 figures per day (there are an estimated 15,000 rights issued; this figure is inferred from Zimconsult (1996, Table 2.3). In addition, for the Department of Water Resources to assess the concept of beneficial use,² it would also require data on type and area of irrigated crops in the various seasons of the year, including planting dates, production figures, etc. It is doubtful whether a central government department would have the capacity to digest such amounts of data. Moreover, the Department of Water is supposed to enforce a law which hinges on the concept of 'normal flow'. Under changing climatic conditions, and given the measurements that are currently taken, to quantify normal flow with any precision is in fact very difficult. In practice, therefore, hydrological data need careful interpretation. They are thus easily subject of social or political struggle. Hydrological reports submitted to the Water Court with the application for a new water right should therefore be considered constructs, even if the Court, with the granting of a right, seems to elevate such data to the status of simple and plain facts.

If laymen, such as water users, were able to assess whether water is being used in accordance with the law or not, then the Department itself would not need to monitor constantly all issued rights. Here we arrive at the other monitoring problem within the framework of the current legislation. The type of measuring devices used are such that one needs calibrated tables to interpret readings and compute discharges (and regular re-calibration in case of siltation of the measuring weirs). Without the benefit of those tables and appropriate skills, many people find it difficult to check whether irrigators indeed take water in accordance with their formal rights. This is an important observation; any legal system relies on lay people being able to 'read' whether other people observe or infringe the rules. But the Water Act was never designed to be 'read'

by ordinary citizens, nor were the gauging stations designed in such a way that measurements can be verified. Moreover many people have never shared the values reflected in the Water Act in the first place. In short, many people have never considered the Water Act, and the principles upon which it is based, to be legitimate. And this, in turn, makes the Act very difficult to enforce (Bolding, 1996; van der Zaag and Röling, 1996; and also Chapter 8, this volume).

A reformed Water Act, then, should be more in accordance with the actual behaviour of rivers and with the practices and perceptions of parties with an interest in water. 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, making it more in line with real-world problems. Once water rights are defined in terms of proportions to the total flow passing a certain point, the entire concept of 'priority' becomes superfluous and can simply be abolished (and with it its discriminatory connotations). Such a reform, from alienating water to sharing it, would link up with what many farmers consider fair and just. Examples include Chinzara where communal irrigators 'give each other chances', and the commercial farmer community in Manyame who 'help each other out' (van der Zaag, 1996).

International experiences

Any discussion on water rights, at one point, has to deal with the three types of rights systems most widely used in the world: riparian rights, public allocation, and prior (appropriative) rights. The Zimbabwean Water Act is mainly founded on this last principle, although it still contains some vestiges of the other two types. Riparian rights link ownership, or reasonable use of water to ownership of the adjacent or overlying lands. Public allocation involves administered distribution of water, as is done in Zimbabwe with the so-called 'government water' (see below). Prior rights are based on the appropriation doctrine, under which the water right is acquired by actual use over time (Rosegrant and Binswanger, 1994: 1615-16). Discussions in literature mainly focus on the advantages and disadvantages between the riparian versus the prior appropriation doctrines.

Although the system of prior appropriation has generally been hailed as the most advantageous, especially in water scarce environments (Howe *et al.*, 1986), a growing body of studies recognises its limitations. A number of authors concur that for dealing with water shortage, the appropriation doctrine is 'inefficient' (Howe *et al.*, 1986: 442), 'imposes greater risks' (Rosegrant and Binswanger, 1994: 1621) or is less flexible (Ciriacy-Wantrup, 1985). As proof of these statements the incident of California, USA serves as a good example (Box 15.1).

Box 15.1. Solving water scarcity in California, USA

The users of California's heavily over-exploited groundwater basins jointly decided to abolish the priority system because it had become unworkable. They re-defined the absolute volumes of water they were entitled to into proportionate shares. They further agreed that all rights be of equal standing in any future dispute. This in effect also implied that water rights became separated from ownership rights to (overlying) lands. This rather unique legal solution became known as the doctrine of correlative rights (Ostrom, 1990, Chapter 4).

What then could be a viable alternative water allocation principle? Some international experiences appear to converge with the conclusion of the preceding section: water rights should be expressed in proportions of a river's flow or yield. International experience further emphasises that it is important that such rights may be sold or transferred. This last requirement is incompatible with the appropriative rights system. Selling water may be interpreted as non-beneficial use and constitute grounds for revocation of the water right (Rosegrant and Binswanger, 1994: 1615-16). In Chile, such a system of tradeable water rights has been adopted since 1975. According to a World Bank report (LeMoigne *et al.*, 1994), the complete overhaul of Chile's water right system has proved to be a success. More recent publications by observers have been more cautious and critical (Hoogendam, 1995; Solanes and Gonzalez, 1996).

In contrast to, for instance, the USA and Zimbabwe, where a water right basically is a user right (but a very firm one), in Chile a right holder owns the water, meaning that s/he may trade the right, (temporarily) lease (part of) it, sell it, etc. This, it is argued, gives the right holder the necessary security in the water title. Also, a water right is not attached to a specified piece of land; i.e. one may own a water right without owning a piece of land. Furthermore, water rights in Chile are expressed in volume by unit of time (litres per second or cubic metres per year or month) and are aliquot (proportional) if supply is insufficient (Gazmuri, 1994: 66). As a result of this, there is no priority in Chilean law. When no other means are available to satisfy the domestic water needs of a locality, the government may expropriate rights for reasons of public welfare. In such cases prior payment of compensation must be made. The expropriated party must be left with enough water for domestic use (Gazmuri, 1994: 70). In case the right holders cannot reach agreement about how to distribute water in times of water shortage, the president of the republic may declare the area a drought zone. An appropriate government department is then empowered to distribute the little water available in the interest of the general public (Gazmuri, 1994: 71).

Gazmuri concludes that this new set-up resulted in a dramatic increase in agricultural production and employment. This was accomplished without the

need for new hydraulic infrastructure: the increase was achieved by shifting land from cultivation of grain, corn, oilseeds, and cattle-raising to the more water-intensive fruit production. The freedom to buy and sell or "rent" water gave farmers greater flexibility to shift crops according to market demand. Gazmuri further argues that the certainty of water rights and the legal and managerial attributes of users' organizations greatly diminished the conflicts arriving in the courts (Gazmuri, 1994: 76).

A cautionary remark about Chile's experience should be made here: in Chile the system of proportional rights may well be functioning effectively because of its two-century long tradition. Only in the period 1966-1975 was the system abolished and did the government allocate water (in an administrative allocation system). The recent Mexican water reform bears more similarities with the present Zimbabwean situation, changing from an administrative allocation system to a decentralised limited trading of water rights system. This experience will be discussed at length in a later section on economic reform of the water sector.

Some pertinent questions

To conclude this section we highlight the fact that a reformed Water Act will have to choose between the following options:

- (a) retain or discard the priority rights system
- (b) retain or discard the concept of 'normal flow'
- (c) retain or discard the principle of 'beneficial use'
- (d) retain or discard the system of defining water rights in absolute volumes
- (e) retain or discard the principle that water rights are attached to specified pieces of land.

EQUITY

Any discussion regarding ownership and user rights and principles of water allocation in Zimbabwe has to take account of the historical dimension of water access. The skewed access in favour of the minority white farmers requires that the issue of equity be addressed. This issue requires a dispassionate, rigorous and well-founded argument. In this section we discuss this issue firstly by examining the principles of the present doctrine of water allocation — prior appropriation. After that we explore some scenarios for water reform.

The doctrine of prior appropriation

The system known as prior appropriation emerged in the south-western part of the USA. This was not an historic accident. All 'frontier areas' in semi-arid climates appear to have developed prior appropriation doctrines, such as in Zimbabwe. The basic idea apparently underlying this type of legal thinking

was that frontier zones were 'empty' of other human beings, and the first colonial arrivals could simply take what they needed. The rule of "first in time, first in right" was thus adopted by custom, which later became law (Teerink, 1993: 17). Teerink summarises the process in the USA:

During early settlement of the West, most of the land was in the public domain and not subject to water diversion under riparian rights. Local customs and regulations developed based on simply taking and using water. Later, such appropriation was formalized by posting a notice of intent to take water and recording such notice in the county of local jurisdiction. Legislation and court decisions recognized this method, known as prior appropriation, which eventually was adopted into a formalized framework of a water rights allocation system (Teerink, 1993: 16-17).

Compare this with the Zimbabwean experience. A government document of 1938 makes the following remark:

... being a new country, Southern Rhodesia is unhampered by the pernicious common law relating to riparian ownership (NAZ file SP160P cited in Manzungu and Senzanje, 1996: 4).

The problem, of course, is that the frontier zones often were not empty, as is the case for Zimbabwe (Manzungu and Senzanje, 1996: 4). Here, in some, if not most river systems, indigenous Zimbabweans already used river water, not only for domestic use, but also for irrigating crops and probably also for other purposes such as mining. Thus, with the granting of the first colonial water rights, some prior or indigenous rights were adversely affected, or infringed. Furthermore, during the colonial period, the Water Court was biased in favour of white agriculture and may have further infringed on the rights of indigenous water users.

Two basic questions can be posed;

- (a) Would it be possible and worthwhile to scrutinise all water rights issued before 1980 and amend any 'inconsistencies' with the laws that then ruled?
- (b) Would it be worthwhile to re-look at the established water rights with the 1990s ideas of what is just?

For a satisfactory resolution of the equity issue we probably have to consider both options, starting with redressing all the 'oversights' and 'errors' the Water Courts may have made during colonial times.

Redress within the terms of the colonial laws

It is a well-known fact that white settlers took water (as they did with land) from the black indigenous population. Firstly water was taken from individuals and communities. For example in Mutambara, the colonial state appropriated individual furrows (Manzungu, 1995). Communities also lost water as people were moved out of well-watered areas or lost access to perennial rivers. Redressing the situation means that water has to be returned to these different

actors. The complication is that these pre-colonial riparian rights were never documented in black and white, but were nevertheless understood by the people involved. We will here give three examples of how the situation could be (partially) redressed, in terms of the colonial laws itself. This is not an exhaustive list of possibilities.

(a) There is historical evidence, in some river systems, of indigenous irrigation being practised at least at the same time as the first efforts of commercial settlers to develop irrigation (see for instance Bolding *et al.*, 1996; and Soper, 1996). This is an important observation since the colonial water law was based on prior appropriation and not prior application. Problems started to emerge only later (often decades after) when commercial farmers applied for formal water rights *en masse*, and indigenous Zimbabweans did not. The procedure of granting such water rights was flawed, as it involved officially gazetting the application, to which those potentially affected by the granting of the right had, in practice, no access. This type of redress would involve the collection of historical evidence estimating the amount of water used by indigenous farmers prior to granting the water rights to the commercial farmers. Rights to water should thus be returned to their rightful, that is first owners.

(b) Some white commercial farmers were granted water rights with the following proviso:

This Grant is issued subject to the right of others to whom use of the water may be lawfully granted to obtain the right to use, and thereafter to use, a reasonable share of the water in the said river.

This clause was documented for the original grant of one water right (van der Zaag and Röling, 1996), but may have been included in many other rights granted in the first decades of this century. It meant that even with a right to the total flow, downstream users were, in principle, allowed access to an unspecified 'reasonable share' in future. The logic of this ruling seems at odds with the concept of priority dates. In 1970, the Judge of the Water Court asked the Hydrological Branch to advise how this water right should be revised 'so as to eliminate this unusual and detrimental feature'.

Redressing existing imbalances in the distribution of water rights could therefore be based on this clause (for those water rights which contained such a clause in their original grant). The argument would be that subsequent court decisions of nullifying this proviso were against the spirit of the original grant. This would create possibilities for transferring some rights to downstream users, equal to a 'share' deemed 'reasonable'. The question of quantifying what would be 'reasonable' falls outside the scope of this chapter.

(c) A third example pinpoints the differential way in which the Water Court defined a river system, when considering applications for a water right from white and black farmers respectively (Bolding *et al.*, 1996). 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 [i.e., upstream of] the Reserves which will not be subservient to this right [of Nyanyadzi scheme].

In the Nyanyadzi catchment, applications for water rights between 1949 and 1952 for existing irrigation furrows on white farms located upstream of Muwushu and Mutambara were mostly granted by the Water Court quoting the above passage. At the same time, African farmers in the same catchment were treated differently. By the mid-1950s most furrows in Muwushu reserve were forced to close down.

This 'jurisprudence' blatantly went against the letter of the colonial water laws. Similar judgements may have been made in other river systems as well. Given that files related to water rights are relatively intact and complete, it would be possible to re-define the relative priorities of rights according to the letter of the colonial laws.

Redress in the light of the post-independence ideas of what is just

A redress in terms of the colonial laws is the easiest to define in terms of the criteria used, since they derive from colonial law itself. This may amount to a considerable transfer of righted water to the indigenous population. We have, however, no idea what it would amount to in quantitative terms. In any case, it would not be sufficient (see below). There is thus a need for the development of contemporary criteria for more water to be transferred. The Zimconsult report avoids to address this issue and alludes to the Minister transferring adequate amounts of water. Such a vague notion cannot be a sound basis for practical policy. More precise criteria have to be defined. Two possible criteria are suggested below.

(a) The first contemporary criterion could base itself on a doctrine similar to that of 'prescription' in American law (also known as 'adverse use'), provided this doctrine is compatible with the Zimbabwean Constitution.³ It is a known fact that some water right holders do not use all the water they are entitled to. It is also a known fact that some indigenous farmers use water without having a formal water right. Prescription occurs where a legitimate water right holder has that right impaired by the actions of a second party, resulting in that right being lost and acquired by the second party. The second party thus acquires a prescriptive right, which overrides the earlier granted right that was impaired. For a prescriptive right to occur, several conditions must be met. There must be a continuous taking over a period of time (usually several years). The taking

must be peaceful. It must be open, and it must not be an invasion of the rights of another (Teerink, 1993: 17). The doctrine of prescription can thus be used to legalise most, if not all present-day 'illegal' furrows.

(b) Although the above criterion may result in a substantial additional transfer, it still would not be sufficient for one simple reason: all those indigenous farmers who *would have* developed irrigation but *could not* because commercial farmers had already taken all the water, do not qualify for such transfers of water rights. There is therefore need to develop yet another criterion. This last criterion is based on subsidies granted by the colonial state to commercial farmers. Private storage capacity at commercial farms was generally constructed with significant subsidies during colonial times.⁴ Even after independence this continued in the form of the National Farm Irrigation Fund (NFIF) funds (see Manzungu and Senzanje, 1996). These subsidies gave an advantage to white commercial farming which are difficult to justify. The basis of redress would simply be the percentage of subsidies received for storage capacity, a percentage which can be established by archival research. This same share could now be allocated to historically disadvantaged sectors of the economy, by simply surrendering an equivalent amount of storage rights. This criterion could also be used in a slightly different way. Owners of 'subsidised' storage capacity could be required to repay this subsidy (for instance in instalments) to an 'Historic Development Fund', with which new storage capacity can be constructed, and storage rights granted to disadvantaged sectors. It is important to note here that there is still scope to double the water yield in Zimbabwe through the construction of new storage capacity (Zimbabwe, 1994: 6; FAO, 1990).

Some questions

An important question remains: what will be the role of the state in redressing the unequal access to water? There are a number of options that the state has at its disposal to deal with the issue. First, the state can allow individuals and groups of people to claim back the water that they lost. In this case the rights do not revert to the state but to the individuals and groups of people.⁵ Another means of redress is compensation which can be paid to the individuals and groups of people. Again the state is the facilitator and not the beneficiary. The state, however, can opt to retain all the lost water rights to itself and then reallocate the water to relevant groups. This is the choice that the government of Zimbabwe has taken with regard to the land question. The problem is that the state has to bear the distributional costs, such as paying for irrigation infrastructure, etc. This can prove a major drawback as evidenced by the fact that most national dams have water reserved for smallholder farmers who lack the financial means to develop the necessary infrastructure. As such the water remains unused (Rukuni, 1994).

The criteria developed in this section would justify a substantial transfer of water rights to historically disadvantaged segments of society, although we have no material to quantify it. The most important point, however, is that by adopting the suggested criteria, the most glaring historical injustices, as reflected in the established distribution of water rights, would have been sorted out to some extent. With a clean sheet, the government could then start looking to the future, and embark on the development of sound development policies. Here, the suggestion made by the Zimconsult report becomes valuable. Zimconsult (1996) proposes the establishment of a Water Development Fund with which new irrigation infrastructure can be financed for the benefit of historically disadvantaged groups. This fund would be financed from a (modest) levy to all water users. Zimconsult suggested a levy of Z\$4 per 1,000 m³, generating Z\$14 million annually (some US\$ 1.4 million at 1996 exchange rates).

SUSTAINABILITY: ECONOMIC AND ENVIRONMENTAL CONSIDERATIONS

Experiences world-wide indicate that certain provisions of a water law may induce rapid depletion of water resources, while other designs may help to prevent this from happening. A reformed water act in Zimbabwe should, obviously, consider these experiences. In this context, economists have been very forceful in their argumentation in favour of (1) security of tenure, and (2) using the opportunity cost of water for allocation decisions. Some of these viewpoints are summarised by Muir-Leresche (1996). Muir-Leresche argues the first point as follows:

where individual users . . . do not have control over the future use of that water then their decisions will be based on maximising their returns in the short term and this may not be socially optimal. It means that users do not take into account the scarcity value of not conserving the resource for future use. In establishing allocative systems for water rights it is important to recognise the inefficiencies which will result from insecure access to that water in the future (Muir-Leresche, 1996: 7).

She goes further in stating that 'A system which requires that the user must use the water or lose the rights to it discourages water conservation — careful users who use less water find their allocations reduced' (*ibid.*).

Regarding the second point, that of opportunity pricing of water, she argues that 'It is . . . possible to predict that the price of water will rise over time unless new measures are found to maintain the supplies, reduce the cost of access or reduce demand for water. . . . If the price of water is not allowed to rise over time then society will not be receiving the signal to change use patterns and invest in alternative technologies' (p.4-5). Muir-Leresche concludes that

where an individual has control over the future of that water, and where that individual expects the price to rise over time, then consideration will be given

to the returns from using the water today compared with in future (Muir-Leresche, 1996: 5).

Opportunity pricing and its weaknesses

The subject of opportunity pricing is an interesting one, as it has been often used by proponents of the market. Some of these proponents, however, have applied this principle in the wrong contexts as far as irrigation water is concerned.⁶ The argument has been as follows: charge people a reasonable price for water and then they will use it efficiently. Much energy is then put in calculating what the right price is (see for instance Zimconsult, 1996; but also Peacock, 1995; Jansen, 1993; IFAD, 1994). Ideally, it is said, one would charge the real scarcity value of a unit of water at any place, time, season, etc. Thus one would inherently need a system of volumetric water pricing.

Moore (1989: 1738-1740) has convincingly argued that such a system is incompatible when dealing with irrigation water. First of all, water is an unusually mobile physical commodity (see previous section). So one first has to harness its movements by means of dams, canals, pumps, boreholes, etc. Furthermore, water in most river and irrigation systems is not demand scheduled, where demand scheduled means that consumers are supplied with the resource as and when required, and charged accordingly. The analogy with closed circuit systems as in the case of piped domestic water supplies or electricity supplies, is not valid for river systems with their unpredictable floods, droughts and dynamic interplay between rainfall, ground and surface water flows, and the hydraulic dependence of downstream users on top-enders. Another complicating factor in instituting volumetric water supply systems is the prohibitive costs involved in measuring and monitoring water flows, certainly if one considers installation of measuring devices at each individual's plot. Moore observes that in most irrigation systems, managing agencies ultimately resort to wholesale selling of water to groups of water users. In such instances efficiency gains at individual level only occur when high levels of organizational control can prevent free-riding by top enders. If organizational control is lacking, such wholesaling does not lead to economizing on individual water consumption, but rather to water hoarding in the face of insecurity about when one next gets a turn (see Wade, 1990).

Despite the above 'imperfections' in the operationalisation of a water market, it goes without saying that water pricing will facilitate some efficiency gains. Still, under the present legal system, only water owned by government (i.e. its storage rights) may be sold. This way of attaining opportunity pricing will therefore only result in a more efficient allocation of ministerial (or agreement) water. What about the rest?

In conclusion economic calculations should be considered as mere signals to usher in credible political mechanisms (accompanied by accountability to the

users) in water allocation (Moore, 1989). This is very relevant to Zimbabwe where existing inequalities to water access are a political rather than a market issue. We however argue that a regulated market can be viable (see below).

Markets in tradeable water rights

Basically there are two options for achieving a market in water allocations. The first option is for government to relinquish its ownership of water rights to the actual users and allow free trade of these rights, as was done in Chile (see above). The second option represents a more gradual establishment of a water market. Government retains the ownership of the water, but allows limited trade amongst users according to certain specified conditions, as was done in Mexico in the early 1990s.

To attain efficiency that would, economists maintain, result from opportunity pricing, simply means to allow all water rights to be tradeable. It is not necessary, if not inappropriate, for government to price all water. The possibility of a water right holder selling or leasing the right according to market principles is a sufficient condition.⁷ However, this system has a number of disadvantages, which might prove detrimental to smallholder irrigators. First of all, once water rights are made tradeable, concentrations of water rights might occur. Scrupulous entrepreneurs may take advantage of, for instance, indebted smallholders and acquire water rights cheaply. This actually happened in Chile. Speculation on the water market grew to an extent that government had to introduce new legislation to regulate the water market so as to contain speculative practices (Hoogendam, 1995: 12; Solanes and Gonzalez, 1996: 4). A second draw-back would be the accumulation of water rights by non-agricultural (mining, urban, industrial) sectors at the expense of agricultural use, since agricultural consumers can never compete with prices paid, for example, by urban consumers.

The Mexican water reforms, that started in 1992 and are still on-going, provide an example of a phased introduction of a (limited) water market (Rosegrant and Gazmuri, 1996). Mexico bears certain similarities with the present Zimbabwean context in that it has been liberalising its economy since the beginning of the 1990s and had a highly centralised water allocation system run by government departments. The water reforms were motivated by a need to improve efficiency of water use in order to cut on the exceedingly high state subsidies on operation and maintenance of water works (as high as 0.5% of GNP in 1992). It was also realized that a market based water allocation system would be more responsive to the new (agro)economic opportunities, and less expensive, than centralized allocation of water. However, to prevent water speculation, strong regulations over transfer of water rights were established under the supervision of a government department.

In Mexico the government remains ultimate owner of the water, which is granted to water users in concessions or (in case of state agencies) grants. Concessions carry lease terms of five to 50 years and are preferably issued to a group of users organised in a Water Users Association (WUA). The WUA can grant subsidiary water rights to their members through procedures authorized by the National Water Agency (CNA). The latter agency maintains a public registry of water rights, including extraction and releases of ground water. All transfers of water must be recorded in this public registry. Water transfers are authorised by the organisation responsible for the level of interaction. Transfers amongst members of a WUA are dealt with by the WUA; inter-district⁶ transfers are dealt with by a district hydraulic committee; inter-sectoral transfers are authorised by the National Water Agency (CNA). All transfers of water need a majority consent from members of the authorizing agency. Once all water users in a river basin have organised themselves in a Basin Council, water becomes freely transferable without interference by the National Water Agency. In case the public interest is infringed, the Federal Government may over-ride all other bodies, to regulate water abstraction in order to prevent over-exploitation of aquifers; protect or restore an ecosystem; preserve sources of potable water; preserve and control water quality; and in case of unusual water shortages or drought (Rosegrant and Gazmuri, 1996: 268-73).

Initial observations of water transactions show that most transfers between individual irrigators concern temporary swaps of irrigation turns. Intersectoral trades concern in most cases mutually beneficial deals (Box 15.2).

Box 15.2. Intersectoral water transfers in Mexico

- The City of Hermisillo required more water for its urban consumers and paid the pumping costs of an irrigation scheme in exchange for 25% of the water concession of the Water Users Association in charge of the scheme.
- The City of Monterrey bought one season of water rights from a nearby irrigation scheme in exchange for cash payments amounting to the average seasonal production output of the scheme.
- A factory bought its water concession from a canal irrigation scheme by financing the construction of a water saving drip irrigation system, and using the water thus saved (Rosegrant and Gazmuri, 1996: 276-77).

After handing over of operation and management from irrigation district authorities to a Water Users Association, the latter becomes responsible for collecting a fee to cover O&M expenses. The National Water Authority collects a fee on top of that from WUAs to pay for conveyance of water to their district and O&M costs of (dam, main canals) infrastructure the CNA has retained under its control. The turn-over has already been labelled a success with water users paying 80% of all O&M costs in 1993, compared with 18% in 1988 (Rosegrant and Gazmuri, 1996: 275-76).

The Mexican example seems to point the way for Zimbabwe's aspirations to arrive at a decentralised, financially sound water sector. However, one must note that Mexico has a long standing tradition of organising farmers in *ejidos*, which act as a kind of community organisation. In Zimbabwe this points to the important role that can be played by social animators to help grassroots people to organize themselves effectively. Hand in hand with that is the need to make such constituted organizations legal entities. The lack of legal status of user organisations can be a hindrance. Irrigation Management Committees in smallholder irrigation schemes have suffered from this.

Environmentally sustainable water management

Sustainable water use comes from making sure that adequate conservation measures are taken by all those concerned. As such the new Act must contain aspects of conservation.

Muir-Leresche (1996) discusses the issue of the 'polluter pays principle', which discourages environmental damage done by users. A corollary of this principle relates to a scenario where certain people, through their activities, help the river catchment to sustain a good yield of water. This would apply to, for instance, the case of foresters and farmers who follow sound land husbandry practices. The first priority would be to support those agricultural techniques that are hydrologically beneficial (by conserving soil and water and recharging aquifers) and result in higher yields of dryland crops, and thus translate into immediate benefits to dryland farmers. Such win-win options are however hard to come by. Further research is clearly needed.

Muir-Leresche therefore proposes to introduce subsidies for such practices which are considered positive. This point touches on a major dilemma in the management of river systems: upstream users of land normally do not benefit, or benefit very little, from adopting husbandry practices that are positive for that catchment. Instead of imposing 'good husbandry' by law (as was done during colonial times), it would be easier to induce such husbandry by the positive measures suggested here.

In the context of Zimbabwe's water reforms this implies that all land users in one river (sub) basin, organised in a (sub) catchment council, should in the first instance be considered stakeholders and identify all areas needing conservation. At a catchment level it should be possible to monitor all the conservation measures as well as document their effects on river flows and aquifers. When it is established that some users, either because of their conservation efforts or through their good land husbandry practices, contribute to inflows or aquifer recharge, they could be given by the catchment council water shares or other forms of benefits (like exemption from membership fees), or benefit from targeted subsidies.

Some concluding questions

For a reformed Water Act to be financially and environmentally sustainable, the following questions have to be addressed:

- (a) retain or turn-over the government responsibility for operation and maintenance costs of water infrastructure
- (b) institute or discard operation of a water market in free form (Chile model) or limited form (Mexico model) in order to provide for efficient use of the country's water resources
- (c) retain or turn-over conservation measures to water users by means of locally defined management incentives.

CONCLUSION: TOWARDS A CONSISTENT AND LEGITIMATE WATER ACT

Having circumscribed the options available for a reformed Water Act along four dimensions (ownership, principles, equity and sustainability), we now take the liberty to make our own choices, and explain our preferred options. We will try to show this by sketching a complete picture of the various choices we make.

First of all, historical imbalances in water rights should be sorted out. The suggestions given in the section on equity may amount to a transfer of at least 15% of flow rights and at least 20% of storage rights (excluding Zimconsult's proposal). To prove this considerable research is required. Once the equity issue is sufficiently addressed, attention may shift to how a legal system that best fits the Zimbabwe situation is crafted. This implies re-looking at the strong intervening role the Rhodesian and Zimbabwean governments relied on in administering the Water Act. It may be that this was justified for the attainment of various societal objectives, but will become unnecessary especially in the light of the removal of basic contradictions as suggested in this chapter. In our view, the best legal system can take the form we hereunder outline assuming that the historical legacy is first resolved.

1. Proportional water rights

Right holders will be granted aliquot (proportional or fractional) rights to water in a river system, both to surface water, ground water and stored water. In the process, the priority system is abolished. The only priority right remaining is that of primary rights (domestic water use). As hinted above it is suggested that water rights take the form of shares in the water resources of a given (sub)catchment. When the share principle is agreed on it is necessary that measurement structures are changed to embody the new circumstances (see below).

2. Acquisition of new water rights

It is generally accepted that there are hardly any flow rights left for allocation in Zimbabwe (see e.g. Matinenga, 1996). To be sure, after the transfer business outlined earlier, all surface flow water would be committed. This, perhaps unfortunate situation will make the application to new rights a very straightforward exercise: "new" water will only become available through investments in new storage facilities. Proportional rights to stored water would then simply be issued in accordance with the investment made. It should be noted that the investments coming from the Historical Development Fund proposed here, and the Water Development Fund proposed by Zimconsult would in this set-up be considered as coming from the historically disadvantaged water-less farmers. The rights to these waters are given to this category. 'Normal' investments made by government can be distributed according to government policy.

3. Ownership of water rights

Any Zimbabwean or body established or recognised under Zimbabwean law would qualify to hold a water right, including the landless, farmers in communal areas, town councils etc. For smallholder schemes, plottolders should get specified individual titles to the water they are entitled to, also in proportional terms. Storage rights held by the state could be surrendered to catchment councils. The ultimate ownership of these rights would remain in the hands of government. However, (sub) catchment councils and individuals could take out 'concessions' or leases from government, like in the case of Mexico. If the government sees it fit, it could ask for a nominal lease fee or rent. The term of lease should be conveniently long enough to give the shareholder sufficient security. However, the exact length should remain negotiable. This rented water share should then be open for sub-letting or sale by the owner to any legal party under any kind of negotiated (pay) arrangement.

4. Limited tradeable water rights

The present legislation does not allow the sale or sub-letting of water rights. This inflexible system puts many users in a catch 22 situation. For example a water concession held by an indigenous farmer may lie idle for many years before s/he invests in irrigation infrastructure. If s/he were to rent out that same water concession, that would bring him/her revenue which s/he could invest into irrigation infrastructure.

It seems desirable, as is the case in Mexico, to not completely exclude the government from any role in water allocation since complete release of the water market may lead to the emergence of water cartels (monopolies) and water speculations. Government also has to retain its role of 'safety valve' in case of calamities that over-ride local concerns and capacities to act, like

environmental pollution, drought conditions, degradation of complete ecosystems, and over exploitation of aquifers.

To make the system of tradeable water shares operational it is necessary to have an updated register of all water shares. This register could be maintained by ZINWA (Zimbabwe National Water Authority) in conjunction with the relevant catchment council. Persons wishing to trade water rights would be required to have entries made in the register with the appropriate details of such transactions. It should be made clear that unregistered water right transactions shall be considered null and void. It is at this stage that all the transactions shall be appropriately vetted. In the case of group water rights (e.g. for a communal area irrigation scheme) it should be insisted that cash payments shall not be allowed but investment in, firstly, water related activities and if not, any other project approved by consensus within the group.

It can be seen from the above that what is being proposed is a mixture of types of 'ownership'. Firstly the state remains the nominal owner and by so doing reserves the right to charge for water rights as well as continuing to address new challenges that come up. It is envisaged that the state will devolve its allocation role to local bodies such as catchment councils but retains its regulatory role (see also below). The state can also hold in trust water rights for future generations. Such water rights can be (temporarily) rented out and the money put in a Development Trust that can be used for water-related activities.

5. Service fees

ZINWA would charge water users service fees for delivering water from dams and canals in its possession. Included in these service fees would be all operation and maintenance costs for running pumps, repairs on canals and dams, and amortization of investment.

6. 'Readable' infrastructure

Diversion weirs and other infrastructure aimed at diverting flows from rivers should be redesigned to conform with the aliquot principle (see for suggestions for instance van der Zaag and Röling, 1996). As was mentioned earlier, such proportional weirs should be easy to "read" by stakeholders, thus enabling "peer" monitoring.

7. Effective institutions

To foster democracy in water management it is important that (sub)catchment councils accord the many smallholder farmers a bigger voice. This should be safeguarded by granting the smallholder farmers more representation apart from the Chief or the District Administrator or the Zimbabwe Farmers Union (that represents smallholder farmers). It is important that the new legislation be accessible to all the people, not just distributionally but in terms of

understanding. To this end the vernacular versions of the Act should be produced (it is possible! The South African constitution was written in vernacular languages).

In line with present government proposals we foresee the establishment of sub-catchment councils comprising all possible stakeholders (groups and individuals) at grassroots level. These would need to draft and gazette their own regulations with regard to monitoring of water allocation (registry keeping) and distribution; authority to charge levies on water shareholders for O&M costs and handling costs; decision making procedures; rules and regulations in connection with water transfers; and conflict resolution procedures (very much like the Water Users Associations in Mexico). Furthermore, these councils should be allowed to draft policies with respect to promotion of good husbandry practices in the catchment. Possibly these could also include penalties for 'polluters' to be collected and used by the (sub)catchment council for water development purposes, and allocation of targeted subsidies for good land husbandry. These sub-catchment councils should be represented on the catchment council that in turn is supervised or accountable to ZINWA.

8. Conflict resolution

(Sub)Catchment councils monitor the use of water rights, with the proviso that these (sub)catchment councils comprise all possible stakeholders in that catchment and effectively and truly respect all interests of the various stakeholders. Any disputes occurring between shareholders in the same (sub)catchment could be dealt with by the relevant (sub) catchment council. In case of no resolution of the conflict, the case could be brought to the Administrative Water Court. If this yields no satisfactory result, it should be made possible to turn the case into a civil suit at any Civil Court. For a more thorough discussion on the issue, see Chapter 11 in this volume.

9. Environmental management

In each catchment area, a certain flow right should be set aside for the environment. Such a right should be a certain proportion of the river flow.

Those stakeholders whose actions have a detrimental effect on water quantity and/or quality should make compensations to the (sub)catchment council in proportion to the negative consequences of their actions. This council can use these funds for treatment plants, conservation measures, and 'positive' subsidies. Those stakeholders in the catchment who 'produce' sustainable replenishment of aquifers and river flows could qualify for such subsidies.

10. Water scarcity management

The new Act should specify under which circumstances the government may (a) appropriate water rights (but with full monetary compensation),⁹ and (b)

declare shortage areas, and directly intervene in water distribution. It should be possible to appeal against such government action through the courts.

11. Irrigation finance

It is known that lack of finance has hindered the development of smallholder irrigation. This is radically different from what happened to commercial farmers who financially benefitted in the colonial era as well as in the post-colonial phase (see Manzungu and Senzanje, 1996). As has been argued above, by allowing tradeable water rights, investment in this sector can be boosted. It is also suggested that a proportion of the levy the government charges will be retained by the catchment council for reinvestment.

The above scenario would not only do justice to the specific historical aspects of the water resource, as argued above, but also to its specific physical attributes of being a fugitive liquid. A reformed Water Act should re-distribute some rights, and then clarify the precise rights of farmers to water, and give them all the security of tenure they require. This will certainly help them in improving the management of their resource. This will be by far the cheapest way to economise on water use, while maximising the returns. A new Water Act should also clearly define the role of the state, and we would suggest that it be restricted to regulatory functions. Furthermore, as Chile's and Mexico's cases show, transfer of water use from one sector to the other (for instance between agriculture and urban use) should be made much easier, not only to the benefit of irrigators, but to urban consumers as well (Gazmuri, 1994; Rosegrant and Gazmuri, 1996).

NOTES

1. The omni-presence of the state in Zimbabwe can be understood historically. The colonial state assumed the status of a gigantic intervenor, interfering with nearly every aspect of daily life. Its motive was clear: to establish and sustain a dual economy, and a dual society. This role was gratefully inherited by the post-colonial state for the opposite reasons: it needed a strong intervening role in order to abolish the inherited dualism. This justification for the huge task ahead of government after 1980 is essentially a pragmatic one. It may be valid during a period of transition; but does it provide a sound footing of society in the long run?
2. With the application for a water right, one has to produce an agricultural report (produced by Agritex) that states which crops will be cultivated and how the water applied for is going to be used. By means of this report an assessment is made whether the water is used beneficially.
3. There is however a record of prescriptive rights being enforced in the colonial era (see Manzungu, 1995).
4. Agricultural subsidies to white commercial farms before 1980 (including settlement of ex-service men immediately after the second world war), and the simultaneous taxing of crops produced by black smallholders have received a lot of attention in the literature (see for instance Yudelman, 1964; Palmer, 1977; Deininger and

Binswanger, 1995). This literature emphasises crop-related bonuses and levies. There are, however, many references in old sources to subsidies for water conservation, which were mainly meant for the construction of small and large dams. A quick survey yielded the following information. One of the earliest remarks was provided by Ayles and Hamilton (1937):

Irrigation (Imperial) loans were first introduced after the grant of Responsible Government, but were not extensively applied for, and were dropped for a time. The new system of loans was made available in 1929, and financial assistance is now being increasingly given, at low rates of interest and on easy conditions of payment, for such purposes as soil conservation, dam and weir construction, and the sinking of boreholes. Other loans are obtainable for the erection of fencing and dip tanks. Apart from loans, the cause of water conservation has been assisted by arrangements to supply cement at cheap rates, and the payment of rebates of up to 25 per cent, of the cost of dams and storage weirs. Financial assistance is also available to local sub-committees for the purchase of ditching implements, etc. (p. 6).

Apart from these official subsidies, commercial farmers benefited from hiring, at below-economic rates, government equipment (such as bulldozers) for dam construction and construction of mechanical anti-erosion works. Such was the case in 1946 when farmers hired this equipment for 'in total 9,816 chargeable hours'. They were charged in total £8,500, whereas government expenditure for this plant equipment was £13,000; i.e. an implicit subsidy (apart from the official subsidy) of 35% (Annual Report of the Irrigation Department, Southern Rhodesia; *Rhodesian Agricultural Journal* 44 (July-August 1947): 343).

According to Weinmann (1975), 'In 1945 the ordinary Government subsidy of thirty-three and a third per cent of the cost of construction of soil and water conservation works was increased to 50 per cent in the case of Intensive Conservation Areas'. The Southern Rhodesia Official Yearbook of 1952 (Rhodesia, 1952: 422) stated that 'Water conservation was actively encouraged and a system of subsidies introduced in 1936'. The report gave figures of the amount of storage works constructed in the year 1950 alone, implicitly suggesting that these works were constructed with (some) assistance of government: For the commercial farming sector, 857 small private dams with a combined capacity of 8.3 million m³ were built, and 98 medium to large private dams with a total capacity of 4.8 million m³. In the same year, dams built in 'Native Areas' had a combined capacity of only 0.5 million m³ (Rhodesia, 1952: 459, 465).

Most ministerial annual reports, as published in the *Rhodesian Agricultural Journal*, mentioned the existence of such subsidies. See for instance the Report of Secretary, Department of Agriculture and Lands, for year ending 31st December 1944 (*Rhod. Agr. Journal* 42 (July-August 1945), p. 327). The Annual Report of Secretary, Division of Agriculture and Lands, for the year ended 30th September 1950 (*Rhod. Agr. Journal* 48 (July-August 1951): 4), explained the basis for subsidies for dam construction:

The department of conservation and extension undertakes dams up to a wall height of 18 feet, leaving the construction of larger dams to the department of irrigation. The department is now planning work to cover whole catchment areas systematically with the essential dams and conservation works forming what is known as an Area Scheme. This work, once planned, is initiated under Section 23 of the Natural Resources Act. The expenditure in the first instance is met from government funds and subsequently recovered, after subsidies have been deducted, from the farmers concerned in proportion to their benefits (p. 356).

Still in 1957, mention is made of subsidies on approved conservation works of 33% in the higher rainfall areas and 50% in the drier areas (Cormack and Whitelaw, 1957: 52).

5. Internationally this has been done. Some water rights have been returned to native Indians in the United States. The same principle has been applied to land. A recent case is the return of land to native Aborigines in Australia and in so doing discarding the myth which claimed that the settlers found the land empty of people. Near to Zimbabwe, South Africa has allowed some communities who lost their land, which they had legally bought, to get their land back in the so-called black spots. Such a system is based on a light burden of proof i.e. a rigorous proof of ownership is not required.
6. For a classical analysis see Moore (1989). Incidentally Moore was responding to an economist, Repetto, who was transferring rent-seeking analysis from the subject of pesticides to irrigation.
7. This also implies that a plowholder in a smallholder irrigation scheme (who would in the proposed system be issued his/her individual water right) would only be charged for those services provided by others (such as for pumping, conveyance, administration, but also amortization of the infrastructure), but not for the water itself. (Government could, of course, levy a 'tax' on this property in the same way as it could tax, for instance, land.) As the owner of that water, the holder is the only one to charge for the water itself. If government would charge a price for that water, this could be seen by farmers as an expropriation of their water rights (Rosegrant and Binswanger, 1994: 1615).
8. An irrigation district mostly comprises several Water Users Associations.
9. The question of compensation in cash and kind is also relevant for those commercial farmers who had invested money into legal dam construction.

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