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Continuing Discontinuities: Local and State Perspectives on Cattle Production and Water Management in Botswana

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ABSTRACT: From 1885 when the modern state of Botswana was founded until the discovery of significant mineral deposits in 1967, one year after independence, the livestock industry, particularly cattle production, played a significant role in the country's economy. Today there are concerns about how the livestock industry, because of its importance to many rural households, and its potential to diversify the mineral-dominated economy, can be revived. In recognition of the country's semi-arid climate, the government has promoted a policy of developing water sources for livestock watering. The state has acknowledged the policy has largely been ineffective, but continues to implement it. This paper attempts to explain this paradox by examining state and local perspectives in the management of water and related resources in the Botswana part of the Limpopo river basin. The discontinuities between the local inhabitants and state practitioners are analyzed within the wider physical social, political, and economic landscape. We ascribe the continued implementation of an ineffective policy to modernisation claims.

KEYWORDS: Traditions, modernisation, state, water resources management, cattle production, Botswana

INTRODUCTION

From 1885, when the modern state of Botswana was founded, after the British declared it a British Protectorate,¹ up to the discovery of significant mineral deposits, particularly diamonds, in 1967² 1 year after attaining independence on 30 September 1966, the livestock industry, particularly cattle production, played a significant role in the economy of this southern African country (Tlou and Campbell, 2003). However, persistent droughts, an important feature of the country's semi-arid climate, limited its potential. By 1997 a drought had been declared in 27 out of the 33 preceding years (GOB, 1997), often with disastrous social and economic consequences. For example, it is reported that "the happiness brought about by Independence was spoilt by a severe drought that lasted for more than five years", which caused the death of more than 400,000 head of cattle and left 72% of a total population

¹Technically, Botswana was not colonised but was put under the protection of the British Government. However, in practical terms this was a form of colonialism. In this paper we use the word colonial to refer to this period.

²Before independence, there was no significant mining as compared to today with important diamond, copper, nickel, coal, and soda ash mining activities (Tlou and Campbell, 2003).

of 500,000 people requiring food aid (Tlou and Campbell, 2003). Against such a background it is no wonder that water was identified as one of the main factors limiting cattle production (Braat and Opschoor, 1990). This explains why local people as individuals and as groups under the guidance of traditional leaders, as well as the colonial government, invested in the development of water sources (Tlou and Campbell, 2003). The postcolonial state³ followed suit, and in 1974 introduced a policy aimed at providing water resources for livestock watering. This entailed constructing small dams⁴ and installing boreholes, decentralising the management of these to local communities (GOB, 1974). A decade after its introduction, the policy was reported to have failed (Fortmann and Roe, 1985), a verdict that seems to be echoed by every evaluation of the policy (GOB, 1998, 2004). Nevertheless the policy continues to be implemented, as are many other related policies intended to improve the livestock sector (CAR, 2006). Together the policies represent a "strong, diverse and prolonged" government support for the livestock sector centred mainly on the provision of inputs (CAR, 2006).

We try to explain this paradox by examining local and state perspectives in relation to management of water sources meant for livestock watering. We demonstrate that the issues at play include management of grazing areas around the water sources, cattle marketing, and the contribution of cattle to local livelihoods as well as the rural and the national economy. To this end, we make a case for contextualising water resource management in communal areas in Botswana within the broader physical social, political, and economic landscape (see Mollinga, 2008; Molle et al., 2008). Of particular importance is the semi-arid environment, which places physical constraints on what can be done, the land tenure system that directly affects the management of grazing areas and indirectly the water sources, and the socio-economic policy within which the water policy is framed.

To explain the discontinuities⁵ around water resources management and cattle production in Botswana's communal areas,⁶ we investigate the factors that inform local and state perspectives. As Moench et al. (1999) have observed, linear policy models place users at the bottom and managers at the top, who are at a loss when the users "enter the fray", with the result that contradictions between stated objectives and practice emerge. At the centre of the discontinuities are the differing worldviews that are held by local people on the one hand and state on the other. A worldview is a theory of the world or a mental model of reality that frames ideas and attitudes of a society (or part of a society) and influences the basic way of interpreting reality (Funk, 2001). We examine to what degree local perspectives on water management are informed by traditions concerning rural livelihoods in which cattle production plays a significant part. Traditions are inherited, established, or customary patterns of thought, action, or behaviour relating to the past and are commonly accepted as historical but are not necessarily verifiable (www.merriam-webster.com/dictionary/tradition). They tend to be handed down by word of mouth or by example from one generation to another without written instruction and represent cultural continuity in social attitudes, customs, and institutions (www.merriam-webster.com/dictionary/tradition). However, traditions are not static but change in response to local and external factors and are often strategically constructed and interpreted by different actors (Cheater, 1990). In Botswana, traditional local water sources management practices are changing due to economic and social transformation (CAR, 2006). We hypothesise that this is largely driven by a state that sees modernisation as a vehicle for development. A case in point is the 2002

³ "State" is used here to refer to institutions that make and enforce public policy symbolically and actually, while "government" refers to the executive branch of the state (Le Roux, 1996).

⁴ In this paper, we adopt the southern African definition of a small dam as a physical structure with a storage capacity up to 10,000 m³ and a dam wall no higher than 8 m (Senzanje and Chimbari, 2002).

⁵ "Discontinuities" refers to the apparent differences between what the policy states and what happens on the ground.

⁶ "Communal areas" include small villages, cultivated areas, and cattleposts on tribal land. "Tribal land" is defined as land under the allocative and adjudicative control of government land boards and is communally held since it cannot be owned on a freehold basis. A "cattlepost" on the other hand refers to a place where livestock are penned and the adjacent grazing areas, in the vicinity of which are water sources such as dams, boreholes, and open wells (Fortmann and Roe, 1985). For this reason, Fortmann and Roe (1985) argue that it is important to take the village, lands, and cattleposts as a unit of analysis when studying communal area cattle production in Botswana.

Revised National Policy for Rural Development, which defines rural development as a "modernisation process" (CAR, 2006), entailing privatisation of parts of the traditional sector and introducing commercialisation in the remainder of the sector. "Modernisation" refers to the transformation which takes place (or is supposed to take place) when a so-called traditional or pre-modern society changes to such an extent that new forms of technological, organisational, or social characteristics of the so-called advanced society appear (Coetzee, 1996; Long, 2001).⁷

In this paper we argue that the livestock water policy should be seen as part of the state's modernisation project. However, our aim is not to provide evidence that the livestock water policy conforms to the definition of modernisation. Rather we are concerned that the state believes to be modernising. In other words, we look at perceptions of modernity (Ferguson, 1999). We believe that such a perspective allows us to appreciate why the water policy continues to be implemented given the consensus that the results thereof fall below expectations. We also ask whether this brand of modernisation represents the future of water resource management and cattle production in Botswana's communal areas, where at least half of the population resides.

We examine these issues in and around surface and underground water sources in the Limpopo basin. The basin is a critical resource to Botswana, as attested by the fact that 85% of the country's population resides there (Mpho, 2005), with at least half found in communal areas. We present four cases that serve to illustrate the reality of the implementation of the livestock water policy. The cases are based on empirical material that was gathered in 2005 and 2006 in Botswana's Southern district, located in the Limpopo river basin (see figure 1). Just over 400 dams are known to have been constructed, most of which are situated within the Limpopo river basin because of the availability of potential dam sites (Mpho, 2005). Data collection included document review, interviews with key informants such as local inhabitants and government officials, and focus group discussions. The presentation of the cases is preceded by an overview of water resources and water management in Botswana. This is followed by an overview of the political economy of the livestock sector and thereafter by a description of how water and related policies designed for the livestock sector have been implemented. The last section of the paper presents the summary and conclusions.

WATER RESOURCES AND WATER RESOURCES MANAGEMENT

The arid conditions that prevail in most of the country, in no small measure attributable to the Kalahari desert that covers over 75% of the country (see figure 1), makes water scarcity an ever-present threat to economic and social development (GOB, 1991). Annual rainfall varies from about 250 mm in the southwest of the country to about 690 mm in the northeast and is highly seasonal, with approximately 95% occurring between October and April. Average annual evaporation is estimated to be 2000 mm per annum because of the high average daily maximum temperatures that exceed 30°C between October and March. The high evaporation rates compromise the effectiveness of rainfall, which falls over a 25- to 55-day period.

Low rates of surface runoff and groundwater recharge are common, due to a combination of low rainfall, high potential evaporation rates, flat topography, and deep sandy soils. Even the wet season does not produce continuous stream flow. The main rivers only register flow for 10-70 days a year on average (see Mazvimavi and Motsholapheko, 2008). Mean annual rates of surface runoff generally do not exceed 50 mm. No surface runoff is recorded over the whole of the west and centre of the country. The fact that the country's main river systems do not originate from within the country raises the spectre of complicated transboundary negotiations if the country wants to tap into such resources (Swatuk, 2008).

⁷Proponents of modernisation theory assume that processes of industrialisation, which affected Europe in the 18th and 19th centuries and have also occurred elsewhere, are liberating and progressive, should be imitated elsewhere, and that the remaining elements of traditional society should be removed (Moon, 2004).

Groundwater provides about 80% of the country's domestic requirements, mining, livestock, and power generation. Approximately 64% of the water used in urban areas is from groundwater sources, with the exception of major urban centres such as Gaborone, Lobatse, Francistown, and Selebi-Phikwe, which are supplied from surface water sources. The estimated mean annual aquifer recharge from rainfall is about 3 mm but rises to over 40 mm in the extreme north, while much of the central and western part of the country records zero. Only a small percentage of the annual groundwater recharge can be used because of the extremely large number of boreholes that would be needed, as well as the poor-quality water and high development costs.

With total annual renewable freshwater of 14.7 billion m³/year, Botswana is ranked 11th among the 14 southern African states when absolute water availability is considered (Matiza-Chiuta et al., 2002). However, its small population of 1.7 million ranks it fifth when per capita water availability, estimated at 8904 m³, is used as a criterion (Matiza-Chiuta et al., 2002). The low availability of water and the small population have shaped the management of water resources in the country, as will be demonstrated below.

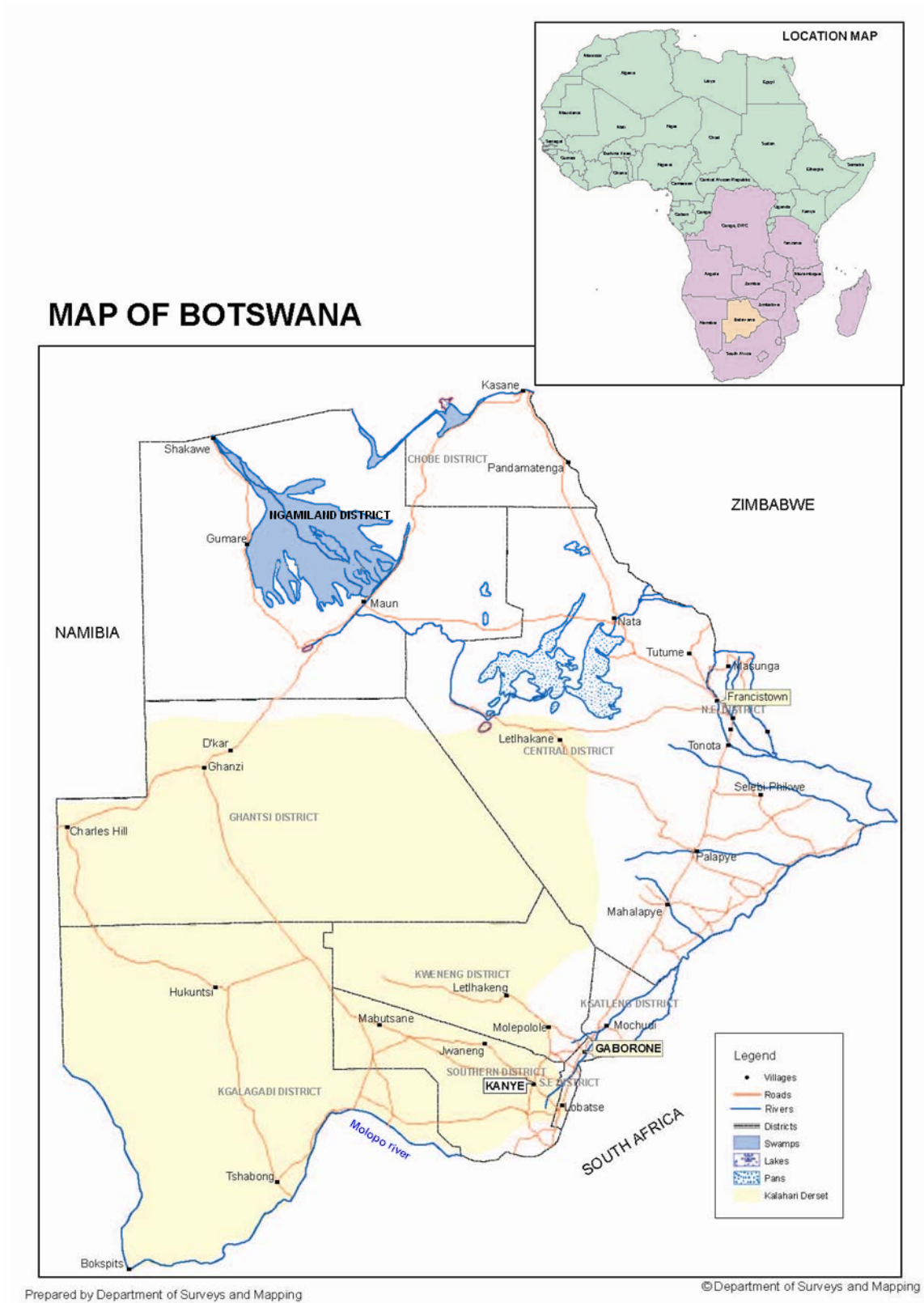
Growth in the economic and social sectors has resulted in increased water demand. In the early 1900s it was estimated that water demand would more than double in the next 10 years in urban centres, while in major villages the increase was estimated at 2.5 times the rate at that time (GOB, 1991). Increasing urbanisation has also been responsible for the increasing water demand. A case in point is Gaborone, the capital city, which was reported to be growing at 9% per annum (GOB, 1991). Increased demand for water has also come from large villages,⁸ natural population increase, mining, and increasing wealth among the population.⁹ The government's response has been to increase water supply through infrastructure development, as well as reforming the policy and legal environment in line with regional and international trends, in which Integrated Water Resources Management (IWRM) features prominently (see SADC, 2005; GWP, 2000). The strong hydraulic mission that the state has pursued resulted in half-hearted attempts at water conservation and increasing efficiency of water use (Boitumelo-Mfula and Lewis, 2008; Swatuk, 2008). In part, this particular type of government intervention has been made possible because both the 1968 Water Act, and its replacement passed in 2002 (GOB, 1968; GOB, 2002) gave the state substantial power over water resources. We examine the rationale for the state investment in water sources for livestock watering, which is unique in that in other southern African countries water policies tend to be directed at irrigation.

The Limpopo river basin is of critical socio-economic importance to the 14 million people scattered in the four riparian states of Botswana, Mozambique, South Africa, and Zimbabwe. In the basin are found major urban centres such as Gaborone and Francistown (in Botswana), Pretoria, parts of Johannesburg and Polokwane (all in South Africa), and Gwanda (in Zimbabwe). These are major users of water resources in the basin, supplying industries, power stations, and municipalities. In rural areas, water is used for domestic purposes, livestock watering, and irrigation. Irrigation is concentrated largely in South Africa and Zimbabwe (Earle et al., 2006). In this paper we show how Botswana has attempted to address the socio-economic needs of its rural population.

⁸ In typical Tswana tradition, households maintain a home in the village capital and another in the lands/cattlepost where crops are grown and livestock are reared. When the population at a cattlepost reaches a certain threshold, the settlement becomes a small village. The paramount chief of the district, through an open consultative process, then elects a traditional authority or sub-chief from among the settlers. This process produces a village with some level of autonomy (Mpho, 2005).

⁹ While average per capita income in 1966 was appreciably less than US\$100 per annum, diamond mining has spurred economic growth, and has caused per capita income to reach to about US\$2800 per annum (Swatuk, 2008).

Figure 1. Map of Botswana showing location and general features of the study area.



POLITICAL ECONOMY OF THE LIVESTOCK SECTOR

The political economy of the livestock sector is closely linked to the increasing role of mineral wealth in the country's economy. As noted in the introduction of this paper, the discovery of minerals soon after independence changed the structure and size of the economy and produced a number of interesting paradoxes. For example, while in the early years of independence the focus was on how to reduce dependence on agriculture, the focus is currently on how agriculture, particularly livestock production, can play a meaningful role in the economy. A joint report by the Government of Botswana and the European Community observed that out of a gross domestic product (GDP) of 50 billion pula¹⁰ recorded in the 2004/2005 fiscal year, mining accounted for 37%, government services 16%, trade/hospitality 10%, and financial/business services 10%, a trend that had prevailed over the previous decade (GOB and EC, 2006). There are, however, concerns about the long-term economic sustainability of such a state of affairs. The other concern is that mining is capital- rather than labour-intensive and accounts for only 3% of total employment in the formal sector (GOB and EC, 2006).

The government plans to diversify the economy away from mining by intensifying crop and livestock production seem to be failing (GOB and EC, 2006). The contribution of agriculture and agro-processing to GDP shrank from 5% in the early 1990s to 2% by 2000 (GOB and EC, 2006), a far cry from the 40% that was recorded in the 1960s (Mpho, 2005). Constraints to agricultural production were cited as recurrent droughts, poor soils, low investment levels, and use of "low technology" in the traditional farming sector. More recently, a series of foot and mouth disease outbreaks caused the ostrich export abattoir approved for European Union exports in 2004 to be temporarily closed (GOB and EC, 2006). However, the livestock sector is considered to be of critical social importance. It is a major source of income for a substantial proportion of the rural population who make up about half of the total population and accounts for some 20% of total employment (Fortmann and Roe, 1985; GOB and EC, 2006; CAR, 2006).

The rapid development of Botswana's economy has transformed the demographic characteristics in urban and rural areas, which have in turn impacted the livestock sector. Rapid urbanisation has led to a decline in the rural population, which declined from 90.5% in 1971 to 54.3% in 1991 to 45.8% in 2001, with 31.8% and 22.4% of the population estimated to be living in urbanised villages and urban areas, respectively (CAR, 2006). Currently urbanisation is estimated at 54%, which is a significant increase from 39% at independence (GOB and EC, 2006), and is reported to have changed people's attitudes towards rural life and traditional agriculture (CAR, 2006).

Before the colonial period (1885-1966), the majority of households in Botswana relied primarily on subsistence rain-fed agriculture and livestock rearing (Schapera, 1976). Migrant labour to the diamond and gold fields of South Africa, which had its beginnings in the 1860s, became a predominant adult Tswana male occupation by the 1930s (Mpho, 2005) and contributed to the establishment of many cattleposts. This and other factors have led to increasing cattle herds estimated at 3 million (Tlou and Campbell, 2003; Mpho, 2005). Male dominance of cattle ownership has continued. Most cattle owners are above 50 years old (CAR, 2006). Cattle dominate the livestock sector, although goats have attained some significance. However, there are striking inequities. Less than 10% of cattle and goat owners own half of the traditional herds (CAR, 2006).

Most farmers in Botswana are traditional farmers whose aim is to secure better tradition-based livelihoods, hence their opposition to modernisation overtures, as shown below. There are 118,893 traditional agricultural holdings, 77,871 of which keep cattle, and 310 commercial holdings, with 270 of these reported to be cattle keepers (CAR, 2006). The numerical superiority of the traditional sector is not reflected in its influence. Large farmers and formally employed people wield power and have as a consequence benefitted most from government support earmarked for the livestock sector (CAR, 2006).

¹⁰ The exchange rate in 2004/5 was 1€ to 6 pula.

Three main livestock production systems characterise the livestock sector, namely village based, cattlepost, and cattle ranching. Table 1 shows the main characteristics of the different production systems. This paper is concerned with the first two systems, which constitute communal land. Most land in Botswana is communal. Some 19.5% of urban households have access to arable land compared to 39.5% in the rural areas (CAR, 2006). However, there is increasing privatisation of communal land, as described below.

Table 1. Characteristics of the different livestock production systems in Botswana.

Feature	Village-based	Cattlepost	Ranching
Land tenure	Communal; village grazing areas	Communal; de facto privately controlled	Leasehold; – freehold; state land
Strategy	Livelihood security and herd growth	Livelihood strategy and maximisation of current and future returns	Profit maximisation; retirement purposes; conservation efforts
Products	Multiple	Multiple but mostly beef and sales	Meat and sales
Characteristics	Low input and low multiple returns	Medium to low input; mostly beef and savings, medium and high returns	High input and high single outputs; capital-intensive
Major constraints	Access to land and water; resource degradation; no expansion prospects; no economies of scale; dual grazing rights	No comprehensive rights, e.g. land rights; far from markets; poor road infrastructure	Far from markets, poor roads; high capital costs
Capital costs	Minimal	Borehole and livestock management infrastructure	Borehole; farm house; management structure
Legal instruments	Livestock ceilings by Land Board; stock and conservation stipulations by Agricultural Resources Board	Borehole rights allocated by Land Board; water rights by Water Apportionment Board; livestock ceilings by stock and conservation order by Agricultural Board	Stock and conservation orders by Agricultural Resources Board; freehold and long-term lease; land rights are transferrable and secure
Economic instruments	Botswana Meat Commission (BMC) beef export monopoly; livestock subsidies; tax advantages	BMC beef export monopoly; livestock subsidies; tax advantages	Land prices and rentals; BMC beef export monopoly; livestock subsidies; tax advantages

Source: Adapted from CAR (2006)

Since independence the government has made huge investments in the livestock sector aimed at improving the rural economy, commercialising the livestock sector, increasing productivity, and supplying domestic and export markets (Peters, 1983; CAR, 2006). Some of the policies have had negative impacts on the rural population. The Tribal Grazing Land Policy (TGLP) of 1975 and the National Policy on Agricultural Development (NPAD) of 1991 are a case in point. The TGLP was an

attempt to address low productivity, livestock incomes, uncertain future for small stock owners and those without cattle, and inequitable access to land (which tends to be controlled by the affluent larger cattle owners). Under the TGLP, commercial farmers were given a leasehold title on tribal/communal land for a renewable period. Ranches averaging 6440 ha were planned in areas that were intended to be unsettled. The remaining communal land was meant for small herds after the larger herds had moved out. The NPAD aimed at entrenching cattle ranching by expanding it and doing away with communal rangeland management. The latter was considered to be unsuitable for increasing productivity, and it was proposed that community livestock should be restricted to community-owned ranches (CAR, 2006).

Both policies produced disappointing results in that commercialisation failed, as illustrated by reduced productivity of the livestock sector, and has produced inequalities in access to land. For example, the TLGP policy resulted in a 20% loss of communal land (CAR, 2006). Low beef prices have not helped the commercialisation efforts. This is why cattle from the communal sector are mainly sold to butchery owners and individuals and not to the Botswana Meat Corporation (BMC), because of stringent rearing standards and low prices (Mpho, 2005). In the following section, we look at how water-oriented support policies and programmes have fared.

LIVESTOCK WATER POLICIES IN THE POSTCOLONIAL ERA

As far as provision of water for livestock watering in communal areas in the postcolonial era is concerned, the Dam and Haffir¹¹ Building Policy is the most significant policy. It attempted to ensure efficient and effective management of resources. The Livestock Water Development Programme was another initiative to achieve the same objective. Between them they represented a suite of policy prescriptions designed by the state to address what was seen as long-standing problems in the communal sub-sector. In the following paragraphs, we highlight the main tenets of the two instruments and the relevant institutions. We next describe the realities in the field.

Policy prescriptions

The Dam and Haffir Building Policy was launched in 1974 and revised in 1993 (GOB, 1974, 1993). Through this policy, the government made stipulations regarding construction and maintenance of small earth dams that were meant to provide water for livestock watering, irrigation, and fishing (Mpho, 2005; Fortmann and Roe, 1985). The policy aimed to devolve greater management responsibilities to people organised as borehole syndicates (BS) or dam management groups (DMGs) and represented an attempt to address what was termed mismanagement of small dams by farmers. Under the scheme, government-constructed small dams were to be handed over free of charge to groups of people who agreed to abide by stipulated management rules. Critical management requirements that were identified included members paying stipulated fees, observance of standard stock limitations set at 400 livestock units (LSU) per year per water source, and commitment to collective maintenance and repair of the dams. The revised policy of 1993 allowed multipurpose agricultural use of dams as long as this was consistent with the land use zoning policy and the stipulated operational rules.

The rules relating to community mobilisation and general management were premised on a strong state role in how resources were used, probably on the grounds that the state provided capital for the dams and boreholes. Government extension staff were expected to take initiative in organising groups who wanted dams while district councils could choose to take complete or partial administrative control of dams. Each dam/borehole management group was to be formed before the water facility was constructed and would consist of farmers who wanted the dam and were willing to control their grazing. Prior to dam construction, each group was obliged to sign a standard form, abide by the terms

¹¹ This seems to be an alternative spelling of heifer.

of agreement to signify willingness to maintain and repair the dam, and pay a specific fee per adult beast per year. Dam/borehole management groups in a community grazing area were to consist of approximately 5-20 members. Average herd size was stipulated at 20-80 LSU at the time of application with a possible maximum of 400 LSU. No single person was allowed to water more than 50 head of cattle. In the next section, we examine the degree to which the villagers have observed the stipulations and the reasons behind their responses. For now we turn to the provisions of the Livestock Water Development Programme.

The Livestock Water Development Programme was started in 1988 and is open to farmers with herds between 60 and 500 cattle as well as syndicates with a minimum herd of 60. Both leasehold and communal farmers are eligible. The programme provides 40-60% funding for drilling or equipping boreholes in areas where water development is considered to be expensive and in drought-prone areas. Grants are also provided. Since 1989, two-thirds of the approved applications have been from syndicates (CAR, 2006). There is not much information on how this programme has fared except observations to the effect that there were problems relating to the high risk of striking a blank or saline borehole, as well failure to equip and use the borehole fully.

The new institutions – dam management groups and borehole syndicates – that were created by the Dam Building and Development Policy have had to operate within an environment that is characterised by a number of institutions that were created for other purposes (table 2). To what extent these institutions facilitate or impede the functioning of dam management groups and borehole syndicates is assessed in the section that deals with water management in practice (see below).

Table 2: Institutions that impact management of water resources in Botswana

Institution	Function
Agricultural Resources Board	Controls exploitation and utilisation of rangeland through issuing licenses or permits authorising individuals or groups to collect rangeland resources; issues conservation orders, regulations and stock orders for degraded areas
Water Apportionment Board	Grants water rights; rights have a ceiling for water abstraction
Water Development Section	Develops water resources infrastructure
District Councils	Administer drought-relief public works whose contracted labour input has in the past assisted in the maintenance of group dams
Land Boards	Allocate water points, fields, and ranches; administer tribal land and implements land use plans; can impose stock ceiling in communal areas.
Agricultural Management Associations (AMA) ¹²	Have oversight of registration or incorporation of all agricultural syndicates, including dam management groups and borehole syndicates.
Cooperative Societies	Facilitate cooperative development of agricultural production and provision of commercial services, particularly in rural areas

Source: Adapted from Mpho (2005) and CAR (2006)

¹² These were established by an act of parliament under the Department of Cooperative Development in the Ministry of Agriculture. One important regulation was that where the collective agricultural venture involves the use and exploitation of tribal land, such as the small dam sites, the Commissioner will send a copy of the application to the tribal Land Board concerned.

Management realities

After describing the larger physical and socio-economic context in which water resource management and communal cattle production is played out, as well as the relevant water policies and institutions, we provide an overview of how the Dam Building and Haffir policy has been implemented in practice. An early review of the policy that was based on 24 dams out of a possible 99 that were constructed under the scheme showed that there was a conceptual clash between the state and communal farmers (Fortmann and Roe, 1985). In spite of the state's characterisation of dam managements as poor, villagers were found to manage water in a systematic and rational manner. This was, however, in a way contrary to what the government prescribed. Villagers tended to use water from more than one water source, did not abide by the restrictions on stock numbers, and had a more equitable system of water allocation. The practices did not degrade the environment any more than what was happening in the surrounding area. Seasonality of water use was found to be important, with water management reflecting the interrelated changes in residence, seasonal cycles of agricultural production, and water availability for livestock watering. Water management was found to involve four levels, namely the water point site, the village locality, the multiple localities (of cattle production), and the rural sector in general.

Below we present a contemporary account of the management of the water sources under the policy. For this we use insights gained from studies undertaken in 2005 (Mpho, 2005; Manzungu and Mpho, 2008) and 2006 whose results are reported for the first time in this paper. Both studies were conducted in Southern district around Kanye village, which is home to 55,000 inhabitants. It lies some 100 km south of Gaborone (see figure 1). We present four cases that illustrate different but related aspects of water management and communal cattle production. The first two cases illustrate issues relating to adherence to stock limits and diversification of water use. The third case shows complexities around a small dam where there is no dam management group in place, worsened by divergent local interests. The last case shows how cohesion among the water users makes it possible to manage what can be termed a complex technology in the form of a pump, which many rural communities do not manage well.

Cases 1 and 2: Maiteko and Mogojogojo dams

Maiteko and Mogojogojo dams are two syndicate small dams located in the communal land in Southern district. The area in which the dams fall encompasses three village settlements and two cattleposts. According to the Ministry of Agriculture, Maiteko dam represented a good or successful managed syndicate while Mogojogojo was classified as poorly managed (Mpho, 2005). This classification provides an opportunity to assess what the state conceives to be good and poor management.¹³ The main parameters that characterised good management were that the group would see to it that (a) the dam embankment and the dam area was properly maintained, (b) there was a functional dam management group, and (c) the group agreed with the stipulated membership and stock numbers (see above). Table 3 shows the main characteristics of the two dams. DMGs account for 17% of the 5623 cattle in the study area, with the remainder being owned by a few wealthy cattle ranchers.

The data confirm that cattle ownership is dominated by elderly males (CAR, 2006), villagers depend on multiple sources of water, and membership is open, contrary to stipulated government policy (Fortmann and Roe, 1985). Even people who do not own cattle can be members. This is because membership entitles people to other benefits. In Maiteko, for example, members can borrow up to P15,000 at 5% interest and use the money for any other purpose. The DMG also supports its membership during bereavement. However, in Mogojogojo, people tended to hide such activities for fear of being sanctioned by the state.

¹³The label of good management in Maiteko could simply be that it was a much newer dam compared to Mogojogojo.

Table 3. Main characteristics of Maiteko and Mogojogojo dams.

Characteristic	Maiteko	Mogojogojo
Year of establishment	2001	1987
Capital investment	P500,000	P300,000
Capacity (m ³)	117,000	97,000
Total membership	34	28
Male: female ratio	3: 1	3: 1
% Active	79	71
% Of members 65 years or older	56	57
Membership	Open to all community members upon paying P350	Open to all community members upon paying P350
Water use	Back-up for livestock watering in dry seasons	Back-up for livestock watering
Local discourse on water use	Lack of funds and government support to diversify water use	Only enough water for primary use
Livestock watering fee	P1 per beast per year for members and P5 per beast for non-members	P1 per beast per year for members and P5 per beast for non-members
Located on which type of land	Communal	Communal
Other sources of water	Exist	Exist
Management oversight	Management committee in place	Management committee in place
Adherence to the 400 LSU rule	No	No
Legal incorporation	Incomplete	Incomplete
Ecological status	-Dam embankment is clear of trees -Evidence of overgrazing	-Trees on dam embankment -Evidence of silting and overgrazing

Source: Adapted from Mpho (2005)

The willingness and ability of members to pay the requisite fees guaranteed grazing and water rights. Thus outsiders were accommodated if and when water was available. In general villagers were not willing to abide by the recommended livestock numbers. Villagers were reluctant to destock because for two main reasons. First, it was risky to destock as animals tended to die because of frequent droughts – it was considered too great a gamble to reduce stock when one may lose cattle in the following season. Second, the quality of grazing was worsened by nearby commercial farmers on leasehold grazing land, who exercised dual grazing rights. They insisted on grazing their livestock in the communal areas during the wet season, thus asserting their communal grazing rights. In the dry season they took their cattle to their well-rested pastures.

Manzungu and Mpho (2008) have observed a number of general shortcomings relating to implementation of the policy (see table 2). First, there is no formal institutional linkage between the Ministry of Agriculture and the Ministry of Local Government, Lands and Housing encompassing rural

district councils. Second, dams not officially handed over to the rural councils are unaccounted for according to the Ngwaketsi District Council; hence requests for assistance from these rural councils are not entertained. Third, local traditional authorities are not formally consulted about the syndicate's application prior to allocation by the land board, which would prevent or minimise conflicts of property rights over dam sites. Fourth, there is no clear formal linkage between land boards and the traditional authority, and between the Water Development Section and traditional authorities vis-à-vis site allocation and dam construction. Fifth, there is no collaborative link between the AMA and district land boards. This is compounded by the fact that in the early 1990s the Department of Cooperative Development was downsized, which resulted in serious capacity problems. Sixth, the push for more diverse water use, such as vegetable production, was not possible because of reliance on older more traditional water sources, lack of funds, institutional problems, lack of adequate water, and land use restrictions. For example, land on which the dam was located was zoned as tribal grazing land. According to the regulations, the associated customary rights do not allow using the land for other uses such as horticultural production.

Case 3: Mmakgodumo dam

Mmakgodumo Dam is located a few kilometers from Kanye Village. It was built at the confluence of the Pharing and Sekae rivers. It falls under the jurisdiction of Chief Seepapitso of the Bangwaketsi people, the main inhabitants of the area. The dam was built to provide water for domestic and livestock uses in response to the 1933 drought which had left many livestock dead. Building started in 1939 and was completed in 1941 and is attributed to the initiative of the chief and the local community. People contributed cattle for draught power, chains, ropes, ploughs, and anything that could help in the construction of the dam. The government provided the necessary financing because it constructed irrigation canals in 1944 on a nearby piece of land intended for vegetable crop production.

What is significant about the dam is the absence of a dam management group as exists for other small dams. It was difficult to assess why this was the case. For this reason, no information could be obtained about the number of livestock that were watered from the dam. This perhaps explains the efforts of the chief to bring the dam under some form of control (see below).

It is said that diminishing support from the colonial government resulted in the local inhabitants failing to sustain operations. As a consequence, the dam was never fenced. As a way round the problem, the chief instructed villagers not to allow livestock near the dam. A £1 fine on any livestock found drinking directly from the dam¹⁴ was imposed. People were encouraged to be careful when using the dam, for example by preventing animals from walking in the water to avoid silting the dam. No written law was ever produced concerning how the dam should be managed. The chief did no more than call men to the *kgotla* (his kraal) and dispense orders. The chief also ordered all cattleposts in the dam area to be relocated to one side of the dam. However, this was never respected, as other decrees by the chief were not respected (see below).

The dam is one of several water sources that are used by the community. Inhabitants are supposed to use water from Bathoen dam, a borehole called Dilowe, and other small dams in the wet season. They also use other traditional water sources. The Mmakgodumo dam was intended to be used only during the dry season. However, people preferred to use the Mmakgodumo dam because the Bathoen dam tended to dry up. The chief could not keep people from bringing their livestock to the dam, which worsened pollution problems. Ensuring that cattle dung was collected and disposed of away from the dam waters was difficult to enforce. The chief's messengers would sometimes stand guard to ensure that livestock watering was done properly, but this had little effect. Some people were reported to have dumped solid waste in and around the dam's microcatchment. This was confirmed by heaps of construction rubble in and around gully-eroded channels leading up to the dam.

¹⁴The fine served as a substantial deterrent since £1 in those days could buy a mature ox.

The various uses to which water in the dam is put seem to be creating problems. The dam is used for other water uses than livestock watering, as attested by a nearby irrigated plot. The story around use of water for irrigating the vegetable crops is unclear. There are stories of vegetables grown on the piece of land being sold to local people and schools with proceeds being kept in a tribal fund for development of the village capital (Kanye) and the surrounding villages. There are also references to the land being used for imparting agricultural skills to local people. Since the 1940s, the plot has seen many tenants.¹⁵ As of 2001, cultivation of the land has been under the auspices of the Kanye Brigade and Community Development Trust (KBCDT), popularly known as The Brigade. The project has access to a total of 50 ha of land. However, only 10 ha is currently in use and is fenced and equipped with a drip irrigation system. Five hectares are used for summer crops such as tomatoes, while the remainder is used for winter crops such as spinach, onions, and cabbage. The project employs eight people. The clients ranged from chain superstores to individuals.

It appears that the irrigation enterprise only benefits a few people.¹⁶ This probably explains the conflicts around water use. Former members of a community farming syndicate who had their operations terminated by the KBCDT were said to be responsible for these problems. Many of the PVC pipes were damaged, causing leakage. In some cases the pipes were seriously damaged in an effort to create drinking puddles for livestock. When the irrigators responded by closing the main gate valve, someone would open it, damaging the valve. The Brigade has sought for a similar replacement throughout country, but to no avail. At times they "bandage" the pipes only to find them "unbandaged". This cat and mouse game does not seem to end.

The chief expressed dissatisfaction with the way the dam was being used and wanted to improve the situation. He has taken steps towards declaring the whole dam microcatchment a nature conservancy area, and to that end he established the Mmakgodumo Dam and Nature Sanctuary Management Trust.¹⁷ The national parliament had gazetted the area as a bird sanctuary in 1992. However, the Ngwaketsi Land Board had allocated business and residential plots within the boundaries of the area, thereby frustrating the chief's tourism plans. This land use conflict was making it difficult for him to access donor funding. Representations were made to the country's Vice President (who is now the President) and meetings with and lobbying influential environmental NGOs were also undertaken. Little headway was made.

According to his plans, the revenue from tourism would be deposited in the tribal fund and would benefit the tribe. He had already seen the potential of the idea as illustrated by some white families who paid money to use the dam for fishing and recreation. According to him, opposition from the community was due to a failure to understand the vision and a lack of respect for traditional leaders. The local people were not shy to voice their dislike of the conservancy idea. They wondered why a dam constructed for livestock watering and irrigating vegetable gardens, which had enhanced the livelihoods of the people, was being converted into something else. It was wrong to change the use of this dam for the purpose of getting money from "rich white people". Stories of a high fence surrounding the dam that would incorporate the cattleposts irritated the people, as did the idea of introducing wild animals to the area, such as keeping birds, as suggested by the chief following a trip overseas.

If conservation was the chief's concern, local people felt that the local belief systems could help conserve the area. People believed that there was a snake that stays in the dam and protected it. There were stories of the snake coming from the Pharing Gorge and preventing the dam from drying up even during droughts. Some locals talked of a time when the road construction company had its pipes destroyed because the snake did not want water drawn from the dam. The Christians also appreciated

¹⁵ Prominent tenants include an Indian merchant who rented the farm from tribal authorities but who later withdrew because of the high rates and a Taiwanese whose desire to grow rice, sugar cane, and wheat irrigation came to naught when diplomatic relations between the Botswana Government and China improved.

¹⁶ We could not establish the identity of these users.

¹⁷ The chief is highly educated and has been ambassador to the United States.

these traditions. An elder of the Zionist Christian church who had come to the dam to fetch water for holy purposes talked of ancestral spirits residing in the hills and forests and being "happy" when people respect these "things". In his view, such "respectful" communities did not suffer extreme climatic impacts.

In sum, the state-recommended management of the dam be constrained by a number of factors. First, dam users were a divergent group with interests that ranged from irrigation and livestock watering, which were not easy to reconcile. Second, and perhaps more importantly, the lack of an alternative institutional model to DMGs and borehole syndicates proved to be a problem in that there was no platform at which the dam issues could be discussed. This thwarted the chief's efforts to resolve problems.

Case 4: Lekgwathi borehole syndicate

The Lekgwathi borehole, which was drilled in 1957, is located in Mogojogojo Village and falls under the jurisdiction of Chief Mogojogojo. It was drilled alongside three others in the Ngwaketsi territory on the instruction of the paramount chief in conjunction with the colonial government. The idea was to mitigate the effects of drought. During construction, men and boys volunteered their labour and cut bushes for fencing purposes and also prepared concrete for building the reservoir.

The dam was handed over to a local syndicate whose current membership is estimated at over 30. Syndicate members and non-members sell their cattle to the Botswana Meat Commission (BMC), butcheries, and traders. However, there were complaints that BMC did not pay well. The syndicate has a management committee composed of nine members. Prominent positions include the chairperson, assistant chairperson, secretary, and treasurer. The positions are elected by the general membership every 5 years. The committee meets once a month to discuss all issues pertaining to the status of the borehole. The borehole is operated according to a constitution that stipulates the regulations of use and punitive actions. The secretary keeps a record of all the borehole events, e.g. when it breaks down and how much it costs to repair. The meetings are a platform for raising complaints and solving conflicts. The local chief resident in Mogojogojo acts as mediator. This explains why every new management committee is introduced to him when it takes over.

The borehole is mainly used for watering livestock and is used conjunctively with water from natural and man-made water impounding structures. Domestic water is provided mainly from a government-constructed borehole not far from the borehole under the auspices of the local district council. There are also public standpipes in the area. However, some people continue to use the borehole as a source of drinking water because borehole water is considered to be much sweeter than that from sources designated for drinking. To this end, syndicate members are allowed a drum (200 l) of borehole water per month for uses other than livestock watering. It is used only during the dry season when surface water is scarce.

It is estimated that 7601 cattle are watered from the borehole serving 11 settlements. Goats, sheep, and calves are watered from the borehole for free. The community did not volunteer much information about its operations. In fact, they treated the researchers as spies sent by the government to find out what they were doing. During the first visit, there was so much hostility that no discussion was possible.

The borehole area is fenced. The fence forms an enclosure within which there is a concrete watering trough and a reservoir. The engine for the borehole is kept under a shed made of galvanised iron. Water is pumped into the reservoir during the night. During the day, a pipe lets water from the reservoir flow into the drinking trough. Usually elderly men sit within the enclosure while younger men let in a certain number of beasts to drink at a time. Other young men ensure that animals that have had their turn do not re-enter the enclosure. Cattle are watered every day from morning to about lunchtime, after which the reservoir is left to fill up for the next day. The record keeper maintains a list of the number of animals that were watered from the borehole and then prepares and sends a bill of payment to the owners. The pump attendant is supposed to ensure that the engine runs smoothly and is

switched off when the temporary holding reservoir is full. The gatekeeper regulates livestock entry into the drinking area and ensures that only livestock of those with demonstrated willingness to pay go through to drink. Paid volunteers selected from syndicate members also assist and receive P300 to P350 per month depending on the estimated demands of the work.

The charge per beast is P10 each per year for syndicate members and P15 for non-members. The money is paid to the treasurer and is kept the treasurer's personal account since the syndicate has no bank account. This is because it has only a pre-independence certificate of incorporation, which is not recognised by law. The revenue thus obtained goes into maintaining and repairing and the borehole pump as well as purchasing diesel fuel. This is to prevent incidences such as the one occurring in October 2005 when the reservoir almost ran dry because the engine had developed a fault. Members who fail to participate in operation and maintenance duties are charged P10 for each scheduled activity. Sometimes syndicate members are required to contribute money when the livestock drinking water fund is exhausted. In the past, some members were compelled to sell some of their livestock in order to pay for repairing the borehole. Government pensions come in handy at such times.

Conflicts that arise relate to disputes involving paying the livestock drinking charges. Such issues are resolved collectively during general syndicate meetings. The membership can be demanding when it becomes apparent that the accused was blatantly refusing to pay, which can result in this person being expelled from the syndicate, who forfeits the right to water his or her livestock. Difficult cases are referred to the village chief for arbitration. Most if not all conflicts have thus far been solved without the chief's intervention.

The syndicate can be said to be independent of the state and the local villages: it operates autonomously of village institutions. The closest the members work with a village institution is when obtaining information from the Village Development Committee (VDC) on how to run their committee. For example, their constitution was fashioned after that of the VDC. The syndicate acts strategically. It once approached the VDC for assistance in accessing the village councilor and the member of parliament.

Overview of state and local perspectives

On the basis of the cases presented above, we highlight differing worldviews between the state and local communities regarding the management of water resources and cattle production, which in our judgement constitute differing worldviews (table 4).

Before we discuss why these differences exist in the next section, we wish to highlight the intralocal dynamics in the various groups. There are often differences between the groups that have arisen because of different interests. In this regard, the Mmakgodumo dam provides the best illustration. The significant differences around the vegetable garden, we suggest, do not, however, negate the main argument of the paper. This is because the differences that arose because of a limited resource did not result in wholesale disagreement regarding how cattle production was to be ordered. We see a common opposition to converting the dam into an eco-tourism project, for example.

Table 4. State and community worldviews.

Parameter	Local perspective	State perspective
Number of cattle per water source	Flexible and takes into account the needs of the general community. Reliance on other traditional sources and practice of rotational grazing	Fixed to protect water and grazing resources
Membership in a dam or borehole group	Flexible and is even extended to people who do not own cattle	Fixed and restricted to cattle owners
Activities of dam management groups and borehole syndicates	Flexible and includes non-livestock issues and sometimes doubles as credit clubs and burial societies	Restricted to livestock issues
Use of water	Circumstance-dependent	Dedicated to prescribed uses such as cattle watering and irrigation of crops
Cattle disposal	Premised on need to maintain a large herd that can withstand shocks in the physical and economic environment	Success is measured by number of cattle sold to Botswana Meat Commission
Perspective of cattle production	Social, cultural, and economic activity	Economic activity that should be commercialised

SUMMARY AND CONCLUSIONS

There is no doubt that water provision is critical to cattle production in Botswana in both the commercial and communal sectors. This has been demonstrated throughout Botswana's history as represented by the efforts of local communities as well as the colonial and the postcolonial state to secure water for the livestock sector by investing in the development of water sources. In the last three decades, the postcolonial state has put in place supportive policies in the form of substantial financial resources to provide capital and operational costs for the development of small dams and boreholes. In this paper, we sought to understand the nature and impacts of postcolonial state intervention in the provision of water for livestock in the communal areas. We believe that this reflexion was needed because the state has admitted that the interventions have so far failed to produce the desired results. We did this by looking at the effectiveness of the water policy for livestock watering in communal areas in Botswana, as part of the Dam Building and Haffir Policy, not only in terms of its prescription, but also its practice (Mollinga and Bolding, 2004). In the paragraphs that follow, we attempt to shed light on two main aspects, namely the conceptualisation and implementation of the policy.

As for conceptualisation, one must begin by asking why the state has continued to implement what it admits to be an ineffective policy, as judged by the results that do not meet the original expectations: the dam management groups and borehole syndicates do not operate according to the stipulations. The actions of the state, by introducing minor revisions to the same policy, seem to suggest that the state was not convinced that there was something substantially wrong with the policy. According to the state, the problem was unwilling communities that did not wish to adopt the policy prescriptions that would result in positive changes in water resources and cattle production. The changes envisaged included more efficient use of water, better management of grazing lands, and increased cattle offtake from the communal areas, all of which would result in better living standards.

On the opposite side of the debate were local communities¹⁸ whose actions showed that they believed that the substance of the policy was wrong in terms of how it conceptualised local water resource management and cattle production. First, local communities saw water management as not restricted to boreholes and dams but extended to traditional water sources that formed part of a repertoire of local water management practices. To this end, it was not prudent to rely on dams and boreholes, which, although they may yield more water, came with restrictions in terms of number of cattle that could be watered therefrom. In the second instance, local inhabitants did not agree with a fixed membership of the dam management group or borehole syndicate. Across all the cases that were presented above, membership was fluid and depended on local circumstances (see Fortmann and Roe, 1985). Third, stock limitations premised on the need to protect the natural resources base proved difficult to enforce. For local people, the biophysical and socio-political realities meant that one could not be certain of the number of cattle to keep and how many cattle to water per water source, nor could one rely on a single water source, have fixed closed membership while being a part of a community, and engage in commercial cattle production given a difficult market within the context of the Botswana Meat Corporation and a small domestic market. Besides, cattle production was a traditional lifestyle which predated the dam management groups and borehole syndicates.

The conceptual differences also extended to how the state and local communities evaluated the policy: the state dam management groups and borehole syndicates were not able to efficiently utilise the resources; hence the attempts to refine the regulations. On the other hand, local communities felt that they were doing fine given the circumstances. The problem was state interference in the way they managed water resources and cattle production. To explain the apparent differences between the state and local communities, we take our cue from the modernisation efforts as reflected in the Tribal Grazing Policy of 1975, the National Policy of Agricultural Development of 1991 and the 2002 rural development policy, which broadly declared rural development as a modernisation process. The modernisation philosophy framed the state's approach to water management and cattle production in communal areas, as indicated by concerted efforts at privatising communal areas and commercialising whatever was left of the communal sector. In this paper, we were not concerned with evaluating whether what the state labeled modernisation amounted to modernisation as defined in the literature. Our view was that modernisation claims produced a set of consequences which materially shaped local water resource management and cattle production in Botswana, and hence warranted study in that light. We observe that given the ineffectiveness of modernisation in water resource management and cattle production in communal areas of Botswana, a paradigm shift may be the best way to move forward while recognising the different worldviews on the part of the state and local inhabitants on not only water resource management, but also rural livelihoods and rural development. In this vein, we argue that the seemingly strategic and sometimes practical behaviour of local communities was underlain by a certain philosophical perception of the world. Such a view may help the state to appreciate the resistance it is encountering.

As far as implementation of the policy was concerned, the problem lay in the defective institutional arrangements. There were institutional inconsistencies as exemplified by problems relating to legal registration of dam management groups or borehole syndicates, contradictory land uses, and the ineffective marketing arrangements in the shape of the BMC, to mention only the main ones. The institution of traditional leaders, which was always prominent in Botswana society, was bypassed and replaced with non-viable institutional arrangements. This was not an isolated case however. Indeed the government's reform of the institution of traditional leaders has undermined their role. Tlou and Campbell (2003) note that the postcolonial state managed to curtail the powers of the traditional leaders, a feat which the British had failed to accomplish. Citing a local newspaper, Mpho (2005) writes that chiefs at present were regarded as "nothing more than quasi-judicial officers working for

¹⁸ While there were instances where there was disagreement within communities, we maintain that this did not amount to substantial *conceptual* differences in the way they wanted to manage water.

Government and answerable to politicians". The fortunes of the traditional leaders are no better in the land and water resources arena. The Tribal Land Act of 1970 (GOB, 1970) and the Water Act of 1968 transferred land and water administrative powers from traditional leaders to state institutions in the form of the Land and Water Apportionment Boards, respectively (GOB, 1968). It is interesting to observe that some communities found a way of incorporating traditional leaders into the management arrangements.

It is also important not to lose sight of the general national environment. The economic status of the country also did not help policy implementation. The country's new-found wealth brought about opportunities and challenges regarding the management of water resources. A wealthy state has been able to continue providing various forms of support. The mineral-dominated stable economy has made it possible for the state to continue to uphold to its modernisation policies and has not sought alternative policies in the face of a stagnating agricultural sector.

This was manifested in livestock's declining contribution to rural livelihoods, the lack of impetus in the commercialisation endeavour, and inequalities with regards to access to land and financial resources. Low beef prices contributed to problems achieving commercialisation of livestock.

In conclusion, we see no merit in modernising communal area cattle production (and water resource management), as suggested by CAR (2006), because modernisation has failed to recognise that differential patterns of development that are specific to a region or locality are possible, and because of its deterministic, linear, and externalistic views on social change downplays prospects of endogenous growth (Long, 2001).

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