CAMPFIRE and payments for environmental services

Peter G H Frost

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Abstract

Advocates of payments for environmental services (PES) distinguish such schemes from the more common integrated conservation and development projects on the grounds that the payments for the environmental services are direct, more cost-effective, less complex institutionally, and therefore more likely to produce the desired results. Both kinds of schemes aim to achieve similar conservation and development outcomes, however, and tend to function in analogous social, political and economic environments. Given the relative novelty of the PES approach in many places, what lessons can be learnt and applied from earlier initiatives, especially those that might be more like PES than is commonly assumed? In this paper, we describe the evolution over the past 15 years of Zimbabwe's Communal Areas Management Programme for Indigenous Resources (CAMPFIRE). This is an archetypal community-based natural resource management programme that has been widely emulated in southern and eastern Africa. Under this programme, communities using land under communal tenure have been granted the authority, through their Rural District Councils (the lowest accountable tier of government), to market the wildlife in their area to safari operators. These in turn sell the hunting or photographic safari opportunities to, mostly, foreign sport hunters or eco-tourists. The revenue and other benefits are received by the Rural District Councils on behalf of the communities and are generally paid out to them according to an agreed formula, though there are frequent delays and occasional underpayments. Overall, during 1989-2001, CAMPFIRE generated over US$ 20 million for the participating communities, 89 per cent of which came from sport hunting. Although 37 districts have appropriate authority to market wildlife, only 12 generate revenue regularly (97 per cent of all CAMPFIRE income). Performance varies markedly due to differences in wildlife resources, human population density, local institutional arrangements, and governance. We suggest eight lessons for emerging PES schemes: form should follow function; objectives can change; be flexible; promote diversity; recognise the complexity of the institutional landscape; success and failure are relative; complexity can be distracting; and high uncertainty increases transaction costs. There are three major unresolved issues: aligning the scale of decision-making and management (ideally small) with that of viable production units (necessarily large); organisational complexity due to overlapping jurisdictions among a range of authorities and interest groups functioning at different scales; and the lack of clearly defined property rights and strong tenure among individuals and communities.

Keywords: CAMPFIRE; conservation; payment for environmental services; rural development; Zimbabwe.

Contents

1. Introduction

The concept of 'sustainable development' encompasses two opposing notions: *development*, which implies change, usually and unfortunately with some adverse environmental consequences; and *conservation*, predicated on the idea of minimum disruptive change outside that due to natural processes, so as to maintain the capacity of environmental systems to continue producing goods and services. Various approaches to reconciling these contrasting outcomes have been tried, though often only with moderate success. Initial efforts focused largely on direct conservation measures, most commonly through setting aside wilderness areas, national parks and nature reserves within a larger matrix of human-modified environments. Although many such conservation areas exist around the world, not least in Africa, their integrity is often threatened by encroachment, fragmentation, deregulation and, potentially, long-term environmental change. They are costly to establish and even more so to maintain. Most importantly perhaps, local people have no say in how these areas should be used and cannot access important resources that could help underwrite economic and social change (Adams and Hulme, 2001).

In response, various other approaches have been tried. These range from indirect conservation measures, such as allowing limited use of natural products in reserves or paying subsidies to land users to curb their activities and impacts, through to more direct measures including payments for the provision of environmental services (Ferraro and Kiss, 2002). Much of the impetus over the past 20 years has been with the indirect approach, mainly in the form of integrated conservation and development projects (ICDPs), sometimes referred to as community conservation.[1] These initiatives attempt to link the conservation of protected areas to the socio-economic development of adjacent communities through a combination of limited permitted use of natural resources from the area, developing alternative sources of livelihood, and improving social services. The assumption is that such developments will reduce the pressures on the protected areas. The track record of such assumed "win-win" initiatives, however, has been patchy at best. They have generally proved to be complex to implement, and seem to be neither cost-effective nor sustainable. Some commentators query whether they have even produced sustained development or lasting conservation benefits, let alone both (Barrett and Arcese, 1995; Gartlan, 1998; Logan and Mosely, 2001; Ferraro and Kiss, 2002).

In response to the apparent shortcomings of ICDPs, there has been increasing support recently for more direct payments, commonly known as payments for environmental services (PES). These are based on the notion that to maintain the supply of environmental goods and services, immediate incentives are needed to induce people to forego more disruptive land- and resource-use practices. Such goods and services (usually contracted to the term 'services') include the production of 'clean' water in sufficient quantities, the storage of carbon in vegetation and soils, and the maintenance of both biodiversity and the aesthetic qualities of landscapes, primarily 'landscape beauty' but also including other facets of landscapes from which people can derive pleasure (Pagiola et al., 2005). If PES really is a novel approach, as is implied by various recent reviews (Ferraro and Kiss, 2002; Landell-Mills and Porras, 2002), then one might predict a period of experimentation and adaptation before the approach

[1] Adams and Hulme (2001: 13) define community conservation as "those principles and practices that argue that conservation goals should be pursued by strategies that emphasise the role of local residents in decision-making about natural resources". Such initiatives span a wide range of conservation interventions that include co-management, parks outreach, and resource sharing (Jones and Murphree, 2004).

enters the mainstream of development options. Are there any longstanding precursors to PES from which one might be able to learn lessons about implementation, performance, outcomes and possible adaptations? One possible initiative is the Communal Areas Management Programme for Indigenous Resources (CAMPFIRE), started in the late 1980s in Zimbabwe and widely emulated subsequently elsewhere in southern Africa. The underlying philosophy of CAMPFIRE places it firmly within the 'community conservation' paradigm, but in its functioning it shares many features with PES.

In this paper, we explore some lessons learned from CAMPFIRE that may help in the development of PES. We argue that there is more in common between the two approaches than is commonly acknowledged. The actors and language may be different, but many of the ideas and principles are the same. Community conservation and PES both play out in analogous institutional landscapes, and are subject to similar external pressures. The background, key features and evolution of CAMPFIRE are briefly described in the next section. We then look more closely at CAMPFIRE through a PES lens, focusing on some of the variation in form and functioning that has emerged over time and why this happened. We conclude by drawing some lessons from CAMPFIRE for PES, which will need to be taken into account if that programme is to move from articulate rhetoric to successful practice, and we discuss some emerging issues likely to be relevant to both approaches. Given the political, economic and social changes in recent years in Zimbabwe, which have affected all facets of life, we limit our quantitative assessments of CAMPFIRE largely to the period 1989-2001, though we reflect on the resilience of the programme in responding to the more recent upheavals.

2. What is CAMPFIRE?

The **C**ommunal **A**reas **M**anagement **P**rogramme **f**or **I**ndigenous **Re**sources – CAMPFIRE – was developed largely around the concept of managing wildlife and wildlife habitat in the communal lands of Zimbabwe for the benefit of the people living in these areas. Its details were first elaborated in 1986 (Martin, 1986) though its foundations were established in the 1960s when the commercial possibilities of wildlife production in the country were being explored (Dassman, 1964). At that time, wildlife was considered to be state property, managed by the state and only able to be used commercially under a rarely-granted licence. As a result, farmers of both commercial and communal land treated wild animals as pests. More broadly, wildlife was threatened by the ongoing widespread transformation of natural habitats to agricultural land. In short, the future of substantial numbers of wildlife outside demarcated conservation areas was bleak.

Initial efforts to utilise wildlife commercially focused on meat production, on the assumption that wildlife is better adapted and therefore more productive than domestic livestock, at least in semi-arid environments. As the wildlife industry developed, however, it became clear that the economic advantages of wildlife lay less in its biological productivity than in the many different ways that value could be added to the basic product in the form of services offered to various end users. Because these services can be added at little environmental cost, and because consumers are generally willing to pay well for them, wildlife utilisation has become an industry with the potential to be both ecologically sustainable and economically viable (Child, 1988, 2000).

The diversification and growth of the industry was helped greatly by the introduction of the 1975 Parks and Wild Life Act. Among other things, this granted private landholders the right to use the wildlife on their land for their own benefit, including for safari hunting and the capture and sale of animals. The wildlife industry flourished. In 1960 there were only three game ranches, covering a total area of 350 km^2, all producing venison. By the early 1990s, this had risen to over 216 ranches covering 37,000 km^2 and engaged variously in sport hunting, trophy hunting, photographic safaris, game-viewing tourism, game cropping for venison, and selling live animals, especially in drier areas where it generally proved to be more viable financially and economically than single-species livestock production (Jansen et al., 1992).

Whereas the opportunities created by the 1975 Parks and Wild Life Act were initially limited to private landowners, at that time mostly settlers of European origin, they were extended to people in the communal farming areas after independence. In 1982, the government amended the Act to enable rural communities to obtain 'appropriate authority' to utilise wildlife for commercial gain. Apart from removing obviously discriminatory provisions in the Act, the proposed changes were aimed at finding alternative forms of land use to subsistence agriculture on marginal lands. At that time there was no particular model as to how this could happen without threatening the resource base, though the Department of National Parks and Wild Life Management (DNPWLM) was exploring options within the framework of an integrated land-use plan for the communal lands bordering a number of national parks and safari areas in northern Zimbabwe. This area supported substantial numbers of wild animals, including some that were commercially valuable (*e.g.* elephant, *Loxodonta africana*, buffalo, *Syncerus caffer*, lion, *Panthera leo*, and leopard, *Panthera pardalis*), but which were threatened by ongoing expansion of agricultural land use, much of it low yielding and used mainly for subsistence purposes.

One initiative was Project Windfall – **W**ildlife **Ind**ustries **f**or **All** – in which revenue in the form of trophy fees and lease fees paid by mostly foreign hunters operating in the communal lands, together with money from the sale of ivory and skins of animals shot whilst crop raiding, was paid to government acting on behalf of communities. This money was to be paid out for approved development projects within the district concerned, though in reality many of these projects were implemented in areas other than those from which the revenues came and where the people had to bear the cost of wildlife damage. Although these latter communities benefited to some extent from the distribution of meat from animals culled in the adjacent national parks or killed while crop raiding, this was generally an insufficient incentive to promote tolerance of wildlife. Moreover, the people took no part in making decisions about the use and management of the wildlife resource. Consequently, Windfall was not a sustained success. Future initiatives for wildlife management in the communal lands would have to transfer significant rights to the landholders (Martin 1986, G.F.T. Child 1995).

The CAMPFIRE concept was developed largely in response to the realisation that unless people living adjacent to or within wildlife habitat can obtain value from wildlife directly, other forms of land use will eventually replace it. For people to be prepared to put up with the threats to life and property that living with elephant, buffalo, lion, leopard and other species entails, they would have to get much more direct and substantial benefits. They would also need to have a much greater say in how those benefits would be derived, and have a stake in the future of wildlife through management inputs. Giving back to people a large measure of ownership over wildlife was seen to be important in re-empowering them to take greater control over the mode and tempo of their development, and to build the necessary institutional arrangements and structures to serve this.

The programme therefore aimed specifically to stimulate the long-term development, management and sustainable use of natural resources in the communal farming areas of Zimbabwe by promoting land uses appropriate to the natural constraints and opportunities of agriculturally marginal areas. This was to be achieved by giving resident communities custody over and responsibility for managing the resources and allowing them to benefit directly from their use. The necessary administrative and institutional structures, together with financial and technical assistance, would be established under the appropriate ministry (Martin, 1986).

As originally conceived, CAMPFIRE focused on four major natural resources: wildlife, woodlands, water and grazing. In practice, however, the use of wildlife became paramount since its realisable value is currently so much greater than the others. The original programme envisaged communities voluntarily forming Natural Resource Co-operatives responsible for managing the resources in a defined Communal Resource Area, but for both practical and philosophical reasons, the various CAMPFIRE initiatives departed somewhat from these plans (Murphree, 1997). The first two District Councils were designated as the relevant authority for managing the wildlife in their districts in 1989, though formal appropriate authority status was only granted to these and ten other District Councils in 1991. The extended period between the legislative change (1982), the first formal articulation of CAMPFIRE (1986) and its actual implementation (1989-1991) reflected jockeying for position and tensions over revenue flows within government. There was particular concern about devolving responsibility for receiving and distributing revenues to the proposed Natural Resource Co-operatives. Instead, government only agreed to devolve financial and administrative authority (‘appropriate authority’) to the District Councils, the lowest accountable tier of government. The District Councils in turn also opposed the formation of

the co-operatives, seeing them as a threat to their own authority and financial viability. Nevertheless, in return for being given appropriate authority they agreed to pass on to the producer communities a fixed percentage of the revenues earned. The agreed but non-binding guidelines were that not less than 50 per cent of the revenues was to be paid to the communities[2] (as wards[3]), not more than 35 per cent allocated to wildlife management (habitat management, fire control, monitoring, hiring of game scouts etc.), while 15 per cent could be retained by the District Councils as an administrative levy. In the longer term, however, DNPWLM intended 80 per cent to be returned to the producer communities, with corresponding reductions in the amounts allocated to programme management (15 per cent) and general administration (5 per cent: B.A. Child, 1995).

The arrangements for using the wildlife resource commercially have also varied. Some Districts opted to auction concession areas to safari companies, which in turn pay an annual concession fee and a trophy fee for each animal shot. This has engendered considerable competition among safari operators, with the longer-term (three to seven-year) concessions attracting disproportionately higher bids. Some communities entered into joint-venture partnerships with safari operators, the net profit being shared according to prior agreement. Others, mainly those with limited wildlife attractions, established locally-controlled enterprises (hiring their own professional hunter to support clients or setting up campsites and facilities for eco-tourism).

At its peak, CAMPFIRE encompassed 37 districts with appropriate authority, though only 23 of these really functioned as intended, while only 12 received regular income from wildlife through hunting or eco-tourism. Between 1989 and 2001, CAMPFIRE revenues amounted to almost US$ 20.3 million, 97 per cent of which originated in these 12 districts. Of this, 49 per cent has been disbursed to communities (118 wards and over 121,500 households), 20 per cent used for wildlife management, just over 12 per cent retained by the District Councils as a levy, 3 per cent used for other expenses (including the 1.5 per cent levy to the CAMPFIRE Association – see below), while about 15 per cent is still being held by the Rural District Councils pending allocation (Khumalo, 2003). Almost 90 per cent of this income has come from safari hunting. The low return from other natural resources (2-3 per cent) partly reflects the relatively low value of most other natural products, or the difficulties of transforming them for distant and discerning markets, and partly because policies in other sectors such as forestry and mining make no provision for paying stumpage fees or royalties to rural communities.

As a result of this diversity and innovation, CAMPFIRE has long been considered the flagship community-based natural resource management (CBNRM) programme in southern Africa, attracting much public and academic interest globally and producing a wealth of knowledge and experience on the potential for and constraints on the management and sustained use of wildlife by communities[4].

[2] The term 'community' is used here to refer to a group of people living together in a common social setting in which they interact frequently and regularly. Use of the term in this context does not necessarily imply any unity of background, organisation or purpose. Most CAMPFIRE communities are heterogeneous entities, socially, economically and in many other ways.

[3] A ward is a sub-district administrative unit comprising, on average, six villages, with each village in turn comprising approximately 100 households. Settlement in these areas is not always consolidated.

[4] For more detail on the functioning and assessment of CAMPFIRE in general see Jansen (1990), Child (1993, 2000), G.F.T. Child (1995), Hill (1996), Bond (1999), Duffey (2000), Maveneke (1998), Murphree (1993, 1997, 2004), and Jones and Murphree (2001, 2004), among many others.

However, three interrelated problems currently burden CAMPFIRE arrangements (Murphree, 1995, 1997; Jones and Murphree, 2001). First, the actual wildlife areas in the communal lands are not clearly demarcated and, as management units, they lack particular economic or ecological rationales. Ideally, such units should be contained within the jurisdiction of a recognised community group, and be small and sufficiently discrete to allow for direct interaction, discussion and decision-making among the community members. But they should also be large enough to sustain a resource base that can be exploited in ways that are both economically viable and ecologically sustainable. Such a combination is not easily achieved.

Second, the communal lands are organisationally complex with overlapping jurisdictions among various kinds of authorities (traditional, spiritual and modern), functioning at a range of levels. Internally, the communities are differentiated by social standing based on lineage, influence and relative wealth, among other things, so consensus is more difficult to achieve than is commonly assumed.

Finally, the greatest problem is the lack of clearly defined property rights and strong tenure at both individual and community level. People's rights over the land and its resources vary with location, ranging from usufruct rights over arable land to collective rights elsewhere. This creates uncertainty and leads to opportunistic use of resources, with little or no investment in resource management other than that which will produce a near-immediate return. Moreover, as non-legal entities, the producer communities cannot enter into legally binding contracts, or sue or be sued. Any contracts into which they enter are subject to common law. Despite calls to strengthen both communal and individual rights, backed up by a government-appointed commission on land tenure (Rukuni, 1994), little has changed. Communities and their constituents remain in legal limbo. These contradictions will eventually have to be resolved, or CAMPFIRE will falter.

3. CAMPFIRE and payments for environmental services

3.1 Actors and services

The principal actors in CAMPFIRE are the producer communities, whose land-use decisions ultimately determine the fate of wildlife; the Rural District Councils (RDCs), representing the communities and authorised by government to receive and manage revenues from the use of wildlife under the CAMPFIRE scheme; and the safari or eco-tourism operators, who enter into various contractual arrangements with the communities through the RDC and then market the opportunities for hunting or eco-tourism to mostly foreign clients. These interactions in turn have been facilitated by a loose consortium of third parties who helped to initiate the programme, provide technical advice, and reconcile the different interests of the principals. These formed the CAMPFIRE Collaborative Group (CCG), to assist with programme development, and comprised individuals from government (mainly DNPWLM, the main regulatory agency), academia (Center for Applied Social Studies, CASS, at the University of Zimbabwe) and the NGO sector (World Wide Fund for Nature, WWF, and Zimbabwe Trust, a rural development NGO). The CCG in turn helped to set up the CAMPFIRE Association (CA) to represent those RDCs with appropriate authority. By 1992, the CA had assumed the leadership of the CCG, and by 1998 it was acting for over 30 RDCs and smaller community groups (Maveneke 1998).

The CAMPFIRE Collaborative Group, both jointly and in their separate capacities, also served as channels for funding from bilateral donors, mainly the United States Agency for International Development (USAID). Between 1989 and 2003, USAID earmarked just over US$ 28 million to support the formation of CAMPFIRE (Child et al. 2003). In the end, just under US$ 25.2 million was disbursed, 24.4% for community development, 19.7% as grants to various intermediary organisations, 12.7% for community funds and institutional capacity building, 11.8 % for wildlife conservation, 6.9% for planning and applied research, and 3.6% for regional communication and training. The balance (20.9%) funded the administrative contract between USAID and the Institutional Contractor (Development Associates, Inc. Arlington, Virginia, USA), including audit fees and contingencies. Overall, this funding helped meet the costs of administering projects, providing technical assistance, purchasing and maintaining capital equipment (vehicles, electric fencing), and partly underwriting recurrent expenditure, at least during the early years of the programme.

Some proponents of PES have argued that this funding constitutes a massive subsidy of CAMPFIRE, and have queried the extent to which the viability of CAMPFIRE depended on this support (Sven Wunder, CIFOR, pers. comm.). Given the almost complete absence of models, skills and infrastructure for community-led conservation in Zimbabwe's communal lands at the time, it is questionable if CAMPFIRE, as a broad conservation and development programme, could have got off the ground without some initial outside financial support particularly since rural communities have almost no access to credit and therefore could not have sustained the high initial start-up costs. Most of the funds went to creating an enabling environment – developing skills, institutions and infrastructure – and supporting the activities of third parties. None was spent on subsidizing the basic transaction between the producer communities and safari operators. Donor funds also allowed the CCG to lobby extensively for changes in policies and statutes, thereby making it possible for CAMPFIRE to evolve from an uncertain beginning. By promoting the concept consistently and coherently the CCG convinced many that the initiative was an experiment deserving support. Whether the eventual

level of that support was material to CAMPFIRE's success is unclear. One could even argue that it was the incipient success of CAMPFIRE and its prospects as a vehicle for development that attracted the donors rather than their funds being integral to that success.

Finally, the technical assistance given to RDCs by these outside organisations greatly improved CAMPFIRE's functioning. Broadly accountable and transparent institutions evolved. Communities became empowered to press for their rights, though not all issues (e.g. land tenure) have yet been resolved. The efficiency of CAMPFIRE operations improved considerably. The RDCs were encouraged to adopt an open competitive bidding process through tenders for concession areas. More bids were attracted, thereby ensuring that the full market value of the resource was realised and the potential for rent capture reduced. The tender process also drove prices upwards (Table 1), as did the procedure of interviewing operators interested in securing a contract (WWF 1997). In short, these organisations were crucial in the initial phases of CAMPFIRE.

Table 1. Pre- and post-tender prices for hunting concession areas in three districts participating in CAMPFIRE (WWF, 1997)[5]

	Pre-tender price ZW$	Post-tender price ZW$	% Increase
Tsholotsho	108,000	280,000	159
Hurungwe	172,000	654,000	280
Chipinge	70,000	300,000	329

3.2 What is being bought?

Safari operators are buying the rights to bring sport hunters or eco-tourists into their concession areas either to hunt a set quota of animals, or to track, observe and photograph animals, or simply to enjoy the scenic qualities of an area. This is enhanced by specific services that the safari operator provides: information, experience and a certain camaraderie; good food and drink; comfortable accommodation; and transport. In all cases, the clients get aesthetic pleasure from their adventure. In this sense, CAMPFIRE most closely fits the notion of paying for landscape beauty though, to date, only about 2 per cent of CAMPFIRE revenues come from tourism; hunting accounts for 90 per cent. While hunters no doubt appreciate the landscapes in which they hunt, their pleasure derives more from the process of hunting itself, in which landscapes are largely a backdrop. Thus, in the case of CAMPFIRE at least, the concept of paying for landscape beauty should be extended to a more general notion of deriving aesthetic pleasure from landscapes in diverse ways.

[5] The pre-tender price refers to the annual value of the lease in the year immediately before it was tendered through an open market process.

3.3 How are payments made?

Despite the political, social and spatial diversity of the communities involved in CAMPFIRE, a common set of financial arrangements emerged. The central contractual arrangement is between the RDC, acting as the seller on behalf of its constituent communities, and one or more safari operators buying the service on behalf of their future clients. Both the RDCs and safari operators can be considered to be intermediaries, albeit with strong vested interests in the outcome. The details of specific contracts vary considerably, however, as each party seeks to extract maximum benefit from the arrangement (WWF 1997). In most cases the hunting or eco-tourism rights are being leased to safari operators, with additional fees for each animal taken in, or tourist brought to, the area. The early contracts were simple and based on standard government rates for leased hunting rights and the size of the quota for the concession area. The contract defined the relationship between the safari operator, the RDC and the wildlife producer communities in terms of hunting ethics, monitoring, infrastructural investment and in some cases employment. From the mid-1990s more sophisticated contracts began to be developed with the rights and obligations of all parties being more clearly specified, including an implied conditionality in the link between service provision and payment.

Compliance with these arrangements has been and remains highly variable. Typically, RDCs had little capacity to understand and monitor the safari operations and resulting payments. Operators were relied on to make correct payments. There is little evidence to suggest that operators did not make the necessary contractual payments, although there were a number of minor disputes. . Conversely, safari operators seldom if ever held RDCs and the wildlife producer communities to account for failing to meet their contractual obligations over and above receiving a hunting quota. Early contracts between safari operators and RDCs frequently featured fungible benefits such as “a good, used Landrover for use by the RDC”. The more recent contracts have eliminated virtually all these non-financial payments. Most contracts are now denominated in foreign currency, albeit paid in Zimbabwean dollars to comply with government regulations, to ensure that the RDCs are not compromised by periodic devaluations of the Zimbabwean dollar. Recently, in response to growing community dissatisfaction with CAMPFIRE over the failure of many RDCs to pass on the communities’ share of the revenues (see below), which is threatening the whole initiative, including the RDCs’ revenue streams, some safari operators have taken to paying communities and the RDCs directly but separately according to their agreed shares (Russell Taylor, WWF SARPO, pers. comm.). This ongoing adaptability of all parties is a key feature of CAMPFIRE.

Some RDCs have attempted to act as their own safari operator, but have not yet acquired the marketing and logistical skills to run an effective operation (Jansen, 1990). The market for both hunting leases and clients is highly competitive, with individual skill, recognition and reputation being important qualities. By exploiting this competitiveness through the use of tenders and auctions to market leases, and by innovatively structuring contracts, CAMPFIRE communities have achieved substantial real increases in wildlife-based revenue (Bond, 1999). Whether the producer communities got market-related prices for their wildlife depended on how the leases were marketed. When there was an open, accountable and competitive process, the prices were clearly market-related, as judged by prices paid for similar services elsewhere in the region. In contrast, in the few cases when leases were granted using uncompetitive and unaccountable procedures, the RDCs received much less than the market price (Bond, 1999). It is a matter of speculation as to who captured the rent.

3.4 Financial and economic benefits

Between 1989 and 2001, RDCs earned a total of US$ 20.29 million from wildlife-based activities (Table 2). Of this total, 89 per cent came from leases with safari hunting operators, about 6 per cent from the sale of hides and ivory, with the balance from tourism (mostly photographic safaris: just over 2 per cent) and other miscellaneous activities. Of the revenue earned from safari hunting, at least 60 per cent is attributable to hunting elephant (Bond, 1999). The development of photographic tourism within the communal lands has been constrained by the fragmented nature of most of the wildlife habitat and, relative to the protected areas of Zimbabwe, low wildlife population densities.

Table 2. Income earned by Rural District Councils with appropriate authority between 1989 and 2001 (data from Khumalo, 2003)

	Safari hunting	Tourism	Sale of hides and ivory	Other	Total
Income by activity (US$ million)	18.15	0.46	1.17	0.51	20.29
% of income by activity	89.5	2.3	5.7	2.5	100

Wildlife revenues are allocated annually in arrears. At a national level, the guidelines on the disbursement of CAMPFIRE revenues (see section 2) have been largely met (Table 3). At the level of individual districts, however, the extent of disbursement has been highly variable. The cumulative unallocated funds over the period 1989-2001 in one district, Gokwe North, amount to 65.5 per cent of all funds received, while Gazaland District, the smallest CAMPFIRE operation, serving only two wards, unallocated funds come to only 1.1 per cent of total receipts! Over the 12 main CAMPFIRE districts, an average 14.9 per cent of funds received over this period have not yet been paid out.

Table 3. The allocation of wildlife revenue earned by Rural District Councils between 1989 and 2001 (data from Khumalo, 2003)

	Producer wards	Wildlife management	Council Levy	Other	Unallocated	Total
Revenue allocated (US$ millions)	9.89	4.08	2.51	0.68	3.13	20.29
% of total revenue	48.8	20.1	12.4	3.4	15.4	100

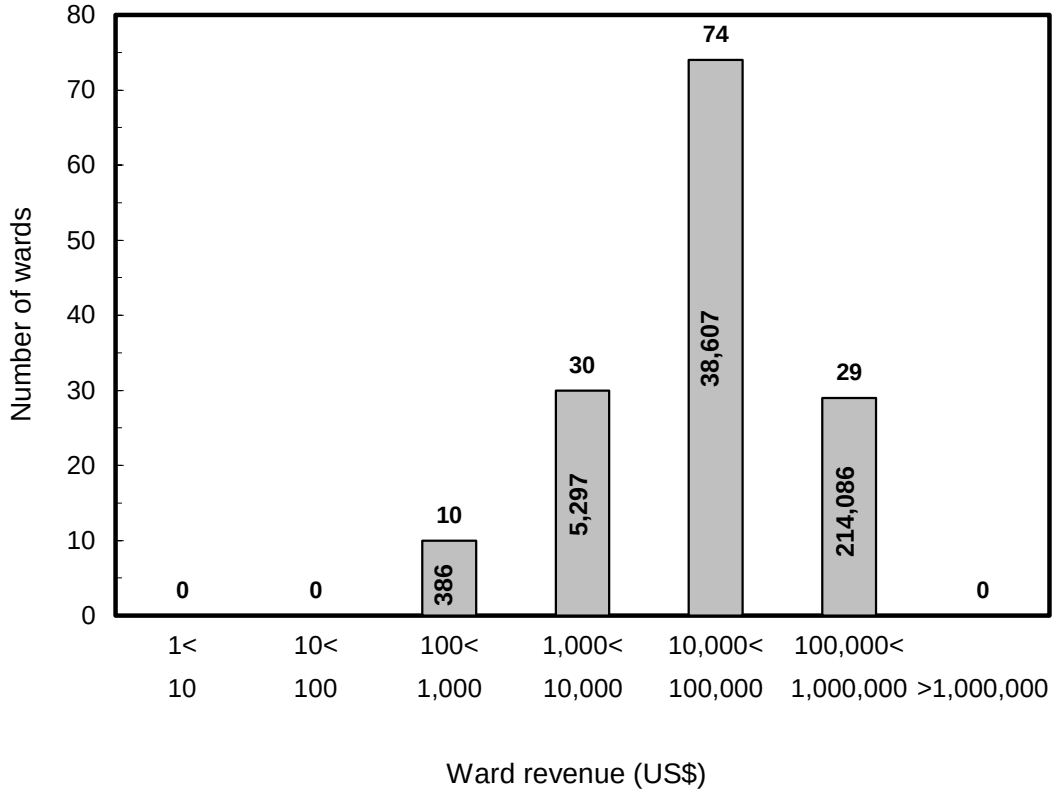
Quantifying the overall financial benefits from CAMPFIRE is complicated by factors such as the size of the programme; the increasing number of participating districts (and therefore people) over time; and the variability among wards within districts. Nevertheless, the financial benefits can be considered at four levels: the safari operators; rural district councils; wards; and households. Of these, the economics of the safari operations are least well understood, despite the volume of research on CAMPFIRE. Initially, it was assumed that as

Zimbabwe's share of the international trophy hunting market was growing, and as operators were competing for leases and benefiting from the expanding hunting opportunities in the communal lands, no immediate information was required, at least for management purposes. The move to competitive marketing of wildlife leases may have reduced the profitability of their activities compared with previous arrangements, but has probably forced increases in efficiency to compensate.

As the legal authority for wildlife, RDCs act as the gatekeeper for all wildlife revenue. For most RDCs, the CAMPFIRE revenues were a new and significant source of funds coming at a time when the central government, being urged to devolve authority, also took the opportunity to shed some of its fiscal responsibilities. Wildlife revenues can constitute up to 24 per cent of all locally earned income, and in several districts has exceeded all other forms of local income and government grants (Bond, 1999). Between 1989 and 2001, the RDCs retained a total of US$ 6.3 million (31 per cent) of the income from wildlife, not including that set aside for wildlife management (US$ 4.08 million: Table 3). This includes the RDCs' agreed levy (US$ 2.51 million, 12.3 per cent), but also a substantial block of unallocated funds from which the RDCs benefit in the form of investment income. The communities have had to bear the opportunity costs of this unpaid money and, given the present hyperinflationary conditions in the country, when it is eventually paid, it will be worth a lot less.

Figure 1. Frequency distribution of total CAMPFIRE revenues received by wards (n = 143) for the period 1989-2001.

The number of wards in each category is given above the bars while the average revenue received in each category is shown within the bars. The overall lowest revenue received was US$ 137, while the highest was US$ 801,042. Note the logarithmic scale. Data from Khumalo (2003).



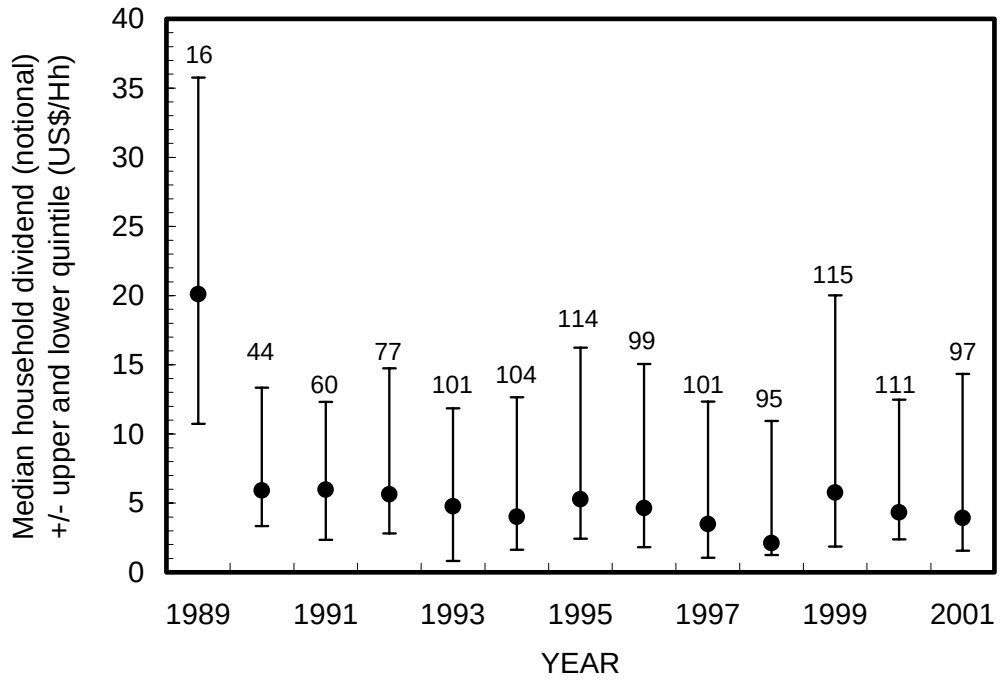
Wards were created by government as sub-district level planning and development entities, though they have no means of raising revenue. Effectively, they have never progressed beyond being units for political representation at the district level. With the devolution of revenue through CAMPFIRE they had, for the first time, financial resources with which to become potentially effective units of development. Between 1989 and 2001, almost US$ 9.9 million was devolved to a total of 143 wards (though not all were producer wards as some RDCs adopted the principle of distributing benefits to all wards, irrespective of whether they had contributed to revenue generation). The aggregate amount received by the wards during 1989-2001 averaged US$ 64,037 (median: US$ 27,152; range: US$ 137–801,042; Figure 1). As with RDCS, wards also benefited substantially from investments in infrastructure and training by donor and supporting agencies.

Estimates of the benefit per household are largely speculative, being calculated from the revenue received at ward level and available population data. In only a few cases was money paid directly to individual households (*e.g.* Masoka community in Kanyurira ward, Guruve district: Murphree, 1997), as the amounts received by the wards, once calculated on a per household basis, were minor. Calculated this way, the median gross financial benefits to households between 1989 and 2001 varied from US$ 2.1 per household in 1998 (range US$ 0.2 - 252.3, n = 95) to US$ 20.11 per household in 1989 (range US$ 2.39 – 80.7, n = 16) when only a few, more productive, wards participated (Figure 2). Compared with the benefits obtained from agricultural production, the income received by households from wildlife in most wards is purely supplementary, amounting to only about 10 per cent of gross income from agriculture in the same environment (Bond, 2001). Nevertheless, such aggregate analyses conceal the occasional substantial financial benefit, sometimes exceeding the estimated gross income from all agricultural sources, as shown by the upper range of these household amounts (Figure 1; Bond, 1999).

Figure 2. Median values of the putative benefits to households of CAMPFIRE dividends paid to wards, 1989-2001, together with upper and lower quintile values.

Since direct payments to households were seldom made, the values are largely notional. The number of wards receiving CAMPFIRE revenues in each year is given above the upper quintile.

Data from Khumalo (2003) with additions.



3.5 Conditionalities, opportunity costs and the scale of benefits

As a national programme, CAMPFIRE has grown substantially since its beginning in 1989. In 2002, the CAMPFIRE Association represented 37 Rural District Councils, covering over 244,000 km^2 and supporting some 777,000 households. Only 12 of these districts had a consistently marketable quota of wildlife for hunting or some other saleable natural attraction, however (Khumalo, 2003). Within these districts, the actual wildlife production areas are restricted to about 118 wards covering approximately 43,000 km^2 and supporting approximately 121,550 households. CAMPFIRE has not been a trivial undertaking in terms of scale of operation.

The key assumption underlying CAMPFIRE is that benefits derived from using wildlife can create sufficient incentive for communities and individual households within them to modify or limit their use of land in appropriate ways. Its validity depends greatly on whether the benefits are assessed at district or ward level, where the aggregate amounts can be

considerable,[6] or theoretically at the household level where the payments are likely to be small and intermittent (Table 4). In most wards, household payments were either not made or, if they were, then the money was immediately paid back into agreed community funds to be spent on community projects (e.g. Child and Peterson 1991). Instead, the communities opted to use their aggregated funds to build or extend schools, construct clinics, drill boreholes, or purchase grinding mills or irrigation pumps. In so doing, there has been collective pressure on individual households to accept some limitations on the use of land so as to safeguard revenue generation. Likewise, many RDCs, by promulgating by-laws on the use of natural resources, have created top-down pressures on communities and individuals to conform to larger land-use plans (though ones in which individuals and communities were not always properly consulted). This has sometimes created tensions, as in the case of households in the Nyatana Wilderness Area, who resisted demands that they resettle outside the area. In short, in most communities the small value of the payments at a household level are unlikely to be sufficient incentive to forego other more immediate and individually rewarding land-use practices, even if the aggregate amounts at ward and district level are somewhat more compelling (Bond, 2001). It remains to be seen whether, in the long run, the moral economic imperatives of communities triumph over individual self interest.

In using CAMPFIRE funds to provide essential social infrastructure and services (schools, clinics, water supplies) are communities not subsidising the state, given that these are normally things that government should provide? As such expenditure comes from tax revenue anyway, and given that CAMPFIRE revenues are not directly taxed, perhaps this is a more efficient way of supplying social infrastructure and services than waiting for government to do so. Such investments can also engender a real sense of ownership and responsibility within communities for their own development - surely a positive outcome.

[6] The benefits are even greater at national level, where the US$ 20 million in direct revenues to CAMPFIRE translates into an estimated US$ 100 million, once upstream and downstream economic impacts are taken into account (PWC, 2001).

Table 4. The magnitude of CAMPFIRE revenues in 1999 at different levels of organisation.

The three districts have been the most profitable ones under CAMPFIRE and 1999 was the most rewarding year in terms both of total CAMPFIRE income and disbursements to communities. These therefore represent a 'best-case' scenario. Monetary values in US$, rounded to the nearest dollar.

	District		
Organisational level	**Binga**[1]	**Guruve**[2]	**Nyaminyami**[3]
Rural District Council			
1999 income	301,580	489,872	772,731
Retained	103,368	349,114	470,429
Disbursed	198,212	140,758	302,302
% disbursed	65.7	28.7	39.1
Ward			
Average	9,439	23,460	25,192
Range	3082 – 30,826	0 – 56,160	0 – 55,918
Number of CAMPFIRE wards	21	11	12
Household			
Average	10	58	59
Range	3 – 35	0 – 160	0 – 197
No. households (all wards)	19,669	5,303	5,720

[1] The Binga RDC distributes some revenue to each ward, irrespective of whether they have exploitable wildlife populations or other natural attractions.

[2] In Guruve, only 11 out of 21 wards produced CAMPFIRE revenues during the period 1989-2001, and then not in every year. Payments to wards reflect their contributions to annual revenue generation.[3] In Nyaminyami, 12 out of 16 wards are involved in CAMPFIRE, with payments reflecting their contributions to annual revenue generation.

A measure of the contingency in CAMPFIRE payments is evident in the strong correlation between the net income received by districts from wildlife[7] and the standard value of the hunting quota for a district,[8] used here as a proxy for the size and quality of the wildlife population and its habitat (Figure 3). Those districts with larger wildlife populations, or with greater numbers of high-value species, such as elephant and buffalo, receive larger and more valuable quotas. In principle, this should be an incentive for communities to encourage the growth or maintenance of the wildlife populations in their areas through habitat conservation

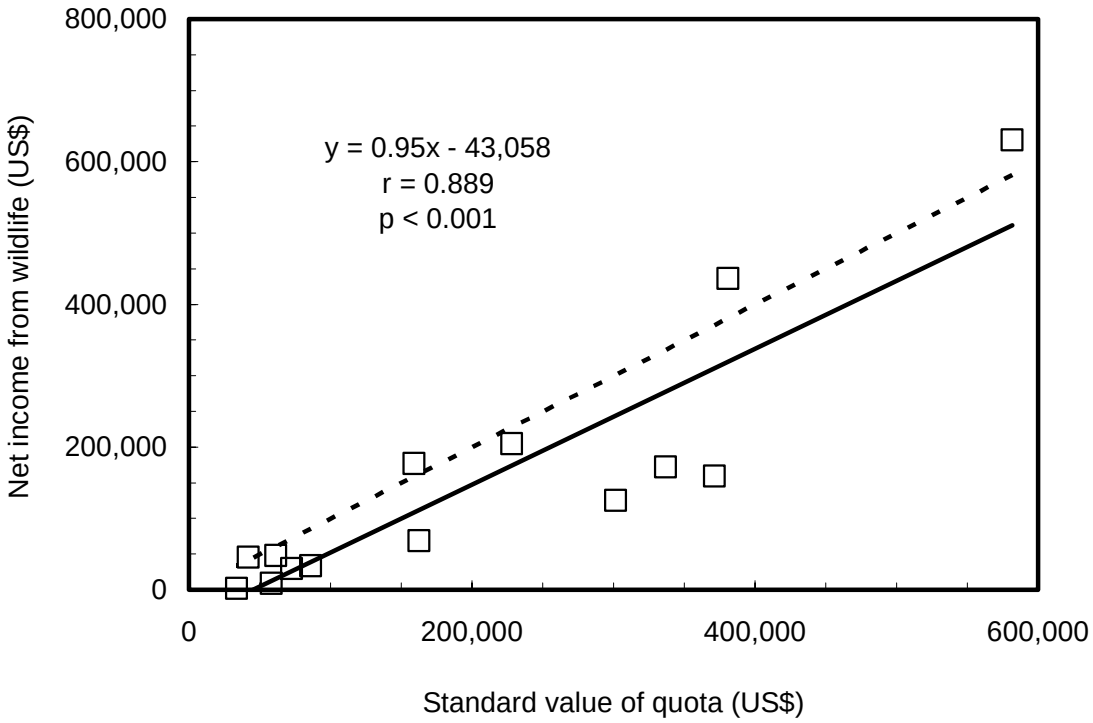
[7] Net income includes revenues received from concession fees, trophy fees, a proportion of the daily rate paid by eco-tourists and income from the sale of ivory and hides. It excludes income received from animals culled because of crop raiding or other threats to life and property (referred to as income from problem-animal control, PAC).

[8] The 'standard value' of the quota is the product of the number of animals of each species that can be hunted (the quota) and the standard trophy value of each species. The number of animals placed on quota is based on estimates of population size (for the larger species, derived from censuses) multiplied by a proportion of the estimated annual rate of population growth (usually 0.5). The quotas are normally set through negotiations between the DNPWLM and district representatives, with outside resource persons supplying information on the estimated population size of particular species, where appropriate.

and reduced poaching. More direct contingent measures to link benefits with performance at the level of individual households will be difficult to establish, however, given differences in the spatial scale of land use by individual farmers (small), the home range of wildlife (intermediate), and the scope of safari operations (large). Even if substantially larger payments were made directly to households, there would still have to be considerable collective agreement and adherence among land users to regulate land and resource use.

Figure 3. Correlation between the net income received from wildlife (sport hunting and eco-tourism) by the top 14 CAMPFIRE districts in 2001

(The standard value of the hunting quota for each district, used here as a proxy for the size and quality of the wildlife population and its habitat.) The regression line is solid, while the line of equality is dotted. See text for an explanation of the variables. Data from Khumalo (2003).



What opportunity costs do individual land users and communities have to bear? Where people have curtailed hunting of wildlife for themselves, their intake of protein has probably declined, though the economic cost of this is not known. In some cases, people have relocated their homesteads away from wildlife areas. Sometimes this was done deliberately to encourage the establishment of wildlife, as on Ngwachumeni Island in Mahenye Ward (Chipinge District), immediately adjacent to Gonarezhou N.P. (though this happened in 1983 during Operation WINDFALL, the precursor of CAMPFIRE: Peterson, 1991). This apparently resulted in less poaching and longer occupancy of the area by elephant, a small quota of which were hunted annually by foreign hunters, with the proceeds going to the Mahenye community. The Nenyunka community, Gokwe North district, demarcated a wildlife corridor from which settlement was excluded so that elephants could move between two national parks. Though there has been some marginal encroachment of settlement into this corridor, it generally remains intact. In Kanyurira Ward, Guruve district, the people of the Masoka community agreed to limit settlement to within an area encompassed by an electric fence established with the help of donor funds, and to curtail poaching. The loss of crops to

raiding elephant and other wildlife species, which the electric fence effectively prevented, was undoubtedly an added incentive to remain settled within the fenced area. Nevertheless, the settlement area has expanded as people from outside (mostly distant relatives) moved in.

Not everyone has been willing to resettle away from wildlife areas. The rural district councils of UMP (Uzumba-Maramba-Pfungwe), Rushinga and Mudzi districts attempted to move people from the Nyatana Wilderness Area, which the RDCs had demarcated for safari hunting and eco-tourism. This push for resettlement was done largely at the instigation of the concession holder, though it goes against the principles of CAMPFIRE, which seeks accommodation between people and wildlife, not the setting up of mini-reserves and exclusive hunting zones. The local people living in the area had hardly been consulted before the area was established. Some people moved but others resisted and remain in the area today.

Land clearance has also been restricted in some areas, though much of the land set aside for CAMPFIRE is marginal for agriculture. Some of it is too rugged or arid to be worth clearing, even for subsistence farming, and so probably bears little opportunity cost (though it could be used for grazing livestock, in areas where there is no tsetse fly and trypanosomiasis). Elsewhere, the productive use of land is constrained by shortages of labour and capital, so enforced limitations on settlement tend to carry an opportunity cost for people from elsewhere, or for future generations of people already in the area. In some cases (e.g. southern Omay, Nyaminyami district), communities have not been able to prevent settlement and land clearance by migrants from overcrowded communal lands elsewhere, especially where these have brought with them technologies to overcome local constraints. An example is the spread of cotton cultivation in parts of the Zambezi Valley, including some areas that were formerly part of CAMPFIRE (Bond 1999).

3.6 Baselines and additionality

CAMPFIRE was initially conceived as a means of conserving wildlife and wildlife habitat in the communal lands of Zimbabwe (Martin, 1986). Wildlife numbers or ecological indicators could therefore be one measure of performance from which additionality can be calculated. Elephant, buffalo and other large and conspicuous species have been monitored regularly through aerial censuses of the major protected areas and the communal lands of the Sebungwe Region[9] since the early 1980s, and more sporadically elsewhere. These data show that while the total number of elephants in this region has remained more or less constant, there have been significant changes in their distribution away from areas of human habitation (Dunham and Mackie, 2002). This is particularly significant in the Gokwe District, where substantial areas of prime wildlife habitat have been converted to settlement and agricultural lands over the last 20 years (Cumming 1997), though in the context of the region as a whole, the changes are relatively small.

Quantifying changes in wildlife habitat using remote sensing has been hampered by the lack of extensive (and expensive) ground-based verification (Dunham, Davies and Muhwandagara, 2003). Unverified remote sensing studies at a regional scale (area ~18,000 km^2) do not consistently pick up the variability of the landscape and the patterns of settlement and land use, all of which affect wildlife production (Dunham et al. 2003). An alternative is to use gross wildlife revenue as a proxy for wildlife production.[10] This shows a negative exponential relationship between wildlife productivity and human population density, suggesting that wildlife and farmers compete for key habitats (principally riverine areas with alluvial soils) and water within the larger landscape (Bond 1999).

While there are indications of continuing habitat loss, this does not mean that the payments have had no positive impact. For example, in Nenyunka, the wildlife corridor that was established in 1990 has remained largely intact with only minor encroachment at the margins. In other areas, communities have made decisions that have consolidated settlement and created wildlife habitat. Almost as important as establishing a baseline against which future changes can be measured is a need to understand the processes leading to change. An analysis of land-use planning decisions in eight districts between 1989 and 1993 showed that these were mostly imposed on local communities by the RDCs, for whom wildlife revenue had become significant (Bond, 1999). The top-down planning mentality is hard to reverse.

3.7 Permanence, accounting and leakage

The legislative changes that have allowed the development of wildlife as a form of land use on private and communal land in Zimbabwe have no time limitation and can potentially continue indefinitely. Nevertheless, although CAMPFIRE was conceived as a long-term programme rather than a series of short-term payments, permanence is by no means guaranteed. The policy and legislative changes that allowed payments to be made to RDCs and wildlife producer communities is increasingly threatened by gradual or wholesale re-centralisation. Moreover, changes in the relative market prices of wildlife and agricultural commodities could still easily change land-use practices (as in the case of the spread of cotton cultivation in parts of the Zambezi Valley). Factors that might lead to relative price changes

[9] Three major RDCs are located in the Sebungwe Region: Nyaminyami, Binga and Gokwe North.

[10] The sample used wards in which revenue was allocated on the 'producer ward' principle, rather than spread among all wards in a district irrespective of their contribution to CAMPFIRE revenues.

include: genetic modifications of livestock and key crops (cotton); reduced demand for wildlife-based tourism resulting from local and global instability, high oil prices or changing consumer tastes; and climate change.[11]

Within southern Africa, most CBNRM initiatives are based on policy and legislative changes that have devolved ownership of wildlife and wildlife habitat to communal land farmers. A core issue has been how to interpret these legislative changes. In their enthusiasm and desire to initiate CAMPFIRE, advocates of community conservation may have assumed that they shared a vision of local empowerment with central and district governments. In reality, the relative financial success of CAMPFIRE has opened up opportunities for rent-seeking by individuals and covert taxation by government (Bond 1999, Murphree 1993). In short, different stakeholders have competing interests in relation to the CAMPFIRE revenues (and, in some cases, the ancillary donor funds that have been attracted to support CAMPFIRE). Within CAMPFIRE, the government has sided with the RDCs against the wildlife producer communities in terms of the share of revenue that the RDCs can appropriate.[12] Linked to this has been a gradual re-centralisation by government of some key provisions of CAMPFIRE, inadvertently supported by some who claim that community conservation programmes have failed and that a return to protectionism is required (e.g. Barrett and Arcese 1995).

Reductions in human impact in CAMPFIRE areas could eventually lead to intensified impacts elsewhere. Accounting for such impacts will be difficult, given the large areas covered by CAMPFIRE and the inevitability of other, unrelated, changes (e.g. changes in transport networks, agricultural opportunities, and demographic change). Moreover, intensified pressure on land elsewhere does not necessarily mean an equivalent pressure on wildlife, since almost all of the areas containing substantial wildlife populations in communal lands are already incorporated within CAMPFIRE.

3.8 Participation of marginal groups

The intra-community and intra-household impacts of CAMPFIRE are poorly known. Given that wildlife revenues received by households have generally been supplementary to other income sources (though none of these is large), a direct financial impact on poverty, especially of the poorest people in society, has probably been marginal at best. Nevertheless, from a development perspective the redistribution of power and the formation of effective units of common property management (Hulme and Murphree, 2001) have been important achievements. CAMPFIRE has enhanced the communities' sense of ownership of their natural resources, and ongoing dialogue and discussions have helped to build confidence and skills in negotiating and managing conflicts. It remains to be seen if these attributes can be used to advantage in other contexts.

On the negative side, there is, largely anecdotal, evidence of the benefits in many producer communities being captured or manipulated by elites for their individual advantage. These include nepotistic employment practices and appropriation of project equipment for personal

[11] For the large-scale commercial farmers on private land in South Africa and Namibia, the greatest short-term challenge will be the redistribution of land by authorities that do not support or recognise wildlife as a legitimate and appropriate form of land use (Bond, 2004).

[12] Bond and Cumming (in press) document the extensive policy and advocacy efforts by the CAMPFIRE Collaborative Group (CCG), which still failed to change the levels of ownership of communal land farmers over wildlife and wildlife habitat.

use. Some ethnic groups such as the Tonga, vaDema and Shangwe have been marginalised in much of the decision-making, even though they are often the original inhabitants of these remote areas. Women are also generally marginalised, and their needs and concerns overlooked (Sithole and Frost 2002). Countering these tendencies will be a significant challenge for CAMPFIRE in the future.

4. Discussion

4.1 Lessons for PES

CAMPFIRE was never conceived of as a payment-for-environmental-services programme, though it exhibits many PES-like features. It was set up to address the issue of sub-optimal land use, at least from a broader societal perspective,[13] by creating economic incentives for land users to protect natural habitat and associated wildlife in areas considered to be marginal for agricultural development (Bond, 1999). The widespread conversion of land was seen as the core reason for the loss of wildlife and wildlife habitat in communal farming areas. Any other environmental benefits were generally considered as positive and uncompensated externalities. Nevertheless, lessons can be drawn from the CAMPFIRE experience that might be important for the emerging PES schemes. We suggest the following.

Form should follow function. There is too often the tendency to design projects for rural communities, including establishing organisational structures and institutional arrangements, before there is any real functioning for such features to serve. CAMPFIRE was no different at the outset but the original plans were soon left behind as people focused on getting activities going on the ground.

Recognize that objectives can change. The original concept of CAMPFIRE was underpinned by an explicitly conservationist agenda, with issues of human wellbeing and rural development being seen as the means of achieving its objectives. Once CAMPFIRE was established, however, rural development concerns became more prominent, to the point where, for some, conservation-oriented concerns became the means to achieving human development ends (Jones and Murphree, 2001). The fulcrum on which these competing interests are balanced is the rural institutional and organisational framework. It too has developed over time to become now an objective in its own right, driven by the need to accommodate internal diversity, individual ambitions, and shifts in influence and authority, both locally and in larger-scale institutions. This co-evolution of organisational structure and institutional functioning has been critical in the ongoing process of community empowerment, allowing people to discover and explore options, and choose from among them (Murphree 2004).

Be flexible. There is too much uncertainty to make it practical to adopt rigid rules and procedures. The evident flexibility of CAMPFIRE is one of its major strengths, since it has allowed considerable variation in functioning to emerge. From this, adaptive solutions to differing social, environmental and other circumstances materialised. By not insisting on rigid adherence to some preconceived plan, those who promoted the CAMPFIRE concept ensured that local communities and outside interests could forge relationships that they thought best fitted their circumstances at the time. In so doing, a much greater sense of local ownership and commitment was developed. PES schemes will no doubt be similar if allowed to follow the same route. Nevertheless, there are some instances where more structure would be advantageous. For example, the lack of a clear legal framework governing tenure, property rights and responsibilities for receiving and distributing funds has exposed CAMPFIRE communities to the vagaries of administrative whim and selective interpretation.

[13] From the perspective of the individual land user, however, the current land use may often be the most rational and rewarding under prevailing personal circumstances.

Promote diversity. Although each CAMPFIRE initiative is based on the same fundamental plan laid down within a common regulatory environment, they all differ importantly in the details of their development and the outcomes to date. Variation in environmental and social settings, timing (in relation to the experience of others and to changing national economic and political circumstances), and the nature of external advice and advisors, all provided subtly different selective environments in which these initiatives evolved. That diversity, together with flexibility, was CAMPFIRE's strength, allowing natural selection to take place, both within and among the various initiatives over time. No doubt, that selection will continue to operate.

Recognise the complexity of the institutional landscape. The institutional framework within which CAMPFIRE is evolving is considerably more complex than the simple configuration of a seller and a buyer of an environmental service, perhaps with an intermediary organisation facilitating the transaction. First, there are existing institutional arrangements and structures, including traditional leadership and mechanisms for making decisions and managing disputes. Building on these rather than side-lining them would seem to be sensible. Second, there are other interests which need to be co-opted, negotiated with and, if necessary, countered. Agent-based models provide a good paradigm for such settings. Third, at least for CAMPFIRE, there were real markets for the services, so these did not have to be developed. Moreover, in most cases there was more than one buyer vying for the right to operate a concession, creating competition among them. But there was also the option to participate in bidding for more than one concession area, thereby fostering competition in turn among the service suppliers.

Success and failure are relative. It is somewhat invidious to talk of success and failure as if these are absolutes. Success can be ephemeral; failure no more than a temporary setback, if the lessons learned are applied to turning things around. Each CAMPFIRE initiative has been, in essence, an experiment. Learning and applying the lessons from each are crucial to the ongoing evolution of CAMPFIRE as a whole. Even under the present extremely adverse conditions in Zimbabwe, CAMPFIRE continues to evolve, with innovative solutions to current problems emerging. The lesson for PES is to strive for constant improvement: success should not be taken for granted, for external conditions will surely change; the notion of absolute failure should be rejected, as lessons can always be learned and applied.

Complexity can be distracting. The complexity of ecological systems generally makes it difficult to establish and measure any direct causal relationships between 'payments', land-use change, or ecological indicators of environmental integrity. Consequently, too much concern over issues of 'additionality', 'leakage' and the demonstration of causality could become diversionary. While not wishing to understate the significance of these problems, we nevertheless feel that they should be kept in perspective and not allowed to stand in the way of implementation.

High uncertainty increases transaction costs. Establishing trends in complex social-ecological systems is difficult because baseline measurements are seldom available and pre-project circumstances were never static anyway. Time-series data are seldom collected with sufficiently replicable and constant methodologies to allow for meaningful comparison. Even when they are, lack of confidence in the estimates constrains precise interpretation over short timeframes. The assumption is that for PES to work there needs to be an assurance that the changes that are being paid for are happening. The lesson from CAMPFIRE is that even over an extended period of time, it is difficult to establish tangible, causal linkages between the

payments that have been made and changes in land use and management. Monitoring these relationships with the necessary precision is likely to lead to substantial transaction costs, thereby potentially diminishing any gains in benefit and efficiency that might have been achieved by the market-led solution. A trade-off will be necessary.

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