Assessing the failure of a community-based human-wildlife conflict mitigation project in Budongo Forest Reserve, Uganda

A.D. Webber, C.M. Hill and V. Reynolds

Abstract Primate crop raiding is a major cause of human-wildlife conflict around the forests of western Uganda. In an attempt to ameliorate the situation a conflict mitigation strategy was established in villages around the Budongo Forest Reserve in 2001. Live-traps were constructed that allowed the identification of crop raiding animals; pest species could be disposed of and threatened species released unharmed. However, by 2004 none of the traps in the study area were functioning and interviews were conducted to assess the reasons for their decline and local people's acceptance of the intervention. Forty-one percent of respondents did not believe the strategy was effective and the majority of local farmers did not accept responsibility for the traps. This was because of operational failures in four areas: (1) the identification of key stakeholders, (2) objective evaluation to assess the efficacy and benefit of the intervention, (3) participatory monitoring and evaluation, and (4) long-term funding commitment by conservation agencies. We examine the impact of these four elements upon the sustainability of the live-trap programme and stress the importance of recognizing and reporting failures to develop effective and acceptable mitigation strategies.

Keywords Budongo Forest Reserve, crop protection, human-wildlife conflict, primates, Uganda.

Introduction

Human-wildlife conflict is recognized as a significant threat to the success of conservation initiatives (Strum, 1994; Environmental Leaders Forum, 1998; Madhusudan, 2003; Osborn & Hill, 2005) and in 2003 the World Parks Congress addressed this issue (IUCN, 2003). A common, ancient and global example of human-wildlife conflict is crop raiding (Hill, 1997; Naughton-Treves, 2001; Osborn & Hill, 2005) whereby a range of mammals, birds and insects utilize cultivated crops as food resources. Although conflict is regarded as almost inevitable, failure to recognize its significance can result in local resistance to an environmental initiative (e.g. trespassing, poaching, trapping; Little, 1994; Knight, 2000), and a negative attitude to wildlife and reduced support for conservation (Newmark *et al.*, 1993; De Boer & Baquete, 1998; Naughton-Treves, 2001; Madhusudan, 2003). These problems can have a detrimental effect on the long-term success of conservation programmes and are especially significant where rural livelihoods are dependent on agriculture.

Primates are particularly effective crop raiders due, at least in part, to their intelligent, adaptable and sometimes intimidating behaviour (Else, 1991; Strum, 1994; Hill, 2000). In addition, they are frequently the focus of conservation legislation, which can aggravate, and even generate, conflict (Knight, 2000) by protecting species and restricting traditional crop protection methods (Hill, 1991; Naughton-Treves, 2001; Osborn & Hill, 2005). It is therefore important to conduct research that examines conflict mitigation strategies for primates, making rural farmers less vulnerable to crop loss while protecting important wildlife species.

Despite a growing body of literature examining conflict mitigation (Woodroffe *et al.*, 2005), much data concerning traditional crop protection methods, and conservation practice generally, is anecdotal (Sutherland *et al.*, 2004; Osborn & Hill, 2005). Recent management strategies for primates and other species (e.g. electric fences, taste aversion, sterilization, compensation) have shown potential but are only temporarily effective, and expensive, invasive, labour intensive and unnecessarily bureaucratic, and thus neither sustainable nor suitable for many human-wildlife conflict situations (Biquand *et al.*, 1994; Strum, 1994; Naughton-Treves, 2001; Madhusudan, 2003; Mishra *et al.*, 2003; Forthman *et al.*, 2005; Miquelle *et al.*, 2005). In addition, research has seldom examined the perceptions of local people

A.D. Webber (Corresponding author) and **C.M. Hill** Anthropology Centre for Conservation, Environment and Development, Department of Anthropology & Geography, Oxford Brookes University, Oxford OX3 OBP, UK. E-mail awebber@brookes.ac.uk

V. Reynolds School of Anthropology, Oxford University, Oxford, UK.

Received 6 January 2006. Revision requested 26 April 2006. Accepted 2 October 2006.

towards such methods. Here we review the implementation of a conflict mitigation strategy in Uganda and explore its failure to achieve long-term sustainability around Budongo Forest Reserve. It is rare to find unsuccessful projects reported in the conservation literature but it is vital for future development of successful and sustainable conflict mitigation strategies.

Study area

Budongo Forest Reserve is on the northern edge of the Albertine Rift, Masindi District, Uganda. It comprises 435 km^2 of medium altitude, semi-deciduous tropical rainforest, and is home to numerous duikers, birds, small mammals and six species of primate (Reynolds, 2005) including one of only four viable populations of chimpanzees *Pan troglodytes schweinfurthii* in Uganda (Plumptre *et al*., 2003a). The Reserve is also the largest mahogany forest in East Africa (Reynolds *et al*., 2003) and in the 1960s was home to Uganda's biggest sawmill operation (Paterson, 1991; Reynolds, 2005). The mill is now closed and the forest is managed by the National Forestry Authority.

The human population in this area is ethnically diverse. After a dramatic decline in population density (as a consequence of sleeping sickness control strategies in operation locally during the British protectorate and more generally through famine and disease) migrants flooded into the area attracted by resettlement programmes, land and employment at cash crop estates and sawmill operations (Baker, 1971; Paterson, 1991). There was also a later influx of refugees because of unrest in the neighbouring countries of Democratic Republic of Congo, Rwanda and Sudan (Hill, 1997). The population has continued to rise, resulting in the clearance of many forest fragments for agriculture (Reynolds *et al*., 2003); 16% of forest cover was lost in this area between 1986/1987 and 2001 (Plumptre *et al*., 2003b). The subsequent closure of the sawmills and decline of large estates has meant many workers have become increasingly dependent upon subsistence agriculture.

The villages south of Budongo Forest Reserve are the site of persistent human-wildlife conflict. Complaints regarding crop damage have increased in the last 10 years (C. Byarugaba, Vermin Control Officer, Masindi District, pers. comm.) and local communities consider crop raiding the biggest challenge of living close to a forest edge (A.D. Webber, unpubl. data). Whilst a number of wild and domestic animals raid food and cash crops, primates are a particular concern and baboons *Papio anubis*, chimpanzees, red-tailed monkeys *Cercopithecus ascanius* and blue monkeys *Cercopithecus mitis* regularly consume agricultural crops (Hill, 2000). Baboons cause significant damage and are much reviled by local people (Hill, 1997, 2000). Despite growing antagonism to chimpanzees raiding sugar cane in the area (Reynolds *et al*., 2003) most farmers are still tolerant of their presence and do not actively hunt them. However, many chimpanzees display limb deformities as a result of snares and leg-hold traps (Waller & Reynolds, 2001) used around fields to deter vermin species (Ugandan policy documents define 'vermin' as problem animals that can legally be killed; around Budongo this includes vervet monkeys *Cercopithecus aethiops* and baboons). These non-specific strategies are inadvertently putting the Endangered chimpanzee at risk (Reynolds, 2005; IUCN, 2006).

An intervention was required that could reduce crop raids, replace the use of indiscriminate crop protection methods, and protect chimpanzees. Thus, the live-trap was developed by Christopher Byarugaba, the District Wildlife Management (Vermin Control) Officer for Masindi District to promote wildlife conservation and encourage active public participation in a conflict issue (C. Byarugaba, pers. comm.). The live-trap is a large, cage-like wooden structure made of locally sourced materials (Reynolds, 2005) and baited with crops that are regularly raided by wildlife, e.g. bananas or maize. The wooden door is attached by wire to the baited food and if disturbed this will close, capturing the animal alive. If the animal is classed as vermin it can be killed, if not it can be released unharmed by one person standing atop the trap roof. The trap requires a moderate level of commitment to work effectively; in addition to checking bait and resetting after an animal is captured, it needs regular maintenance.

In October 2001 Budongo Forest Project began to support this initiative with seed funding from an international conservation organization and in 2002 a pilot project began with seven villages on the southern edge of Budongo Forest Reserve (Nyakafunjo, Nyabigoma, Kanyege, Nyabyeya II, Kyempunu, Fundudolo and Maram). Two awareness meetings were held in each village by the Project, and a Vermin Control Committee was chosen by local people. This committee, along with local farmers, decided where the trap should be located and agreed to take responsibility for all maintenance and management. One trap was installed in each village as a demonstration; if found to be useful, farmers could build their own. Each community agreed to stop the use of snares and leg-hold traps in farming areas assumed to benefit from the presence of the live-trap. The Project conducted awareness sessions and follow-up visits as part of their ongoing environmental education programme. It cost UGX 150,000 (*c*. USD 90 in 2001) to construct one trap and fund these visits.

After the live-trap project had been operational for 1 year, two assessments were conducted (Joseph &

Ralston, 2002; Seabo *et al.*, 2002). These studies found that the local communities were generally happy with the traps and agreed they had responsibility for them. However, only a small sample of those living close to the trap (n = 40 and 39 respectively) were involved and neither evaluation could be termed independent as Project staff were used as translators and focus groups were facilitated by the Project Co-Director with the Vermin Control Officer in attendance. Research methods were also unsuitable and poorly utilized; questionnaires can be restrictive, and focus groups, which are essentially concerned with discussion and group interaction (Bryman, 2001), were conducted with high numbers of participants and translators (n = 16 and 20). This, and the presence of powerful local figures, suggests that unbiased, in depth discussion would have been difficult regardless of the skill of the facilitator.

The reports did highlight some concerns pertaining to the long-term sustainability of the programme; a number of the units were not functioning correctly or had not been maintained. Joseph & Ralston (2002) recommended that these traps be upgraded and monitored to assess efficacy and the cost:benefit ratio per trap. The training of an individual to ensure the humane death of vermin species was also advised. In September 2002, C. Byarugaba and personnel from the Budongo Forest Project (including VR) met to discuss progress and issues pertaining to maintenance of the traps. As seed funding had been used to establish the intervention, a decision was made to apply for the continuation of funds to assist with issues outlined in the assessment reports. However, the collaborating conservation organization decided not to extend support and the live-trap project continued without further funding, training or technical input.

Methods

In 2004 we began a 13-month study to examine the actual and perceived risk of primate crop raiding in four villages around Budongo Forest Reserve (Kyempunu, Nyabyeya II, Fundudolo and Nyakafunjo; Fig. 1). All contained a live-trap or were no more than 1 km from one. One hundred and twenty-nine farming families living in these plots were visited on a weekly basis to measure crop damage. Perceptions of crop raiding and the live-trap project were explored through semi-structured interviews (n = 93), seven focus groups and participant observation. Ethics approval was granted by Oxford Brookes University Research Ethics Committee, UK, prior to beginning fieldwork. Semi-structured interviews were used in preference to structured techniques because they are flexible, allow the researcher to discover what the study population perceive to be important and let the participant have some control over the interview experience (Bryman, 2001). Interviewees were recruited opportunistically and focus group participants randomly from the research sample. Interviews took place from April to June 2004 during the main agricultural season, a period of particular risk from crop raiding wildlife.

Results

Approximately 70% of the farmers in each village were interviewed and the majority of interviewees' farms

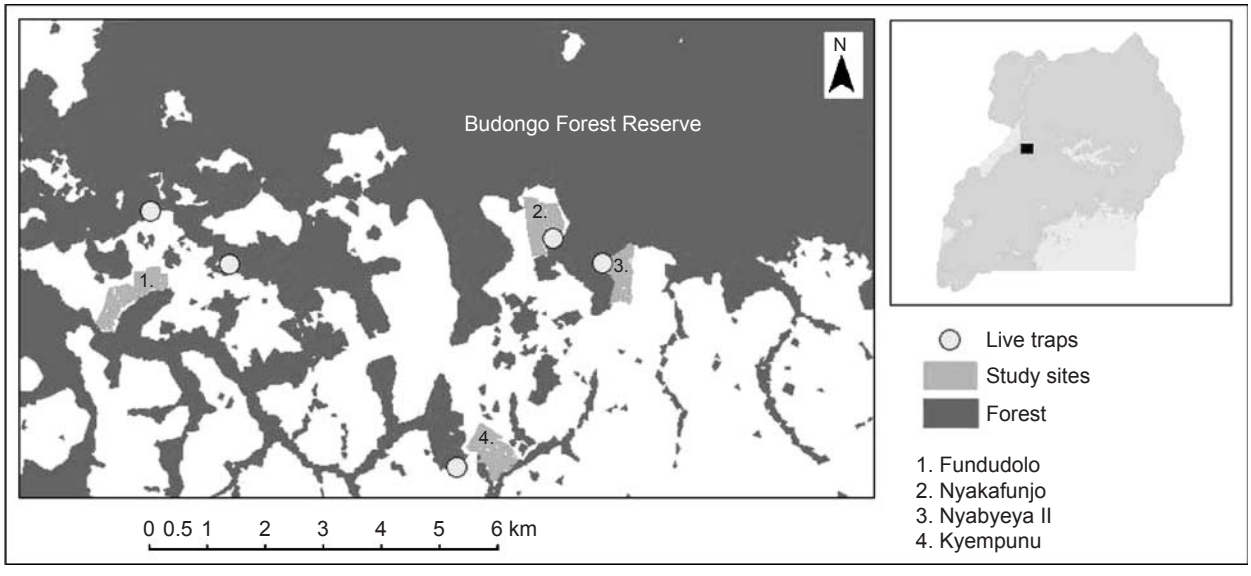

Fig. 1 Location of study sites and live-traps around the Budongo Forest Reserve. The inset shows the location of the Reserve in Uganda.

https://doi.org/10.1017/S0030605307001792 Published online by Cambridge University Press

Table 1 Local people's responses to whether the live-traps were effective or not (n = 84).

Response	Frequency (%)
Don't know	28 (33)
Effective	16 (19)
Killed/trapped baboons	11 (13)
Baboons stayed out of fields/away from crops	5 (6)
Not effective	34 (41)
Effective at first as trapped baboons but now they are avoiding the area	11 (13)
Effective at first but trap now broken/not maintained	11 (13)
Not effective, baboons not entering trap/avoiding area	9 (11)
Not effective, trap not positioned close to individual's farm	3 (4)
Other	6 (7)

were at risk from crop damage; 86% (n = 80) experienced at least one raid during the study. Of the interview sample 60% were male, 37% were >45 years old, >25% had no formal education, and 70% were dependent on agriculture for their livelihood. Twenty different ethnic groups were represented, necessitating the use of four local people as field assistants and translators. Crop raiding was found to be a significant problem, with 689 raids and *c*. 6 km^2 of agricultural crops damaged during the study. Primates accounted for almost 40% of all raids and baboons were the most destructive raiding species, damaging a total of 2.05 km^2. However, domestic species also caused a significant amount of damage; goats raided more frequently than any other animal (n = 250).

Evaluating the actual efficacy of the live-trap project was not possible as all the traps were either broken or in disrepair. However, discussions with local people and Budongo Forest Project staff revealed that the traps were effective in allowing farmers to differentiate between protected and vermin raiding species. At least four chimpanzees (one mother/infant pair and two juveniles) and one red-tailed monkey were released unharmed and an estimated 20–30 baboons were caught. All baboons were killed and, in the majority of cases, the meat was sold to neighbours. There is no evidence to determine whether snare/leg-hold trap injuries to chimpanzees reduced during this time.

Forty-one percent of respondents did not believe the live-trap was effective (Table 1), mainly because baboons avoided the structure and thus their meat could not be utilized. The live-traps were initially perceived to be effective by 45% of people, but over half of these (n = 22) lost faith in the project because of animals avoiding the structure or the trap ceasing to function correctly: 38% of farmers who experienced baboon raids believed the trap was effective. Ownership appeared to be a significant issue, with 44% of respondents (women and those over 46 were highly represented in this group; 61 and 62% respectively) stating that they did not know who had responsibility for the traps, and 32% believing that the trap was owned by external agencies: local authorities, the Budongo Forest Project or NGOs (Table 2). Of those referring to the Project, one third mentioned an individual employed to conduct environmental education/live-trap sensitization. Only 11% of respondents stated that the community had ownership and thus responsibility for the trap, despite initial agreements that local people and the Vermin Control Committee would assume all responsibility for the structure. Several farmers stated they had sent messages through local council members requesting assistance with repairs but to no avail. A small number discussed that it was a pilot scheme and that if the traps were successful, farmers could build their own. However, none of these respondents wanted to construct their own trap as they lacked the necessary money and thought it would be difficult to get assistance with building and/or maintenance.

When asked why the trap was located in its particular position, a number of farmers described practical reasons: 'where most of the baboons are', and 'to kill baboons'. However, the majority described autocratic systems of political governance: 'where the Game Department said the problem was', 'where most of the leaders live', 'where the chairman put it', and 'where the local council selected'. Few people stated that the trap location was decided by the wider local population.

Table 2 Local people's responses when asked about ownership of the live-trap (n = 86).

Response	Frequency (%)
Don't know	38 (44)
External agencies	28 (32)
Authorities (incl. government, forest/game dept)	13 (15)
Non-governmental organizations	2 (2)
Budongo Forest Project	13 (15)
Village/community	9 (11)
Individuals (in village/town)	11 (13)

https://doi.org/10.1017/S0030605307001792 Published online by Cambridge University Press

Discussion

Local people's perceptions of the live-trap programme suggest that it did not succeed because of issues of ownership and subsequent sustainability. People did not believe they had responsibility for the intervention and therefore did not maintain the traps. This was because of a fundamental failure in four important areas: (1) the identification and participation of key stakeholders, (2) adequate demonstration of value/benefit of the traps, (3) monitoring and evaluation, and (4) a long-term funding commitment by conservation agencies.

Lack of involvement of key stakeholders

In order to work in the long-term the live-trap project needed the involvement and support of local Vermin Control Officers, the Budongo Forest Project and conservation agencies, and farmers experiencing crop damage by wildlife, particularly baboons. Although local people were engaged with this project, those at most risk from crop raiding were not always involved or given responsibility for the structures. This was primarily because of a lack of participatory planning, the existence of local elites, and a lack of formal contracts.

The live-trap was developed externally and then introduced locally. While this is common in many conflict mitigation scenarios, it can exacerbate the expectation that outsiders will supply technological solutions and risks dissent if the intervention is not successful (Mengesha & Bull, 1997; Osborn & Parker, 2003; Osborn & Hill, 2005). Local people were not involved in the planning or conception of the project, although many who experienced raids by baboons thought the trap was effective. This failure to involve the local population has been found to have a major impact on the success of such projects (Brown & Wyckoff-Baird, 1992; Little, 1994; Biryahwaho, 2002). In Ethiopia, participatory research was found not only to enhance the development of effective mole rat control techniques but also to highlight the inappropriateness of externally supplied technologies (Mengesha & Bull, 1997). By failing to conduct stakeholder analysis and participatory planning, farmers with the greatest incentive to maintain the traps were not adequately involved in the programme. Another compounding factor was the fact that responsibility was given to local elites.

The political system in Uganda begins at grassroots level, with Local Chairmen and Committees voted in by villagers to serve their communities. These individuals are, inevitably, of high social standing and they were often the same people chosen to serve on Vermin Control Committees as opposed to those most affected by vermin (C. Byarugaba, pers. comm). Many women and older members of the community stated they did not know who should take responsibility for the traps. These groups are potentially most isolated from decision making and need to be actively encouraged to participate in conservation programmes (Brown & Wyckoff-Baird, 1992).

The effect of social hierarchies upon the mitigation project is also clearly seen in response to trap location. Many farmers felt disempowered and perceived that dominant figures in the local communities decided where the trap should be positioned. However, it may be difficult to move power from existing political structures to farming units; it has been found in other studies that many local people are not happy to work in groups and want assistance to be aimed at individuals (Mishra *et al.*, 2003).

One method of ensuring key stakeholders are involved and can assume positions of responsibility in a conservation project is through the use of formal contracts. Although informal agreements were made between the Vermin Control Officer, the Budongo Forest Project and local communities, formal arrangements might have been more effective. They have had a fundamental role in the success of other conflict mitigation interventions (Mishra *et al.*, 2003) as they ensure that everyone is aware of their role in the project even when the impact of the conflict is reduced. It is a challenging element of conflict mitigation that if an intervention is perceived as succeeding, the problem becomes less acute and therefore motivation to maintain it declines (Biryahwaho, 2002). Contracts can also build trust between stakeholders and be an effective means of ensuring benefits are given to the relevant groups participating in an intervention (Little, 1994; Biryahwaho, 2002).

Demonstration of benefit of the traps

A successful and sustainable conflict mitigation project needs to meet the diverse expectations of all stakeholders. The live-trap had the potential to achieve both the protection of the Endangered chimpanzee in the context of crop raiding and the control of vermin species by reducing baboon numbers and supplying protein or cash. However its efficacy was never successfully demonstrated to the local community prior to installation and farmers were expected to assume responsibility for a novel programme. This demonstrates the importance of funded participatory trials both to collect empirical data assessing the efficacy of the intervention and to develop the intervention with the active cooperation of key stakeholders. In Kenya trials demonstrated the value of early warning methods and

guarding effort in reducing elephant raids (Sitati *et al.*, 2005). However, trials alone would not have made this project more sustainable. There needed to be a comprehensive understanding of the cost and benefit of the intervention to local people.

A recognizable incentive, often financial, has been identified as a key factor in the development and support of conservation initiatives in economically deprived areas (Hill, 1991; Little, 1994; Mishra *et al.*, 2003; Sitati *et al.*, 2005). For many people around Budongo Forest Reserve, baboon meat was the perceived benefit of the live-trap programme. This is not a new association; customarily meat from animals killed by problem animal control units has been given to local people as a form of reparation by wildlife authorities (Naughton-Treves, 2001). Such meat has also been perceived to be a significant benefit of wildlife in other human-wildlife conflict scenarios (De Boer & Baquete, 1998; Gillingham & Lee, 1999). However, for the live-trap project to succeed local people needed to perceive meat to be more valuable than a commitment to maintenance. It appears that initially that was the case. However, as baboons began to respond to the threat of capture they started to avoid agricultural areas and the trap units. The cost of maintaining the traps became higher than the perceived benefit and people ceased to take an interest in the project. Many conflict mitigation strategies have failed because the intervention is too expensive to maintain (Little, 1994). For example, electric fences installed to protect farms from crop-raiding elephants are seldom sustainable as subsistence crops are often of lower value than the cost to maintain the structure (Osborn & Parker, 2003). In addition, insurance schemes to compensate livestock depredations by tigers have not been effective, partly because the low risk of loss does not justify the cost of indemnity (Miquelle *et al.*, 2005). These results highlight the need for cost-benefit analysis to understand fully the incentive for local people to participate in conflict mitigation interventions. Unfortunately, this type of economic assessment is seldom included in conservation projects (Little, 1994).

Monitoring and evaluation

A lack of effective monitoring contributed to the demise of the live-trap project. Monitoring enables the identification of potential tensions at the outset, allows a programme to respond flexibly to conflict as it evolves (Little, 1994) and shows the local population a degree of commitment to addressing the issue. Evaluation is also vital to the success of mitigation strategies although it is rarely conducted in conservation programmes (Kleiman *et al.*, 2000). However, beyond a cursory attempt to document the number of baboons killed, there was little objective assessment to determine the efficacy of the traps at protecting threatened animals and reducing crop damage. An evidence-based approach is critical to understand the true effectiveness of an intervention and identify any issues that may affect long-term sustainability of a project (Sutherland *et al.*, 2004; Sitati *et al.*, 2005).

Whilst objective monitoring is important, qualitative research is also required to assess local people's perceptions of an intervention. This study highlighted that surveys designed to evaluate the live-trap project were potentially flawed by the use of the Budongo Forest Project Education team as translators/ facilitators. Although those implementing conservation programmes are often working within limited resources, it is vital that the monitoring of conflict mitigation strategies is conducted by external personnel.

Long-term funding commitment

The cessation of funding from this project had a significant impact upon the sustainability of the programme. The repair of traps, training of local people to ensure that baboons were dispatched humanely, and necessary participatory monitoring could not be conducted. Whilst there were some key operational failures, a lack of funds essentially prevented any potential development. This highlights a common problem, that of funding oriented towards short-term objectives. As there is increasing recognition that participation is vital for the success of conflict mitigation interventions, this is particularly problematic. Participatory projects take much longer to develop, monitor and implement than top down conservation programmes, and a number of agricultural programmes have had funding withdrawn because of a lack of success over a short timescale (Little, 1994). In addition, conservation agencies need to support research that assists both the design and implementation of programmes (Mishra *et al.*, 2003). Long-term investment will not only result in more effective strategies, but will also show local communities that conservation organizations and local authorities are committed to long-term solutions.

Conclusion

The introduction of live-traps to villages on the southern edge of Budongo Forest Reserve was an innovative project designed to protect both crops and chimpanzees in villages neighbouring a protected forest. It succeeded in opening channels of communication between wildlife authorities, research organizations and local communities; previous research has indicated that even a low

https://doi.org/10.1017/S0030605307001792 Published online by Cambridge University Press

level of contact between such stakeholders can have a positive impact upon attitudes to wildlife (Newmark *et al.*, 1993). However, because of operational failures and a lack of long-term funding commitment by conservation agencies the project was not sustainable.

This intervention should be valued for its contribution to our understanding of conflict mitigation. Errors and failures are too often ignored, hidden and unknowingly repeated. It is vital that conservationists recognize and evaluate mistakes and are prepared to publish them. Only with such information can conflict mitigation strategies be developed that are both effective and acceptable to local people. In summary, this assessment of the failure of the live-trap programme at Budongo Forest Reserve highlighted that stakeholder analysis, participatory planning and monitoring, funded trials, and socioeconomic analysis are fundamental when attempting to develop an intervention of this nature.

Acknowledgements

We thank the Ugandan National Council for Science and Technology and the Ugandan Wildlife Authority for their permission to conduct this research. The project was supported by an Oxford Brookes University Scholarship and a Wildlife Conservation Society Research Fellowship, grants from the Parkes Foundation, Wenner Gren Foundation, and Primate Conservation, Inc., a British Airways/ Royal Geographical Society (with IBG) Travel Bursary, and discounted equipment from Silva Ltd. Thanks to Chris Byarugaba for his dedication to ameliorating conflict around Budongo Forest Reserve. Ruthlen Atugonza, Jackson Okuti, Mawa Diedonne and Geoffrey Okethuwengu provided invaluable help in the field. We are grateful to the people of Masindi District, and thank Fred Babweteera, the staff at BFP and the Nyabyeya Forestry College for their help. We thank Drs Neil Bailey and Stewart Thompson of Oxford Brookes University, Dr Nadine Laporte of Woods Hole Research Centre and United Nations FAO Africover Project for providing maps and assistance with software. This manuscript was greatly improved by the critiques of two anonymous reviewers. AW would also like to thank D. Huertas whose unequivocal support has been central to her work on this project.

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Biographical sketches

Amanda Webber is interested in the identification of spatial/temporal factors that intensify human-wildlife conflict, local people's perceptions of pest species (particularly those with protected status), and issues that contribute to their acceptance of a mitigation strategy.

Catherine Hill's research focuses on human-wildlife conflict issues with a particular interest in farmer-wildlife interactions. She has carried out fieldwork around the Budongo Forest Reserve to investigate the impact of crop raiding by wildlife on local people's livelihood strategies. Currently she is researching the implications of human population density, changing agricultural policy and practices, and changing land use on people-wildlife interactions in Uganda.

Vernon Reynolds is involved in the running of the Budongo Forest Project in western Uganda. One of his main concerns is how to reduce the number of chimpanzees that are maimed or killed by snares, traps and weapons used by people guarding crops.