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## Research Article

# The potentials for co-management approaches in western Serengeti, Tanzania

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### Abstract

Co-management arrangements are increasingly gaining popularity as an intervention to overcome the shortcomings of centralized management that impede harmonization of conflicting interests among the diverse stakeholder groups. The success of these arrangements depends, among other things, upon capitalizing on potentials existing in the area where they are intended to be implemented. This study was conducted in the western part of Serengeti National Park to analyze some potential for adopting the co-management approaches. We employed local communities' opinions, experience, knowledge, and attitudes to analyze these factors. The paper is framed around the premises that, among other things, co-management arrangements have the potential to work if: (i) the local communities have an outstanding level of awareness on the rationale of, and legal aspects pertaining to, wildlife conservation; (ii) the traditional institutions for management of natural resources exist and local communities have the ability to evaluate their performance, establish causes for inadequate performance and propose some workable solutions; (iii) local communities have the ability to evaluate different options for resource ownership and give valid reasons for opposing or supporting them. In conclusion we underscore the need for co-management approaches as an alternative intervention and a complement for current resource management approaches. We recommend promotion of local awareness on legal aspects of resource management, strengthening of traditional institutions for resource management and honoring people's choices of the types of resource ownership or rectifying the situations making them unpopular.

**Keywords:** *co-management approaches, local communities, traditional institutions, ownership, centralized management, potentials, wildlife, Western Serengeti, Tanzania*

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## Introduction

Co-management, defined as the sharing of power, responsibilities, rights, and duties between the government and local resource users [1,2,3], has become a popular paradigm in natural resources management, in Africa and elsewhere. It is an intervention developed to ensure effective management of resources through empowering different stakeholders and harmonizing their conflicting interests. Based on the relative balance of responsibility and authority between the state and stakeholders, the intervention can be divided into three major categories: consultative, collaborative, and delegated co-management [2]. Consultative co-management gives more control to the state by allowing a limited interaction with other stakeholders while retaining the power of making all strategic decisions. In collaborative co-management, the state works closely with other stakeholders and allows sharing of strategic decisions. This delegated co-management gives more control to people, i.e., the state allows the organized users/stakeholders to make the strategic decisions [2].

Co-management approaches are justified by a number of arguments. The most common and powerful one is the need to overcome the perceived failure of government efforts to effectively manage wildlife and other natural resources against illegal off-take [4, 5, 6] and to reduce the conflicts between the state and other stakeholders, especially the rural communities. Human rights and equity also prompted these approaches [7]. These arguments derive from the fact that the exclusive centralized control over resources by government agencies infringes on human rights by depriving rural communities of their foundation for sustenance and prosperity. This model—popular as the “fences and fines approach”—bars rural people from utilizing, controlling, and managing the key resources such as land, wildlife and forests—a reality that translates into conflicts. The wisdom behind co-management is that local communities have a long history of association with resources and a high degree of dependence on them and are assumed to have accumulated capabilities that enable them to manage resources sustainably [8]

Co-management approaches are also said to have evolved as a demand by international donors, notably the World Bank and International Monetary Fund (IMF), who placed democratization, through decentralization and delegation of management responsibilities, as one of the given requirements for funding [9]. Decentralization—i.e., the transfer of responsibility from central to lower levels of administration—tackles the deficiency of centralized management arrangements in which the management advice is provided in a top-down manner, thus detaching the information for decision-making from the key stakeholders’ needs [10]. It enables the government officials at regional and local levels to work closely with people and reflect their actual needs in the development plan [11]. Centrally controlled national planning is often flawed, as it is too far from the ground reality.

Inadequate understanding of the needs of the key stakeholders may result in wrong or inadequate prescriptions for the interventions. For example, conservation benefit-sharing approaches are adopted as an intervention aimed at motivating local communities to align their behaviors with conservation goals. However, inputs from the beneficiaries are seldom considered in deciding the kind of benefits. As a result people’s immediate priorities and problems are not taken into account. For example, infrastructure and social amenities such as dispensaries and classrooms are provided to people who perhaps would have prioritized food, water, or grazing land as their immediate needs [12]. Furthermore, these benefits are often biased towards economic benefits while ignoring non-economic cultural benefits. The research-based literature establishes that cultural benefits are equally important motivational factors [13, 14, 15]. For example, *Bagisu* communities around Uganda’s Mount Elgon National Park attach more value to smoked bamboo (*Arundinaria alpina*) shoots than to any other resource, because of this activity’s cultural importance during the biennial circumcision ceremonies—powerful spiritual events for the *Bagisu* people [13]. Ribot [16] advises that democratic local governance requires popular input in decisions about natural-resources management and use, because most rural people in developing countries rely on natural resources for their livelihoods.

Despite the compelling arguments for adopting co-management approaches and stated government commitments, their implementation in different parts of the world has revealed some fundamental setbacks. One such setback is the reluctance of central governments and relevant ministries to transfer appropriate and sufficient powers to local authorities. Such reluctance is happening as the government bureaucrats worry about losing economic benefits from the control they presently exercise over natural resources [17, 18]. Other setbacks include: devolved power being captured and misused by the local elites; smooth transfer of authority from the central to the local level being distorted [19]; the concerns of poor and marginalized users being ignored [19, 20]; failure to respect local culture and accept the principles of indigenous control of resources [20]; a top-down planning process that bypasses the participation of important stakeholders; and lack of accountability and transparency in policy-making, planning, and implementation [19, 20]. The success of co-management will depend greatly on the willingness and ability to overcome these setbacks. Furthermore, co-management arrangements are likely to benefit immensely if the conservation agencies can take advantage of the potentials existing in the areas where projects are intended to be implemented.

The focus of this study is communities around Serengeti National Park—one of the flagship conservation areas in Africa. These communities have historical and cultural relationships with resources in this area, although to a large extent these relationships have been interrupted by conventional conservation models, characterized by exclusive and punitive policies. By virtue of sharing land with wildlife, these communities bear most of the conservation-induced costs such as property damage, loss of access to key resources, and wildlife-related accidents [12]. As a way of resisting conservation policies and meeting their livelihood options, these communities are compelled to pursue economic options that are ecologically destructive, such as illegal hunting and encroachment on wildlife habitats [21, 22]. The stringent law enforcement through which these illegal activities have been dealt with has proved a failure. The Serengeti region, like other parts of the world, has subscribed to co-management as a way of ending these problems. This study seeks to analyze some of the potentials on which the conservation agencies can capitalize to develop successful co-management approaches in the area. Since the consent and acceptability of local communities are critical for the success of any management intervention, these potentials are analyzed from the local communities' perspective. Their opinions, experience, knowledge, and attitudes are employed in this analysis. We are guided by the following questions: (i) to what extent are the communities aware of the rationale and legal aspects pertaining to wildlife conservation?; (ii) what traditional institutions exist for management of wildlife, how effective are they, and which interventions can overcome poor performance?; and (iii) what options exist for resource ownership and what are the reasons for opposing or supporting them? The paper starts by giving a brief historical review of wildlife conservation efforts in Serengeti.

### *Evolution of wildlife management approaches in Serengeti*

The history of wildlife management in Serengeti dates back to the early 1890s when Dr. Oskar Boumann, a German explorer, passed through Serengeti on his way to Burundi as an agent of the German Anti-Slavery Committee. His arrival in Serengeti coincided with *Enkindaaroto* (a time the Maasai referred to as "the destruction"). At this time a great rinderpest epidemic and severe drought killed virtually all Maasai cattle, causing hunger and serving as a predisposing factor for epidemic diseases like smallpox. Competition for dwindling resources triggered wars that further depopulated the Maasai in the area. The bush encroachment caused by reduced human impact on vegetation—i.e., lack of seasonal fires and grazing by livestock—shaped the Europeans' perceptions of Serengeti as an open and uninhabited landscape [23]. Since tsetse favor dense bush over grassland, the ecosystem (with the influence of man removed) developed in a way that heavily favored wildlife over cattle. The former, unlike the later, is immune to nagana (trypanomiasis) [23]

The Europeans' perception of "uninhabited wilderness" was mainly used to justify conservation interventions that separated the natives physically and culturally from their livelihoods. The German rule enacted the first wildlife law prohibiting hunting in 1891. Prohibitive mechanisms intended to lock the natives out of wildlife resources entailed the introduction of a licensing system and banning the use of indigenous weapons in hunting. The expensive license fees, the mandatory condition for natives to secure the governor's consent before issuance of the license, and the law prohibiting the natives from owning rifles barred them from hunting important species like antelopes, buffalo (*Syncerus caffer*), and hippo (*Hippopotamus amphibius*) [24]. A militaristic strategy was used to enforce this prohibitive law, thus making wildlife conservation in the Serengeti region a source of conflict between local communities and the state.

The British administration, which succeeded German administration after World War I, viewed wildlife as a source of economic revenues or direct benefits through its use for recreation, resident hunting, and game viewing [24]. The British regime enacted the first comprehensive wildlife conservation legislation, the Game Preservation Ordinance of 1921. Pursuant to the provisions of this ordinance, Serengeti was declared a partial Game Reserve in 1921 and elevated to a full one some eight years later. Because of Europeans' consideration of Serengeti as their property and prohibitive policies against the natives, Serengeti was pejoratively known as "*Shamba la Bibi*" (Swahili words for "Queen's farm"). Essentially, all wildlife was symbolically and legally declared the property of the Queen of England.

The idea of upgrading the Serengeti Game Reserve to a national park (a more restrictive category of protected areas) emanated from the London-based Society for Preservation of Flora and Fauna of the Empire (SPFFE). In 1930, the society sent Major Richard Hingston to Tanganyika and other central and southern African colonies to investigate the needs and potential for developing a nature protection program [24]. Insignificant mineral deposits, infestation with tsetse flies, and scant rainfall were used to justify the suitability of Serengeti as a potential national park. This was because the constraints made the area unattractive to Europeans who would have wished to conduct mining and farming activities [24].

Hingston's report and his recommendation to create the Serengeti National Park were objected to by colonial administrators in Tanganyika on the grounds that it was infringing on African rights and therefore posed a risk of political instability in the colony [25]. As pressure from SPFFE and other powerful conservation lobbies in Europe increased, the colonial government yielded. It enacted the first Game Ordinance of 1940 which repealed the 1921 Ordinance. This ordinance gave the governor a mandate to declare any area a national park. Serengeti became a national park in the same year, although it remained a "park on paper" until 1951, since its actual operation was deferred due to World War II. In 1981 Serengeti gained international status as a World Heritage Site and Biosphere Reserve—the status provided by UNESCO to areas with outstanding ecological, economic, cultural, scientific, and educational value.

For centuries, the management of the Serengeti National Park region and several adjoining protected areas has been a history of conflicts and power struggles heavily influenced by international interests. The principle that animals are more important than people has been rigorously observed. For example, a former Serengeti park manager was once quoted as saying: "The interests of fauna and flora must come first, those of man and belongings being of secondary importance" [25]. The late Bernhard Grzimek, one of the prominent wildlife conservationists in Serengeti, was once quoted as saying that he wouldn't mind sitting down with Germany's Adolf Hitler and Russia's Joseph Stalin if that would help his animals [24]. This mind-set among conservationists has made conflicts between conservation agencies and local communities inevitable. The Maasai in the eastern part resented the proposed park boundaries and opposed them with violence and sabotage/vandalism. Their retaliatory response involved spearing of rhinos, setting fires with malicious intent, and terrorizing civil servants [25]. In western Serengeti, Ikoma hunters opposed colonial conservation policies by violating the wildlife laws and continuing to hunt, while threatening to kill wildlife rangers with poisoned arrows should attempts be made to stop the Ikoma from hunting [26]. In the late 1950s, Chief Makongoro of Ikizu was arrested, prosecuted, and imprisoned by the British administration for

contravening laws prohibiting hunting [27]. In the 1970s, the Kurya of northern Serengeti declared their independence and pulled down a Tanzanian flag, replacing it with a leopard banner as a way of resisting inclusion of their grazing, arable, and hunting lands within the national park boundaries [28]

Following independence in 1961, the post-colonial government of Tanzania endorsed continuation of colonial conservation policies, contrary to the expectations of many that independence would mean decolonization of nature and policy reforms that would address the rights and needs of local communities [24]. Actually, more land was set aside for wildlife conservation. Wildlife-based tourism was seen as a vital economic engine and insurance in case of failure of other economic sectors, such as agriculture and minerals. The first Tanzanian President, Julius Nyerere, was quoted as saying:

*"I personally am not interested in animals. I do not want to spend my holidays watching crocodiles. Nevertheless, I am entirely in favour of their survival. I believe that after diamonds and sisal, wild animals will provide Tanganyika with its greatest source of income. Thousands of Americans and Europeans have the strange urge to see these animals" [29].*

However, the need for change in conservation policies emerged following a deep economic recession that affected many African countries between the 1970s and 1980s. Serengeti was one of the areas which suffered from inefficient state-led enforcement of conservation laws during this crisis. It experienced a dramatic decline of its three charismatic species: the black rhinoceros (*Diceros bicornis*), elephant (*Loxodonta africana*), and buffalo (*Syncerus caffer*). Between 1975 and 1986, poaching drove the black rhino to the verge of extinction while the elephant population dropped by 80% [30]. The buffalo population dropped from 63,144 in 1970 to 15,144 in 1998 [31].

The Tanzanian government's nationwide operation called "Operation Uhai" (*uhai* is a Swahili word for life), which involved the army, police, and wildlife rangers, minimized the problem of poaching to a large extent [32]. However, this intervention could not be sustained due to resource constraints caused by a meager budget allocation. From 1976 to 1981, for example, the entire natural resources sector (i.e., wildlife, land, forestry, and fisheries) was underfinanced, getting only 1.2% (US\$52 million) of the national development budget [33]. The situation continued to worsen for the wildlife subsector year after year. In 1994, for example, the total budget for the Wildlife Department was US\$1.04 million. In 1995 it decreased by 3% to US\$1.01 million [34]. The budget for some flagship protected areas, such as the Selous Game Reserve, were as low as US\$3/km<sup>2</sup> (32). This amount was far less than the actual cost of effectively controlling commercial poaching, i.e., between US\$200 and 400/km<sup>2</sup> per annum [24, 35]. This meager budget translated into poor staffing and inadequate equipment. The staff-area ratio in most protected areas was 1:125 (persons:km<sup>2</sup>), far below the recommended ideal ratio of 1:25 [36]

The above scenario prompted a need to search for lasting and more affordable strategies. Co-management approaches have become a popular strategy. In western Serengeti, efforts are underway to establish Wildlife Management Areas (WMAs) in some villages. WMAs are protected-area categories in which local communities are empowered to take the responsibility of managing wildlife on their lands and to benefit from the same. The Wildlife Department's Serengeti Regional Conservation Project (SRCP) and Tanzania National Parks' (TANAPA) Community Conservation Service (CCS) were set up as a starting point for this co-management.

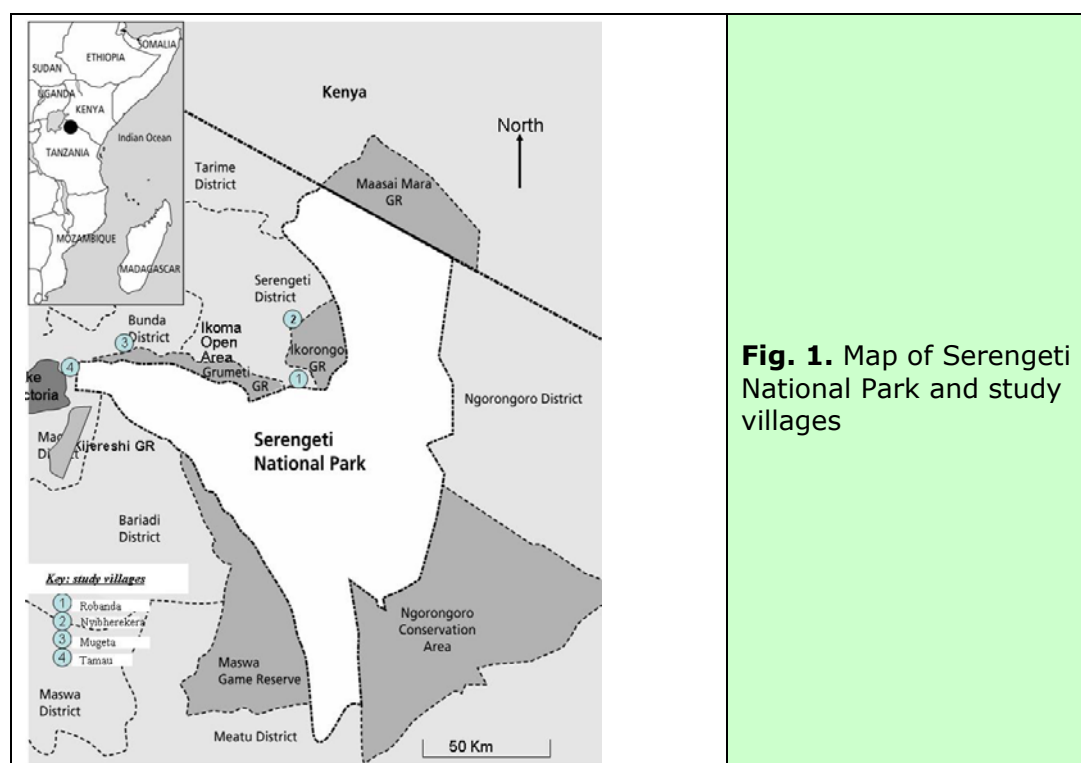
#### *(a) Serengeti Regional Conservation Project*

The Serengeti Regional Conservation Project (SRCP) is an outcome of a workshop held at Seronera in Serengeti National Park (SENAPA) in December 1985 with the "goal of identifying and implementing long-term solutions to the resource-use conflicts threatening conservation of the ecosystem" [37]. The project, with the basic premise of the Seronera workshop that "conservation and human development in Serengeti can no longer proceed in isolation from one another," started in 1988. It had the following objectives: (i) to reconcile human development

needs and natural resource conservation requirements through the cooperation of all resource users and managers; (ii) to enable the protected areas, and wildlife resources in particular, to play a central role in the economic development of the region; and (iii) to enable local communities to achieve sustainable use of natural resources in the region through ownership of land and village-generated land-use plans, thereby reducing pressures on the resources of the protected areas" [37].

*(b) Community Conservation Service or Outreach program*

The Outreach program, implemented by TANAPA, started in 1988 around Serengeti National Park. When this started it was known as "Neighbors as Partners" before the name was changed to Community Conservation Services (CCS) and now to the Outreach program. The program evolved from a working group at the Serengeti Regional Conservation workshop in 1985, which recommended having a "Rural Extension Education" program [38]. The African Wildlife Foundation (AWF) sponsored a pilot project to support TANAPA in developing its capacity for CCS, focusing on three villages (viz. Ololosokwan, Oloipiri, and Soit Sambu) of eastern Serengeti in 1988 [39]. In 1992 CCS became a full-fledged department in TANAPA's 12 national parks. The program has four objectives: (i) improving relations between individual parks and local communities; (ii) ensuring that the interests of National Parks with regard to natural resource conservation and community welfare are presented at all levels; (iii) facilitating the sharing of wildlife-related benefits with target communities; and (iv) assisting communities to gain access to information, resources, and services which promote sustainable development [40].



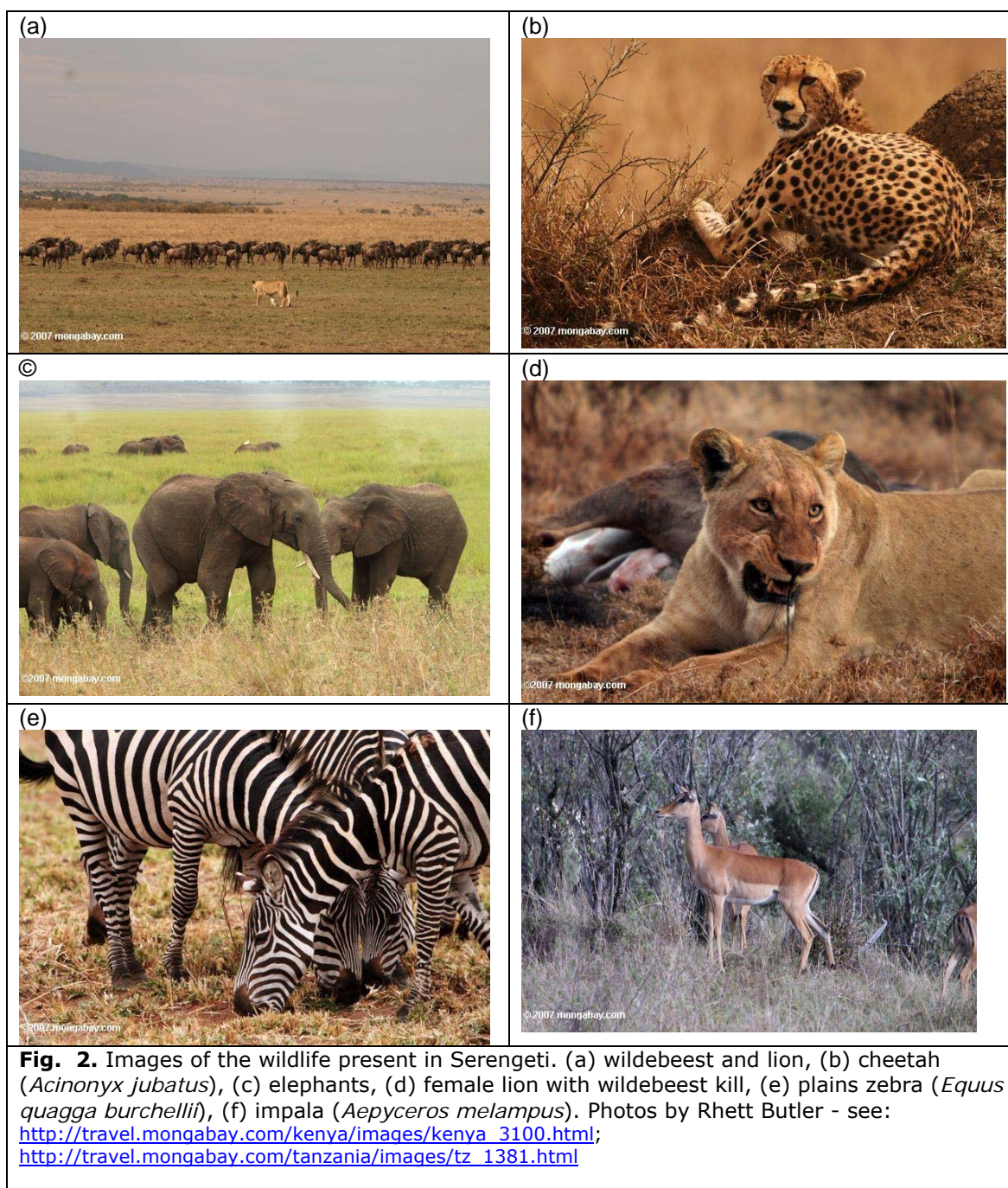
**Fig. 1.** Map of Serengeti National Park and study villages

## Methods

### Study area

The study covered four villages, two in Bunda District (Tamau and Mugeta) and the other two in Serengeti District (Nyibherekera and Robanda) (Figure 1). The two districts lie between latitudes 1°30" and 2°45" S and longitudes 33°00" and 35°30" E., respectively. The total area of Serengeti is 10,942 km<sup>2</sup> and that of Bunda is 3,762 km<sup>2</sup>. Both districts have devoted large chunks of their land to conservation under different management categories (viz. National Park, Game Reserves, Ngorongoro Conservation Area, and Game-Controlled Areas). Protected-area

categories are defined by their functions and prohibitions/restrictions. Human habitation is prohibited in the National Parks and Game Reserves. The national parks are solely devoted to game viewing, photographic tourism, and research, with consumptive use strictly prohibited [41]. The Wildlife Act No. 12 of 1974 [42] allows licensed hunting in the Game Reserves and Game-Controlled Areas. Being the lowest category of protected areas, the latter also accommodates other land uses such as cultivation, livestock grazing and mining. Although humans are allowed to coexist with wildlife in Ngorongoro, graze their livestock, and conduct limited agriculture in specified areas, consumptive use of wildlife is prohibited [43]. The area is one of the prominent game-viewing destinations of the world.



Over 60% of the Serengeti district's land is under wildlife protection. Almost half of Serengeti National Park (14,763 km<sup>2</sup>) is in this district. In Bunda, 40% of the land area is taken up by protected areas. Other important protected areas in western Serengeti are Ikorongo (ca. 563 km<sup>2</sup>), Grumeti (ca. 416 km<sup>2</sup>), Maswa (ca. 2,200 km<sup>2</sup>), and Kijereshi (ca. 66 km<sup>2</sup>). These protected areas and unprotected village lands are ecologically important as buffer zones for Serengeti National Park, critical dispersal areas, and foraging and breeding grounds. The areas are also a critical migratory corridor for ungulates migrating between the park and Kenya's Maasai Mara National Reserve. This migration, which involves wildebeest (*Connochaetes taurinus*), zebra (*Equus burchelli*) and Thompson's gazelle (*Gazella thompsoni*), is a biological phenomenon known worldwide [44]. The ecological roles of lands outside the core protected areas renders the latter insufficient in ensuring healthy wildlife populations. The village lands are, therefore, targeted for co-management approaches.

The study villages make a small fraction of about 32 village communities in the two districts which border (or are located close to) protected areas (i.e., Serengeti National Park, Grumeti and Ikorongo Game Reserves). With the exception of Robanda, the study villages are composed of in-migrants who were either forcibly resettled in 1973/74 to form *Ujamaa* villages (villagization program) or evicted from the areas which were declared protected. The western Serengeti is very diverse in terms of ethnic composition with more than 25 tribes, most of them being proportionally small (Table 1). The tribes include Ikoma, Ikizu, Isenye, Kurya, Natta, Sukuma and Taturu. Others are Ngurumi, Luo, Kerewe, Jita, Ruri, Rogeti, Simijegi, Sizaki, Zanaki, Zangeta, Kisii, Maragori, Suba, Nandi and Fawo [45]. According to the latest census of 2002, the population densities for the Bunda and Serengeti districts were 91.3 and 40.4 people/km<sup>2</sup>, respectively. The overall population density for the entire western Serengeti was 70 people/km<sup>2</sup>. The annual growth rate for the period from 1988 to 2002 was about 3.0% [46, 47]. These high population densities have implications for the demand for natural resources and land for different uses, including increased poaching and encroachment on wildlife habitats.

Table 1: Percentage tribal composition in the study villages. Source: [45]

Village	District	Tribes: Percentage composition							
		Ikizu	Ikoma	Isenye	Kurya	Natta	Sukuma	Taturu	Others
Mugeta	Bunda	10.0	10.0	20.0	7.5	17.4	2.5	22.5	10.0
Tamau	Bunda	0.0	0.0	0.0	34.0	0.0	38.0	0.0	28.0
Nyiberekera	Serengeti	0.0	15.0	57.5	0.0	2.5	7.5	15.0	2.5
Robanda	Serengeti	0.0	99.0	0.0	0.0	0.0	0.0	0.0	1.0
Overall composition		2.5	31.0	19.4	10.4	5.0	12.0	9.4	10.3

The communities in the study area are typically agropastoralist, i.e., relying largely on a combination of livestock keeping and cultivation for their sustenance. Agriculture and livestock account for 80% of the household income. The remaining 20% is contributed by off-farm activities such as hunting, charcoal burning, making local brews, and formal employment [14, 21, 22]. Agriculture is mainly a small-scale operation involving growing of maize, cassava, millet, and sorghum (for food), and cotton (for cash). Most households own relatively small land holdings, with two-thirds owning less than 4 hectares. Over 70% of the households own livestock (cattle, goats, sheep, pigs, donkeys, and poultry). Annual income from livestock ranges between US\$ 45 and 130 [14]. Lake Victoria provides Tamau village with great potential for fishing. The village also takes advantage of the lake to grow vegetables such as tomatoes, onions, watermelons, and cabbage at the lake shore.

### *Data collection*

The data collection process began with researchers visiting a number of villages for informal talks with different stakeholders and a round of focus group meetings for the purpose of framing the issue. Following these visits, a questionnaire was constructed in Kiswahili. A draft questionnaire was tested in a pilot study of 30 households. After several refinements of the questionnaire, respondents were drawn from a randomly selected sample of 120 households (30 from each of the four villages). The number of households for each study village was as follows: Robanda (150), Nyibherekera (470), Mugeta (458), and Tamau (316). The sample of 30 households per village is over and above 5% of the total households in each village. For sample size to be representative enough, a sample is recommended to be at least 5% of the total population [48]. For the purpose of this study, a household was defined as a group of one or more persons living together under the same roof or in several rooms within the same dwelling and eating from the same pot or making common provision of food and other living arrangements.

The study sought to obtain information from all age groups and from both gender groups, and therefore, for every 30 households randomly sampled from each village, approximately half were old people and the other half were youths. The number of women interviewed, however, ranged between seven and nine for each village, and thus the overall number of interviewed women made 27% of the total respondents, implying an apparent gender imbalance in data collection. Cultural reasons hindered the desire of achieving gender balance since it was impossible to interview women in presence of their husbands. Furthermore, gender balance was impractical since the survey targeted the household heads, who happened to be men by about 89%.

With the help of a village chairman or village executive officer or any villager assigned by the village authorities, a visit was made to each of the randomly selected households. A request to participate in the interview was submitted and a date for an interview was set. This was done 1-2 days before the interview. A few people (4%) declined to participate in the interviews for unavoidable reasons such as sickness and other emergencies. These were replaced by their neighbors. Informal discussion was conducted with some key informants to supplement the data collected through questionnaires. The information gathered through informal discussion was also used in discussion of the results.

The respondents were informed that the survey sought to obtain their views regarding the management aspects of wildlife and their suggestions for future improvement. Kiswahili was used as a medium of communication, although indigenous languages were also used when the situation called for that. No translation was done, since the second author, who did most of the interviews, comes from the same area and is well conversant with the local languages. Both authors took advantage of their prior interactions with the villagers to win their confidence.

### *Data analysis*

Both quantitative and qualitative methods were employed in the analysis of the collected data after it was coded. *Microsoft Minitab* and *Excel* software was used for statistical analyses. The Chi square ( $\chi^2$ ) test at 99% ( $\alpha = 0.01$ ) and 95% ( $\alpha = 0.05$ ) Confidence Intervals was used to test for associations between village and several categorical variables. Household information was treated according to each village but sometimes all villages were pooled.

Responses from open-ended questions (categorical data) were coded, i.e., assigned numerical values for analytical purposes, as follows: (A) Benefits for conserving wildlife (national economy and continued benefits = 1; national economy, continued benefits and employment = 2; national economy, continued benefits and ecological interdependence = 3; national economy, continued benefits, employment and ecological interdependence = 4; no benefits or no response = 5); (B) Types of traditional institutions in the village (age hierarchy = 1; clan gatherings = 2; special groups = 3); (C) Performance of traditional institutions (Good = 1; poor = 2; not existing = 3); (D) Causes of poor performance of traditional institutions (modernization,

government interventions, and mixed cultural values = 1; modernization, lack of cooperation among community members = 2; 1 & 2 = 3); (E) Suggested interventions for strengthening traditional institutions (impossible/no suggestion = 1; more emphasis on cooperation among community members = 2; clear demarcation of the cases/areas to be handled by the government and traditional institutions = 3; government recognition and review of current legislation = 4); (F) Preference on the type of resource ownership (private/individual = 1; groups = 2; village government = 3); (G) Reasons for proposing private or individual ownership (higher level of seriousness and commitment = 1; it is an era of privatization = 2; 1 & 2 = 3); (H) Reasons for opposing private or individual ownership (dishonest, selfishness, and ambitiousness = 1; difficult for local individuals to manage common resources alone = 2; conflict among individual owners and/or with village government would impair co-management = 3); (I) Reasons for proposing group ownership (reasonable number of people will ensure effective natural resources management = 1; easier for the group to be supported = 2; 1 & 2 = 3); (J) Reasons for opposing group ownership (lack of seriousness and personal interests may emerge and cause misunderstanding = 1; past experience shows no success by group venture = 2; benefits can be localized within the group, hence inequitable access = 3); (K) Reasons for proposing ownership by village government (adequate governance power and hence effective management = 1; all people would have enough control of resources and access to benefits = 2); (L) Reasons for opposing ownership by village government (past experience of the village in governing and managing resources has proved a failure = 1; village government is very much occupied by other administrative issues = 2; changing ownership from central to village government would make no difference = 3; greedy and self-centered leaders can monopolize the benefits = 4; some village leaders are outsiders and may influence overexploitation of resources = 5).

Table 2: Benefits from wildlife conservation as per respondents in studied villages

Benefits	% Respondents in the villages				% Total (N = 120)
	Mugeta (N = 30)	Tamau (N = 30)	Nyibherekera (N = 30)	Robanda (N = 30)	
I	44.2	42.5	46.7	50.0	45.9
II	26.7	16.7	30.0	26.7	25.0
III	6.7	6.7	3.3	13.3	7.5
IV	3.3	0.0	0.0	10.0	3.3
Totals	80.9	65.9	80.0	100.0	81.7

**Key:** **I** = National economy and continued benefits (ethical values); **II** = National economy, continued benefits and employment; **III** = National economy, continued benefits and ecological interdependence; **IV** = National economy, continued benefits, employment and ecological interdependence

## Results

### *Awareness of rationale and legal aspects of conservation among the respondents*

With the exception of a few (18%) who did not mention any benefit, respondents from all four villages demonstrated a high level of awareness on the rationale for conserving wildlife. About 46% of the respondents gave two reasons (national economy and continued benefits), while 25% and 7.5% added employment and ecological functions, respectively, to these reasons. Respondents from Robanda were more aware of the ecological benefits than those from the other three villages. Those who claimed that there were no benefits, or who did not give a response, included respondents from three villages (Mugeta, Nyiberekera, and Tamau). No respondent from Robanda failed to cite the benefits. A minority of respondents (3.3% from

Mugeta and 10.0% from Robanda) gave a combination of the four benefits mentioned above (Table 2).

The question regarding awareness of the functions and legal mandates of protected wildlife areas seemed to be the most difficult. A significantly large number of respondents (71.7%) were unable to make a distinction between the three major categories (i.e., national parks, game reserves, and game-controlled areas).

*Traditional institutions: types, performance, reasons for poor performance, and suggested interventions*

The types of institutions that were reported by respondents showed no significant differences between the villages (Table 3). However, a majority of the respondents in all villages reported in favor of age-hierarchy-based types of institutions while clan gatherings were the least popular (Table 3). Informal discussions with Ikoma and Kurya elders uncovered *Ritongo* as an important age-hierarchy-based type of institution in Robanda and Nyibherekera.

Response on performance of local institutions was significant ( $P < 0.01$ ) between the villages. Large proportions of respondents in Tamau (86.7%) and Robanda (76.6%) were aware of the existence and functioning of local institutions in their villages, although the majority rated performance of these institutions as poor (Table 3). On the other hand, 56.7% and 50% of respondents from Mugeta and Nyibherekera, respectively, were unaware of the existence of any institution (Table 3).

Table 3: Respondents' reported aspects of traditional institutions by villages

Variable	Category	% of respondents in the villages					Chi square ( $\chi^2$ )	P Value
		Mugeta (N = 30)	Tamau (N = 30)	Nyibherekera (N = 30)	Robanda (N = 30)	Total (N = 120)		
Traditional institutions	Age Hierarchy	60.0	60.0	60.0	73.3	63.3	6.854 (df = 6)	0.335
	Clan gatherings	13.3	0.0	6.7	6.7	6.7		
	Special groups	26.7	40.0	33.3	20.0	30.0		
Effectiveness of traditional institutions	Good	13.3	6.7	13.3	13.3	9.2	20.891 (df = 6)	0.002
	Poor	30.0	80.0	46.7	63.3	55.0		
	Not existing	56.7	13.3	50.0	23.3	35.8		

The unsatisfactory performance of traditional institutions was attributed to numerous factors (Table 4). Modernization, government intervention, and mixed tribal cultural values following the villagization program in 1973, were collectively identified by many respondents (46%). About 11% of the respondents did not see government intervention and mixed tribal cultural values as the strong reasons for the weakness. For them, the weakness was caused by lack of cooperation and modernization. About 34% combined all reasons given by the two groups while the minority (9.2%) did not give any reason. Three forms of interventions for reviving the effectiveness of traditional institutions were suggested, although some few respondents suggested nothing or viewed the whole idea as impossible (Fig. 3).

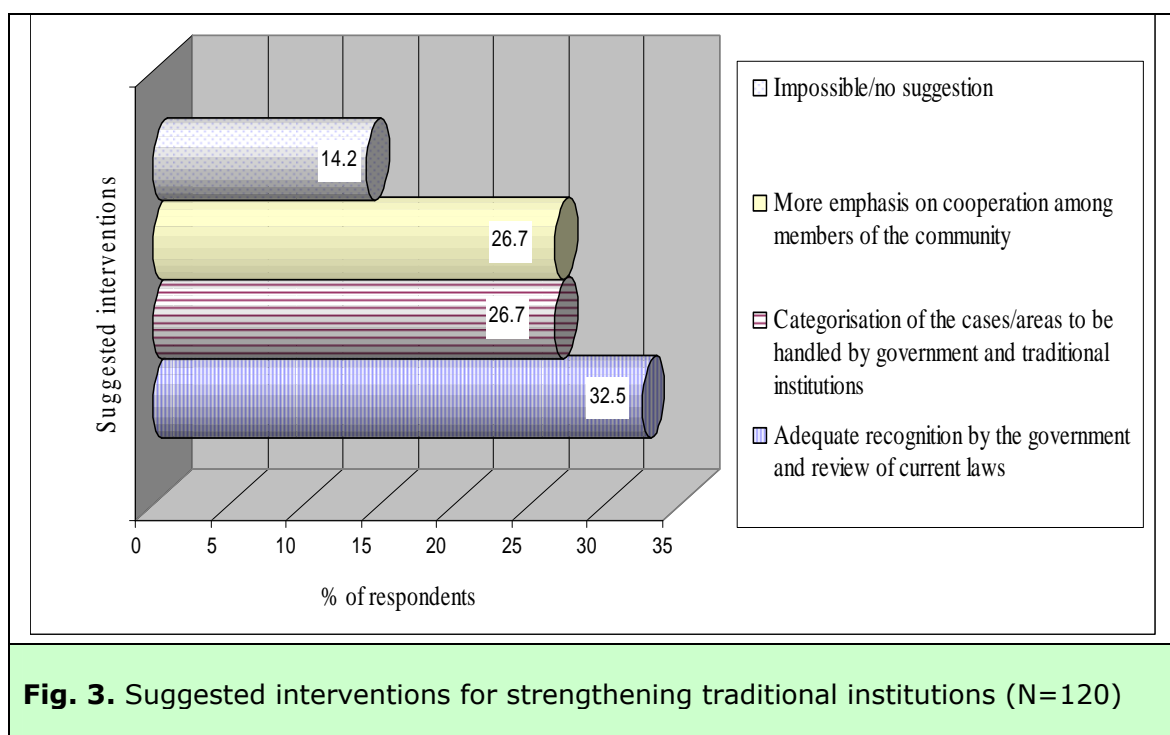
Table 4: Causes of poor performance of traditional institutions in the studied villages

Causes	% of respondents in the villages				
	Mugeta (N = 30)	Tamau (N = 30)	Nyibherekera (N = 30)	Robanda (N = 30)	Total (N= 120)
I	53.3	60.0	40.0	30.0	45.8
II	10.0	10.0	6.7	16.7	10.8
III	23.3	23.3	50.0	40.0	34.2
Don't know	13.3	6.7	3.3	13.3	9.2

Key: **I** = Modernization, government interventions and mixed cultural values; **II** = Modernization and lack of cooperation among community members; **III** = (**I** and **II**)

#### *Natural resources ownership: types and reasons for and against each type*

Response on preference of the types of ownership of natural resources revealed a significant difference between the studied villages ( $P < 0.05$ , Table 5). On the key reasons given for or against the choice of a particular ownership type, one reason given against village ownership—the past experience they had had with government in governing and implementing projects—showed a significant difference between the villages ( $P < 0.05$ ; Table 5). Compared to other villages, high proportions of the respondents in Mugeta (43.3%) and Nyibherekera (20%) were against village ownership because of this reason. Tamau's opposition to this type of ownership was mainly based on the argument that "the government is government," and therefore it would make no difference to change ownership from central to village government (Table 5).



The opponents of private ownership believed that this type is prone to dishonesty, selfishness, and the ambition of individuals in power. On the other hand, a majority of the proponents backed it on the ground that it commands a higher level of seriousness and commitment than other types (Table 5). Support for group-based ownership was inspired by the belief that effective management of natural resources calls for cooperation from a reasonable number of people. However, three limitations that could warrant opposition to group-based ownership were advanced: lack of seriousness and risk of emerging personal interests and misunderstandings; insufficient success based on past experience; and lack of guarantees of equitable access to benefits (Table 5).

Table 5: Types of natural resources ownership and reasons for or against their preference

	Mugeta (N = 30)	Tamau (N = 30)	Nyibherekera (N = 30)	Robanda (N = 30)	Total (N = 120)	Chi square ( $\chi^2$ )	P Value	
<u>Type of ownership</u>								
Private	43.3	33.3	46.7	23.3	[36.7	14.137	0.028	
A group of people	43.3	46.7	33.3	26.7	37.5	(df = 6)		
Village government	13.3	20.0	20.0	50.0	25.8			
<u>Major reasons given for or against the type of ownership</u>								
I.	Dishonesty, selfishness, and ambitiousness can cause misuse and overuse	46.7	43.3	30.0	46.7	41.7	11.360 (df = 9)	0.252
II.	Effective management of natural resources needs cooperation from a reasonable number of people	36.7	36.7	26.7	23.3	30.8	4.318 (df = 6)	0.634
III.	The past experience of the government in governing resources or/and implementing projects has proved failure	43.3	16.7	20.0	0.0	20.0	28.585 (df = 15)	0.018

Key: I. Private; II: A group of people; III. Village government

Although ownership by village government was remarkably unpopular in the three study villages due to numerous reasons, half the respondents in Robanda opted for it (Table 5). The proponents of this ownership type believed that the village government had adequate power to govern and ensure effective resource management along with guaranteeing people enough control of resources and access to benefits (Table 6). The small proportion of respondents in Robanda who opposed this type (16.7%) did so for fear that some greedy and self-centered village government leaders would monopolize the resources for their own benefit.

Table 6: Respondents' reasons for proposing and opposing types of resource ownership

Ownership type	Reasons for proposing	Reasons for opposing
Private or individual	<ul style="list-style-type: none"> <li>The level of seriousness and commitment is much higher (26.7%)</li> <li>It is an era of privatization (4.2%)</li> <li>Both of the two above (5.8%)</li> </ul>	<ul style="list-style-type: none"> <li>Dishonest, selfishness, and ambitiousness will cause misuse and overuse of a resource (41.7%)</li> <li>Difficult for a local individual to manage a common resource alone and we don't want outsiders (18.3%)</li> <li>Conflict among individual owners and/or with the village government would impair co-management (3.3%)</li> </ul>
Groups	<ul style="list-style-type: none"> <li>Effective natural resources management requires cooperation from a reasonable number people (20.8%)</li> <li>Easier for the group to be supported (5.8%)</li> <li>Both of the two above (10.0%)</li> </ul>	<ul style="list-style-type: none"> <li>Lack of seriousness and personal interests may emerge in the group, and cause misunderstanding (42.5%)</li> <li>Past experience shows no success made by group ventures (10.0%)</li> <li>Benefits can be localized within the group, hence inequitable access (11.0%)</li> </ul>
Village government	<ul style="list-style-type: none"> <li>Adequate governance power, hence effective management (15.8%)</li> <li>All people would have enough control of resources and access to benefits (10.0%)</li> </ul>	<ul style="list-style-type: none"> <li>Past experience of the village government in governing and implementing conservation projects have proved failure (20.0%)</li> <li>Village government is very much occupied by other administrative issues, hence should only retain an overall supervisory role (15.8%)</li> <li>Changing ownership from central government to village government would make no difference – government is government (13.3%)</li> <li>Greedy and self-centered leaders would monopolize the accrued benefits (13.3%)</li> <li>Some village leaders, being outsiders employed by the central government, would definitely influence overexploitation of resource base (11.7%)</li> </ul>

*Key: Figures in brackets show an overall percentage of respondents proposed or opposed by giving that particular reason. Percentage in each type of ownership totals 100%*

## Discussion

### *Awareness of rationale and legal aspects of conservation among the respondents*

Logically, people are likely to collaborate in management of resources if they know the reasons for doing so and are aware of the legal aspects governing the resources in question. The results of this study reveal that there is a general awareness of the rationale for conserving wildlife. This is shown by the ability of the majority of the local communities to mention almost the whole range of benefits associated with conservation. More importantly, some respondents, though few, mentioned ecological interdependence in addition to common benefits, something that might not have been expected from the rural people.

Compared to other villages, Robanda had the highest level of awareness, as all categories of benefits were cited in this village, and none of its respondents cited no benefits. This can be explained by the fact that, by virtue of its location, Robanda had in one way or another been involved in many conservation interventions that had taken place in the area, including conservation education programs and benefit-based approaches. Furthermore, its villagers have

relatively higher frequency of interaction with different stakeholders of the wildlife sector, such as researchers, tourists, and wildlife managers. This is most likely due to its proximity to headquarters of Serengeti National Park, Ikorongo-Grumeti Game Reserves, Serengeti Regional Conservation Project, Serengeti Wildlife Research Centre, investors in the sector, and other conservation organizations such as the Frankfurt Zoological Society. This observation corroborates the survey-based studies conducted around Uganda's Lake Mburo [49] and Tanzania's Katavi National Parks [50]. Both studies showed that regular contacts between the wildlife staff and local communities had great influence in enhancing the conservation awareness and improving local support towards conservation.

The respondents from three villages who reserved their comments on benefits or who claimed that there were no benefits may not have done so because of ignorance, necessarily. The negative attitudes they hold towards the conservation authorities may have contributed. This attitude may be a function of the current conservation benefits failing to make good economic sense to communities. Very often these benefits are too minimal to offset the conservation-induced costs and are seldom realized at the household level. Comparison of the costs and benefits of wildlife conservation in western Serengeti showed that the ratio of costs to benefits was 250:1 [51]. When an author wondered why support for construction of a classroom by Serengeti National Park (SENAPA) was not a benefit, a respondent in Tamau, who claimed that there was no benefit, argued that he would thank the Lord if SENAPA would take its classroom and leave him free from problems inflicted by wildlife. The fact of this negative attitude, and therefore the lack of appreciation of the benefits of conservation, is supported by a growing research-based literature. People experiencing higher costs and minimal benefits from conservation hold negative attitudes towards conservation (see e.g., 52, 53, 54); it is not surprising they view conservation as a total loss. This is a serious impediment to realizing meaningful co-management. Emerton (55) puts this concisely as she remarks: "If there is no domestic economic gain associated with wildlife, then there will be insufficient arguments as well as insufficient local incentives either for conserving it or for communities becoming involved in conservation activities."

Despite a high degree of awareness about reasons for wildlife conservation, there was a high level of ignorance on legal aspects of conservation. Only a few respondents (28.3%) were able to make a clear distinction between the wildlife protected-area categories (viz., National Parks, Game Reserves, and Game-Controlled Areas) in terms of functions and regulations. This small proportion was made up of employees or ex-employees of government/conservation authorities and villagers who happened to serve on the village conservation committees. Failure of the average village member to differentiate the management categories of protected areas and the mandates of different government bodies is not surprising. The problem extends to senior government bureaucrats. One of the park wardens cited an example of a District Commissioner (DC) who wrote a letter urging the Chief Park Warden (CPW) for SENAPA to degazette a part of Grumeti Game Reserve in order to provide villagers with grazing land and water for their livestock. One would have expected that the DC, in her capacity, would have known that the National Park and Game Reserves are under different management regimes. Furthermore, failure of the DC to understand the simple fact that the mandate of gazetting and degazetting the protected areas lies with the parliament and not CPW is even more surprising. This situation may be an indication that the wildlife conservation authorities put much emphasis on sensitizing the stakeholders to the economic importance of wildlife, while overlooking other equally important aspects such as ecological interdependence and functions, legal mandates, different categories of protected areas, regulations and rules that govern wildlife resources. This may be a hindrance in realizing successful co-management arrangements. Experience from the Kelka Forest Lands in Mali showed that giving information to stakeholders on boundaries, regulations, and rules governing resource management, and enforcing them without discrimination, had made an immense contribution to realizing effective enforcement of regulations [56].

*Traditional institutions: types, performance, reasons for poor performance, and suggested interventions*

The presence of local-level institutions that can regulate access and use-rights to resources in time and place is essential in enhancing co-management arrangements. Through these institutions, specific habitats (sacred groves) and wildlife species (totemic species) are accorded protection. Strong religious beliefs and social conventions are used to enforce rules and regulations enacted to ensure their effective protection [14, 57, 58, 59].

The villages in this study have different situations regarding the existence and effectiveness of traditional institutions. In Tamau and Robanda these institutions exist, though their performance in conservation is not very impressive. In addition to mixed cultural values, the communities advanced other compelling reasons—modernization, government interventions, and lack of cooperation among community members. This understanding is crucial in adopting co-management approaches. Working with communities who can comprehend their problems and causes can ease the development of a common and acceptable solution.

The low cultural dilution effect appears to be the most plausible factor favoring the existence of traditional institutions in Robanda and Tamau. In Robanda, about 95% of the people belong to Ikoma tribe [45]. In Tamau village, three of its four zones are occupied by one dominant tribe (Sukuma, Kurya or Luo). The fourth zone is inhabited by a mixture of tribes. Low cultural dilution enhances *social cohesion* among the villagers. Cohesion refers to a sense of common identity and interest which serves to bring people together. It arises from a shared history and culture and acts as social glue which persuades people, in spite of their differences, to act collectively to enhance mutual interest [60]. The low cultural dilution effect can, therefore, reduce the impacts of other factors undermining traditional institutions such as modernization, government interventions, and inadequate cooperation among the communities.

The high cultural dilution effect and, most likely, low social cohesion, is more obvious in Mugeta and Nyiberekera. Their populations are made up of multi-ethnic groups with no single dominant tribe. This situation is an outcome of immigration trends and the villagization policy of the 1970s. The SRCP [61] study on immigration trends to the villages between 1940 and 1997 indicated that about 78% of immigrants to the villages were from the Bunda and Serengeti districts and the rest from outside the two districts, such as Tarime, Maswa, Bariadi, Magu, and even Kenya (Fig 1). Although it was unsuccessful, the villagization policy concentrated people of different ethnic and cultural background together in small villages with the ambition of easing the process of providing them with social services. The ethnic heterogeneity and, therefore, the high cultural dilution effect precludes the possibility of having strong traditional institutions in place. This may hinder or delay the implementation of co-management approaches. In the Kunene region of Namibia, the ethnic issue was cited as one of the major constraints that delayed endorsement of the Bersig/De Riet application for the formation of a conservancy (15).

Despite the poor performance of traditional institutions (as attributed to the factors in Table 4), their presence can be a vital force in realizing effective co-management approaches. Informal talks with key informants (who consist of the tribal elders) and focus group discussions revealed that resource management was not new to local communities and that there was willingness to collaborate with state agencies in conservation. According to elders of the Ikoma and Kurya tribes, the existing traditional institutions have potential to overcome conservation problems such as poaching if legally empowered. They mentioned fines and forcing wrongdoers to take an oath known as "*Kihore*" as possible ways of overcoming these problems. Taking *Kihore* is one of the most feared measures, as it is believed that a culprit taking it may either die or suffer from insanity and from diseases [14].

Historically, the traditional institutions in western Serengeti functioned properly to ensure sustainable use and management of natural resources before this conservation role was interfered with, weakened, or terminated by the colonial government through imposition of new management systems. The wisdom of having traditional institutions back and performing impressively in conservation, as they previously did, is derived from the fact that they still

command special respect among the societies. Their role in regulating the culture, behaviors, and traditional values and norms of the society, including reforming socially unacceptable behaviors such as theft, adultery, witchcraft, disobedience, and other social vices, is still credible (14).

One of the important institutions found in western Serengeti is age-based hierarchy. The elders are highly respected and are regarded as a source of wisdom. A young person is obliged to obey the senior members of the society and comply with whatever decisions they make for the good of the society. The elders' council called *Ritongo* is a good example of age-hierarchy institutions that play a crucial role in overseeing and enforcing the tribal rules/regulations or taboos among the Ikoma and Kurya tribes. Some of these rules/regulations target the management of natural resources, although they are not as effective as they used to be during the pre-colonial era (see Appendix 1). The functioning and mode of operation of *Ritongo* is through the use of the traditional aspects of the invisible world. The strongly held beliefs by the Ikoma tribe that breach of particular taboos or rules could lead to bad omens (called "*Aring'a*") has popularized *Ritongo* as a strong traditional institution. "*Aring'a*" may entail disease outbreaks, insanity, deaths, severe droughts, pests, and loss of livestock [14]. *Ritongo* acts as a supreme court and has a final say in all tribal matters. This situation, where age can be considered as an opportunity for achieving co-management, is contrary to what has transpired in some other parts of the world. For example, in the Kunene Region of Namibia, differing interests between the young and older people fomented conflicts and therefore delayed establishment of conservancies [15].

Similar to *Ritongo* are traditional healers and special groups (i.e., members of the society who have excelled in traditional knowledge). Examples are: *Abhachama/Abhazama* (for the Issenye/Ikizu tribe), *Abhalokingi* (Natta) and *Abhagamunyari* (Sizaki) [45]. Social acceptability and the respect accorded to *Ritongo* and these special groups provide an impression that their conservation role can be revived and therefore serve as an important entry point to co-management arrangements. Jones (15) contends that strong and respected leadership and the localized system of justice are key factors for achieving successful co-management arrangements.

If the causal factors for the poor performance of traditional institutions and the suggested interventions (Fig. 3) are simultaneously and carefully analyzed, one may pick practical realities out of them. For instance, it is interesting to see typical villagers viewing legislation and government in general as an obstacle to their traditional management systems and at the same time believing that the situation is far beyond the control of their traditional institutions alone; hence, seeking cooperation with government legal systems may arrest the escalating problems of mismanagement of natural resources.

#### *Natural resources ownership: types and reasons for and against each type*

Ownership or resource tenure is a key aspect of co-management. Without ownership or tenure a resource becomes prone to interference and this may complicate its management [6]. In this study, the villages differ in their preference for the types of ownership of natural resources. This is not surprising given the differences of the villages in terms of perceptions on general governance and government accountability, cultural diversity, and past experience with the performance of different interventions. Respondents in all studied villages, except Robanda, do not perceive their village governments as representative of their interests and able to work for the collective benefit of the communities. Their opposition is based on the fear that the village government leaders can monopolize the benefits derived from the resources. This perceived fear may be authentic, based on the type of leadership in the villages. The tendency of leaders and local elites to monopolize the benefits of co-management is not uncommon. Experience from Brazil, Bolivia, Cameroon, India, Indonesia, Mali, Nicaragua, Mexico, Senegal, Uganda, and Zimbabwe shows that the benefits of decentralization efforts were often captured by local elites for their own use [16].

Opponents of ownership by village government also suspected loopholes for local government officials to realize their own interests, and about which the opponents can do nothing. They also felt that the weak democracy they had could hardly provide adequate public pressure for village and district governments to observe accountability and transparency on several issues. This is epitomized by the collapse of numerous village projects such as community shops, milling machines, etc. [45]. The study of communities around the Selous Game Reserve in Southern Tanzania also revealed that misuse of their authority by village leaders hampers the potential for realizing the benefits associated with the co-management approach [52]

The outstanding preference for ownership based on village government by the majority of Robanda villagers can mainly be attributed to the credibility that the village government commands among its members. This credibility is likely to emanate from the high degree of public participation in most of the decisions as compared to the other studied villages. Participation is one of the key cornerstones of good governance [62]. This being the case, the lesson that can be drawn from this study is that the type of governance at village level is a critical factor that may influence acceptability or rejection of conservation initiatives. Dahal's work on Nepal's community forest indicated that poor governance was a major reason for the unsatisfactory performance of co-management [19].

Good governance, and therefore the high credibility and confidence that villagers in Robanda accord to their village government, may in a way be enhanced by cultural homogeneity and low human population—factors absent or inadequate in other study villages. As observed earlier, Robanda has a low cultural dilution effect with about 95% of its tribes composed of Ikoma people (Table 2)—a situation that enhances social cohesion among its members. By having a single dominant tribe, it becomes more practical for villagers to comply with traditional rules and norms such as respecting the age hierarchy and adopting the government decisions that have the blessing of the elders. In most cases, the village governments consist of elders as members of different committees. The village government leaders, on the other hand, are compelled to observe the codes of leadership because their positions depend greatly on their understanding and observance of the culture and norms of the tribe. Low human population can be another contributing factor in boosting the local support for Robanda village government. The scholars of common property resource management institutions recommend relatively small groups of individuals in order to ensure easier decision-making, transparency, and accountability (63, 64).

Although ownership of natural resources by village governments can be considered as one option for implementing co-management arrangements, this may not always be the case. Experience from Cameroon, Indonesia, and Uganda has indicated that transferring ownership and use-rights to local bodies has resulted in overexploitation of timber, primarily because of the need for income for local governments and local people [16]. Therefore, precautions should be taken in adopting the co-management approach. Effective rules that will discourage unsustainable use of natural resources should be in place.

The increasing desire for ownership based on groups, shown in this study, is likely to be influenced by the on-going agricultural projects funded by the International Fund for Agricultural Development (IFAD). The approach of these projects insists on group ownership of the project facilities, such as dipping facilities to reduce parasites on livestock, etc. [45]. The projects normally start after group members have contributed their part as agreed during the project planning process. Those favoring the private type of ownership are either inspired by the current policy changes towards privatization or are tired of the previous failures encountered by collective ownership and therefore are eager to test other alternatives.

The major deficiency of projects targeting the groups or individuals is their exclusive nature. Experience from the Selous Game Reserves in Tanzania indicated that poor villagers and other disadvantaged groups were excluded in accessing benefits that were targeted for groups or individuals [17]. For instance, in order to secure support to start a project (e.g., poultry, milling machine, sewing machine, and carpentry) individuals were required to raise 50% of the cost of a project. Therefore, the few people who could raise this were supported, sometimes for more

than one project. In many such cases, beneficiaries were not even villagers but government employees or priests who could be transferred at any time, thus taking with them the services intended for the communities [17].

### **Implications for conservation**

Co-management has increasingly been appreciated globally as a strong incentive for conservation and therefore a remedy for numerous conservation problems. The need to adopt this approach in different conservation areas creates an urgency to capitalize on potentials existing in the areas in order to maximize chances of success. This study has attempted to analyze three factors existing in Serengeti which can be used as an entry point to co-management arrangements. These factors are: awareness of the rationale and legal aspects of wildlife conservation; traditional institutions; and different options for resource ownership. Differing situations in terms of experience, ethnography, and geography between the study villages have resulted in different views, preferences, and suggestions regarding different aspects of conservation. Based on perceptions of local people, the following general recommendations are made:

1. The high level of awareness makes all four villages suited for co-management arrangements. However, awareness alone is insufficient. Some efforts are required to change the attitude of the people who do not appreciate the current benefits from conservation since they are too minimal to offset the wildlife-induced costs. The benefits and costs of conservation should be balanced.
2. Along with awareness of the rationale and other aspects of conservation, there is a need to promote awareness of policy and legal aspects among the local communities. Co-management will hardly succeed if one of the key players is ignorant of the legal systems, including management regimes, for different areas, and of the mandates of different authorities
3. Traditional institutions have a potential to contribute to the success of co-management arrangements. However, the fact that most such arrangements are no longer robust or do not exist prompts the need to revive and strengthen them by giving them the full recognition and necessary support that will promote their performance. The causes of poor performance by these institutions (as identified by the communities) should be used as starting points in strengthening these institutions.
4. If village government ownership is opted for, sensitization of the government bureaucrats on the importance of co-management arrangements and a clear definition of their roles are crucial, in order to head off any interference that may frustrate the proper operations of co-management.
5. Principles of good governance should be accorded high priority as a condition for realizing successful co-management approaches. The credibility of and confidence toward the leadership promotes co-management
6. The tendency of village leaders and local elites to monopolize the benefits under village government ownership is common in many places. This should be regarded as a possible "risk" before adoption of a co-management approach. Ways of minimizing this risk should be developed in advance where village ownership is opted for.
7. Where group or private ownership is appropriate, it is important to devise a mechanism to ensure that majority of the people and of vulnerable groups will not be left out. Leaving out these groups may compromise the objectives of co-management.
8. While transfer of ownership and use-rights to the local level is a key aspect in co-management arrangements, precautions must be taken to avoid unsustainable use of the resources as experienced in many parts of the world. The principle that "while rights confer

authority, they also confer responsibility" and that when the two are delinked both are eroded [60] should apply

9. Local people's choices of the types of resource ownership should be observed in establishing or implementing co-management approaches. An imposed type of ownership may weaken the co-management approach, reduce the level of trust within the community, and intensify rather than reduce conflicts. Any good reasons on why local people's options should not be honored should be communicated to them along with strategies to rectify the flaws that make the proposed types unpopular. The best way is for key stakeholders to make a joint analysis and decisions on different types of ownership.

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**Appendix 1:** Laws and rules that ensured rational use of resources among the Kurya and Ikoma tribes of Western Serengeti. Source: [14]

1. Hunting was limited to meat for household use only; Accumulation or storage for future was considered to be morally wrong.
2. Taboos ('*emeghilo*') restricted people from killing an animal before finishing the previous hunt
3. All members of the community shared the meat ('*okomussa*'). This kept the number of hunters in the society minimal
4. Hunting or touching an animal revered (sacred) to a particular clan ('*oghusengera*') was prohibited (examples of these animals are provided in appendix 2)
5. Taboos restricted killing or hunting an animal found at a water catchment area
6. Hunting was prohibited for an animal found giving birth
7. When found fighting, only one animal was allowed to be killed
8. Friendly non-edible wild animals were protected through taboos ('*emeghilo*')
9. Hunting was mostly targeted to adult and male animals
10. Killing of young, pregnant or lactating animals was prohibited. When such an animal happened to be trapped they were set free
11. Some animals such as eland could not be hunted unless permission was obtained from the tribal chiefs
12. Hunting of certain species (e.g. eland, gazelles and impala) were limited to specific seasons only to enhance breeding performance
13. A wounded animal was followed until it was found
14. A belief that a person who kills animals indiscriminately will remain poor as he will never own livestock
15. A bushmeat can not be used in functions such as weddings, rituals and by mothering women
16. Abandoned young animals who lost their mothers were taken home to a lactating goat or cow
17. An animal that sought a refuge in a homestead could not be killed
18. Different clans have different preferences for bushmeat e.g. *abarumarancha* and *abasaye* (eland), *abakigwe* (zebra) and *abangirate* (fish). This reduced competition and therefore probably fostered sustainability of the resource
19. Medicinal and fruit trees were protected
20. Setting fires was a serious crime that amounted to heavy penalties invoked by the elders
21. Firewood for cooking and heating was limited to dead trees only
22. Most of the forests were sacred and nobody was allowed to enter and harvest any resource
23. Tree species were allocated specific use(s) depending on availability, durability and workability

**Appendix 2:** Examples of totemic species revered by different clans of Ikoma and Natta tribes of Western Serengeti, Tanzania. Source: [14].

<i>Clan (k=Ikoma, n=Natta)</i>	<i>Totemic species</i>	<i>Scientific name</i>
Some Abhaghetika (k) & abasaye	Spotted hyena	<i>Crocuta crocuta</i>
Abasaye (Abamwamncha) (n)	Leopard	<i>Panthera pardus</i>
Abharanche (k)	Lion	<i>Panthera leo</i>
Wahikumari (k)	Green mamba	<i>Dendroaspis angusticeps</i>
Some Abhaghetika (k)	Puff adder	<i>Bitis arietans</i>
Abasaye (n)	Leopard tortoise	<i>Geochelone pardalis</i>
All natta and ikoma	Bush buck	<i>Tragelaphus scriptus</i>
All ikoma	Elephant	<i>Loxodonta Africana</i>
Some Abhaghetika (k)	Ostrich	<i>Struthio camelus</i>
Abhahimurumbe	Cobra	<i>Naja haje</i>