# Why keep lions instead of livestock? Assessing wildlife tourism-based payment for ecosystem services involving herders in the Maasai Mara, Kenya

Philip M. Osano, Mohammed Y. Said, Jan de Leeuw, Nicholas Ndiwa, Dickson Kaelo, Sarah Schomers, Regina Birner and Joseph O. Ogutu

## Abstract

*This paper examines the effects of wildlife tourism-based payments for ecosystem services (PES) on poverty, wealth inequality and the livelihoods of herders in the Maasai Mara Ecosystem in south-western Kenya. It uses the case of Olare Orok Conservancy PES programme in which pastoral landowners have agreed to voluntary resettlement and exclusion of livestock grazing from their sub-divided lands. These lands are set aside for wildlife tourism, in return for direct monetary payments by a coalition of five commercial tourism operators. Results show that, on the positive side, PES is the most equitable income source that promotes income diversification and buffers households from the livestock income declines during periods of severe drought, such as in 2008-2009. Without accounting for the opportunity costs, the magnitude of the PES cash transfer to households is, on average, sufficient to close the poverty gap. The co-benefits of PES implementation include the creation of employment opportunities in the conservancy and provision of social services. There is however a need to mitigate the negative effects of PES, including the widening inequality in income between PES and non-PES households and the leakages resulting from the displacement of settlements and livestock to currently un-subdivided pastoral commons.*

*Keywords*:  Wildlife tourism; payments for ecosystem services; poverty; pastoral livelihoods; Maasai Mara; Kenya.

## 1. Introduction

Worldwide, one of the fastest growing tourism sub-sectors is nature-based tourism (Balmford *et al*., 2009), a significant component of which is wildlife tourism; this is "tourism based on encounters with non-domesticated (non-human) animals, which can occur in either the animal's natural environment or in captivity" (Higginbottom, 2004:2).[1] Across Eastern and Southern Africa, wildlife tourism is a core product of the tourism industry and contributes significantly to national economies by providing millions of jobs (Christie and Crompton, 2001). Although traditionally highly dependent on protected areas, wildlife tourism is now rapidly expanding on private and communal lands outside protected areas (Carter *et al*., 2008); some commercial tourism enterprises are incorporating payments for ecosystem services (PES) as an incentive or reward for landowners' provision of ecosystem services that support wildlife tourism (Greiner *et al*., 2009; Goldstein *et al*., 2011). PES has been defined as "(1) a voluntary transaction in which (2) a well-defined environmental service (or land use likely to generate that service) (3) is 'bought' by a (minimum of one) buyer (4) from a (minimum of one)

Philip M. Osano is at McGill University, Department of Geography, Montreal, Canada. E-mail: philip.osano@mail.mcgill.ca, posano@gmail.com

Mohammed Y. Said, Jan de Leeuw and Nicholas Ndiwa are at the International Livestock Research Institute, Nairobi, Kenya. E-mails: m.said@cgiar.org, j.leeuw@cgiar.org and n.ndiwa@cgiar.org

Dickson Kaelo is with the Basecamp Foundation, Nairobi, Kenya. E-mail: olekaelo@yahoo.com

Sarah Schomers is at Leibniz-Center for Agricultural Landscape Research, Munchenberg, Germany. E-mail: sarah.schomers@zalf.de

Regina Birner and Joseph O. Ogutu are at the University of Hohenheim, Stuttgart, Germany. E-mails: regina.birner@uni-hohenheim.de and jogutu2007@gmail.com

[1] Wildlife tourism includes non-consumptive utilization such as wildlife viewing, photography and feeding, as well as activities that involve killing or capturing animals such as hunting in terrestrial environments and recreational fishing in aquatic environments (Higginbottom, 2004:2).

provider (5) if and only if the provider continuously secures the provision of the service (conditionality)" (Wunder, 2005:3).

Despite the proliferation of PES schemes run by funds generated from tourism (Pagiola, 2008; Clements *et al.*, 2009; Ritsma *et al.*, 2010), the literature on the linkages between PES and tourism remains thin (de Groot, 2011). PES that support wildlife tourism are common around protected areas where local communities are paid by tourism operators to protect or refrain from harming wildlife and to maintain land uses and geographic features that appeal to tourists (Frost and Bond, 2008; Nelson *et al.*, 2010).

Tourism is projected to be the sector offering the greatest wildlife-related economic growth opportunities in Africa (Ashley and Elliot, 2003) but in Kenya, there is scant evidence of a substantial contribution of wildlife-based tourism to economic development and poverty reduction, particularly in pastoral areas (Manyara and Jones, 2007; Sindiga, 1995; Homewood, 2009). Furthermore, wildlife tourism is promoted as a strategy for community-based wildlife conservation (Ashley and Roe, 1998) but there is little evidence that it has contributed to wildlife conservation in a meaningful way (Kiss, 2004). In Kenya, wildlife protected areas with a high rate of tourism visitation and high revenues show high levels of poverty in neighbouring pastoral communities (Okello *et al.*, 2009; Homewood *et al.*, 2009) and, in adjacent areas, significant habitat degradation and a large decrease in the wildlife population (Western *et al.*, 2009).

It is argued that the benefits of wildlife tourism to pastoral communities are limited because of the low and uncompetitive wildlife returns that result from the combination of policy, institutional and market failures (Norton-Griffiths and Said, 2010). In particular, the market failures concerning the provision of wildlife goods and services are a result of the diversion of a major portion of revenues generated from wildlife away from the producers of wildlife (pastoral landowners) to the service side of the industry (Norton-Griffiths and Said, 2010).

## 2. The Maasai Mara ecosystem

The Maasai Mara ecosystem (MME) covers an area of 6,500 km$^2$ and includes the Maasai Mara National Reserve (1,530 km$^2$, hereafter the Mara Reserve) and the private and communal lands adjoining the Mara Reserve to the North and East. The private and communal lands comprise three categories of land use types: private wildlife conservation areas within conservancies (820 km$^2$); communal pastoral grazing areas (2,420 km$^2$) and a mixed pastoral and agricultural area (622 km$^2$). The MME has the highest wildlife density in Kenya, with the Mara Reserve alone estimated to account for 25% of Kenya's wildlife population (Western *et al.*, 2009) making the MME a

critical part of Kenya's wildlife tourism industry (World Bank, 2011).

Currently, the sustainability of wildlife and tourism in the MME is threatened by a combination of different factors (Ministry of Tourism, 2009). These include: the land use changes especially the expansion of both large-scale, mechanized and small-scale agriculture (Norton-Griffiths, 1996; Homewood *et al.*, 2001; Serneels *et al.*, 2001); human population growth and expansion of settlements (Lamprey and Reid, 2004); and the ongoing privatization and sub-division of pastoral rangelands from large parcels under collective tenure to small parcels under individual and corporate tenure, driven mainly by the desire of landholders to secure legal title and user rights to land (Galaty, 1994). Consequently, the entire MME is listed in the Fourth Schedule of the 2011 Draft Wildlife Bill, as a *Critically Endangered Ecosystem*, a conservation category that is reserved for ecosystems and habitats that are considered to be facing the highest levels of threats (Republic of Kenya, 2011).

Although wildlife tourism in the MME accounts for over 18% of all annual tourist visits to Kenya and the Mara Reserve is one of the highest-earning protected areas in Kenya — with a total revenue worth KES 2.25 billion (US$ 27 million[2]) in 2009 (NCC & TCC, 2009) — the majority of pastoral landholders living adjacent to the Mara Reserve have so far reaped little financial benefit from this thriving wildlife tourism industry (Norton-Griffiths *et al.*, 2008). The poverty levels in the MME are high, with an estimated poverty rate of 63% and a poverty gap of 20% within the 25 km buffer of the Mara Reserve (Central Bureau of Statistics, 2005). Yet it is the majority of the poor pastoralists that bear the direct costs and risks of the wildlife presence outside the Mara Reserve, in terms of livestock predation, human deaths and injury, and competition for pasture and water resources (Norton-Griffiths *et al.*, 2008).

The lack of a transparent tourism revenue sharing mechanism for both the Mara Reserve and the tourism facilities outside of it is a key reason why the majority of landowners in the MME have so far gained little from wildlife tourism (Thompson and Homewood, 2002). Before the land sub-division in the MME began in the late 1990s, the largest share of revenue from the tourism facilities outside of the Mara Reserve mainly accrued to the service providers in the tourism industry; the small proportion that accrued to the local landholders was differentially distributed among households (Thompson and Homewood, 2002; Honey, 2009). Much of the revenue allocated to landowners was also pegged on the bed-night fees, which fluctuated highly between the low and peak tourist seasons (Thompson *et al.*, 2009).

Following land sub-division and the allocation of individual land titles to members of the former Koyake

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[2] Based on the exchange rate of US$ 1 = KES 83 in 2009.

Group Ranch, some commercial tourism operators, together with the Maasai land owners, developed new forms of institutional arrangements in the form of conservancies. These would support the continuation of wildlife tourism outside the Mara Reserve under a privatized and individuated land tenure for their mutual benefit (Sorlie, 2008). As in most pastoral areas, the process of land sub-division in the MME region and the wider Narok County is driven by supportive government policies that promote rangeland privatization and the failure and mismanagement of the Group Ranch system. This thus prompts individual members to press for the sub-division of lands so as to gain individual security of land tenure and advance their livelihoods on their own land (Galaty, 1992; Mwangi, 2007a).

In the existing conservancies in the MME, the Maasai landowners have amalgamated adjacent individual plots in order to create large viable game viewing areas; they then broker land lease agreements with a coalition of commercial tourism operators under institutional arrangements modeled in the form of payments for ecosystem services (PES). Starting in 2006 with only two conservancies, Olare Orok and Ol Kinyei, with a combined land area of 14,576 ha, by 2010, there were eight conservancies in the MME, with a combined area of close to 100,000 ha.

Despite the rapid increase in the number of conservancies and the associated PES schemes in the MME over the last few years, no evaluation has been conducted to assess if and to what extent these new post land sub-division institutional arrangements involving pastoral landowners and commercial tourism operators are of benefit to the Maasai landowners. To contribute towards filling this knowledge gap, this paper provides an assessment of the PES scheme in operation in the Olare Orok Conservancy (OOC). It addresses the following three questions: (1) what is the conditionality in the OOC PES programme?; (2) what is the level of poverty and wealth inequality among households in the MME?; and (3) what are the effects of the PES programme in the OOC on poverty, inequality, income and expenditure? The remainder of the paper is organized as follows. Section 2 is the methods; Sections 3 and 4 present the results and discussion, respectively, whereas Section 5 is the conclusion.

## 3. Methods

### 3.1. The Olare Orok Conservancy

This study was undertaken in the MME, which includes the OOC, an area that borders the Mara Reserve to the north and is characterized by open grassland and acacia woodland savannah that contain resident and seasonal migratory wildlife. In the OOC, the Maasai landowners are paid to voluntarily relocate their settlements and exclude livestock

grazing inside the Conservancy, which is exclusively reserved for high-end wildlife tourism. The OOC therefore represents a specific situation where a consortium of private tourism operators pay pastoral landowners directly for biodiversity conservation in an ecosystem that is of high touristic value because of the beauty of the landscape and the presence of charismatic wildlife species that support their tourism business.

The OOC covers an area of 10,040 ha and was established in May 2006, following the sub-division of the former Koyake Group Ranch in the early 2000s, as a partnership between 157 landowners and four tourism operators, initially. The land occupied by the OOC is currently under private tenure, consisting of individually owned freehold plots. The OOC operates a business model where the tourism operators guarantee landowners a fixed annual land lease fee which is paid directly to individual member households regardless of the number of tourists visiting the camps within the OOC. The land lease rates are therefore fixed, irrespective of whether tourists visit the Conservancy or not. This is a departure from earlier arrangements where payments were based on the bed-night fees and were remitted to land owners through communal institutions rather than directly to households.

Enrolment in the OOC is confined to the households owning land in the Olare Orok area. Once enrolled, these landowners are required to move their settlements out of the Conservancy land and to adhere to a controlled livestock grazing plan that involves group grazing. The initial payment rates in 2006 were pegged at KES 2,500/ha/yr (US\$ 33/ha/yr). This was revised in 2009 to KES 3,000/ha/yr (US\$ 36/ha/yr) and in 2011 to KES 3,750/ha/yr (US\$ 41/ha/yr) following negotiations between the landowners and the tourism partners.[3]

Assessed through a PES lens, the ecosystem service providers in the OOC are the landowners in the Olare Orok area and the ecosystem service buyers are the five commercial tourism operators that have leased land for tourism purposes. These operators include the Porini Lion Camp, Kicheche Bush Camp, Mara Plains Camp, Olare Camp, and Virgin Camp.

The OOC PES scheme has two intermediaries, OOC Ltd, which is a landowners shareholding company, and Ol Purkel Ltd, which is a not-for-profit company owned by the five tourism operators that are currently involved in the OOC. Founded in 2007, Ol Purkel Ltd had 22 employees and an operating budget of KES 54.5 million (US\$ 636,167) as at 2011. The operating costs of both companies are financed by the five tourist camp operators that also contribute to a fund for landowner's payments based on their respective bed shares in the OOC.

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[3] Exchange rate of KES 1 = US\$ 0.013; 0.012 and 0.010 in 2006, 2009 and 2011, respectively (www.oanda.com).
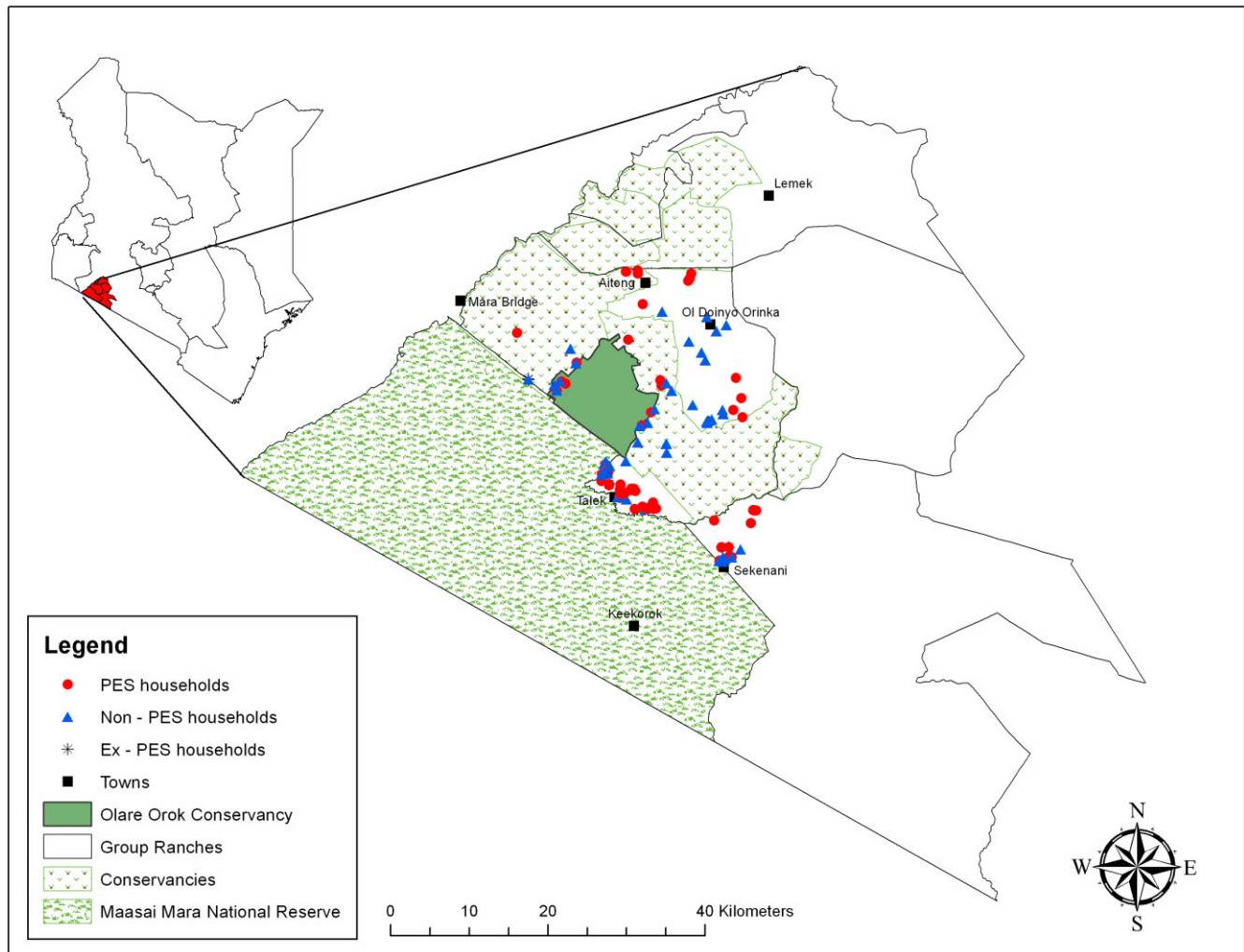
**Figure 1.** Map of the Maasai Mara Ecosystem (MME) showing the surveyed households, the Olare Orok Conservancy, the Maasai Mara National Reserve and other Conservancies.

*Note*: PES households = households enrolled in the Olare Orok Conservancy (OOC); Non-PES households = households not enrolled in OOC; Ex-PES households = households that dropped from OOC.

*Source*: First author's survey data and ILRI.

## 3.2. Data collection

We obtained our primary data from multiple sources: (1) a survey carried out from November 2009 to January 2010 of 131 households in the MME. This included 73 households enrolled in the OOC (46% of total conservancy members) and 58 outside the OOC (Figure 1). The households were selected by stratified random sampling with the sampling frame for the OOC households taken from a list of households enrolled in the OOC and the non-OOC households were chosen from a total list of household heads provided by key informants. The household survey included a recording of the global positioning system (GPS) points for all the surveyed households, and these were used to generate the spatial variables for our analysis; (2) semi-structured and informal interviews with landowners, officials of Ol Purkel Ltd, community members and

key informants; (3) focus groups with representatives of tourism operators; and (4) a workshop bringing together landowners, conservancy managers, policymakers, conservation practitioners and researchers.

We gathered secondary data from: (1) published and grey literature; (2) institutional databases provided by Ol Purkel Ltd and the International Livestock Research Institute (ILRI). The Ol Purkel Ltd database contained information on OOC enrolment, land ownership, livestock incursions within the OOC and the land lease contracts. The ILRI database contained geo-spatial data on land cover and land use in the MME.

## 3.3. Data analysis

We analyzed the survey data in SPSS and SAS and conducted geo-spatial analysis in ArcGIS 9.3 (ESRI,

Redlands, CA). Our final sample included a total of 118 households after we excluded 13 households from our quantitative analysis, including six that reported having dropped from OOC at the time of the survey and another seven that were not enrolled in OOC but were enrolled in a separate PES scheme in the Mara North Conservancy.

### 3.3.1. PES conditionality

We analyzed the record of livestock incursion in the OOC, as well as reproduced and extended an earlier settlement map for the MME (Lamprey and Reid, 2004) to assess the settlement patterns for eight different years between 1959 and 2012. The settlement map shows temporary livestock camps recorded through aerial photography in 1959, 1961, 1967 and 1974, and semi-permanent "bomas" recorded in 1961, 1967, 1974, 1983, 1999, 2005 and 2012.

### 3.3.2. Poverty and inequality assessments

We first compared the differences between the OOC and non-OOC households using the standardized *t*-test and chi-square test. Thereafter, we assessed household poverty and wealth inequality based on the cash income and livestock owned, and then used different combinations of these two variables to establish four livelihood groups. We calculated income poverty by dividing the gross household cash income by the household size expressed in terms of adult equivalent (AE)[4] to obtain the annual per capita gross cash income which we converted to monthly income in tandem with the official Kenyan poverty line. We then classified all households with a cash income equal to, or below, the monthly Kenyan rural poverty line of KES 1,562/AE as cash poor, and the remaining as non-poor.[5]

We established the livestock poverty by calculating the per capita (AE) livestock ownership in tropical livestock units (TLU) (Grandin, 1988),[6] and considered households with livestock equal to or less than 4.5 TLU/AE as livestock-poor. We chose the threshold of 4.5 TLU/AE because it is considered as the level below which a pastoral household is at risk of falling into a "poverty trap" (Lybbert *et al.*, 2004).

We then determined the distribution of households by wealth and poverty status by plotting a graph of income versus livestock holdings for 2008 and 2009, distinguishing OOC from non-OOC households. Using the data for 2008,

we stratified households into four livelihood groups by separating households with livestock herd size and cash income above and below the median. The non-poor or the wealthy group (designated **W**) consists of households with above median income and livestock holdings and the poor group (designated **P**) comprises households with below median cash income and livestock holdings. A third group (designated M1 and M2) formed a middle group. The M1 sub-group consisted of households with above median livestock holding but below median cash income, while the M2 sub-group consisted of households with below median livestock holdings but above median cash income. In this livelihood categorization, the households within the P group represent the most vulnerable pastoral households that are likely to fall into a "poverty trap" with limited potential to escape (McPeak *et al.*, 2012).

To assess wealth inequality, we first calculated the Gini index for cash income (2009), livestock (cattle, goats and sheep) and land ownership (Araar and Duclos, 2009), and then tested for the differences in the Gini coefficient between the OOC and non-OOC households, using standard error estimates (Russell, 2009). We also compared the coefficient of variation (CV) for the different sources of household cash income by dividing the standard deviation by the mean, and expressing the ratio as a percentage.

### 3.3.3. The effects of PES on cash income and expenditure

We estimated the magnitude of PES transfers to households in proportion to the poverty gap, and calculated the share of PES to the total gross household income (Kosoy *et al.*, 2007; Grieg-Gran *et al.*, 2005). During the survey, we asked the OOC household respondents to provide a rough estimate of how much of the money earned from PES in 2009 was spent on food and basic needs (grains, sugar, tea, milk, cloths, etc.); water purchase for domestic use; expenses related to human health; educational expenses (school fees and uniforms, books and pens, etc.); and livestock related expenses including the purchase of livestock, veterinary costs and payments for lease of grazing rights. We then computed the household per capita expenditure for each of the five bundles of goods and services.

## 4. Results

### 4.1. Voluntary transaction

Enrolment in the OOC is voluntary but restricted mainly to the households owning land in the Olare Orok area, which was designated for creation of the OOC. Thus the distribution and allocation of land during the land sub-division process in the Koyake Group Ranch from 1998 to 2004 was a key factor that determined the eligibility for enrolment in the OOC.

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[4] The concept of adult equivalent (AE) is based on differences in human nutrition requirements according to age, where; <4, 5-14 and > 15 years of age are equivalent to 0.24, 0.65 and 1 AE, respectively.

[5] In Kenya, the poverty line of KES 1,562 and KES 2,913 per person per month in rural and urban areas, respectively, is based on the estimated expenditures on minimum provisions of food and non-food items (http://opendata.go.ke/Poverty/District-Poverty-Data-KIHBS-2005 -6/pnvr-waq2).

[6] The tropical livestock unit (TLU) is a composite index used to aggregate livestock species with differing weights. These were derived by multiplying total cattle numbers per household by 0.72 and total small stocks (sheep and goats) by 0.17 (Grandin, 1988).

Out of the 73 OOC households that were surveyed, six reported having dropped from the Conservancy. This represents an annual dropout rate of 3.9% between 2006 and 2010.[7] Since the OOC is one large block of land comprising multiple contiguous plots, household withdrawal from the Conservancy can present a huge challenge in terms of access to parcels located inside the Conservancy; this situation presents a potential source of conflict between the Conservancy management, former members and enrolled landowners.

The OOC land lease contract between the landowners and the consortium of tourism operators signed in 2006 was for two and a half years, and this was renewed in 2009 for another five years. In 2010/2011, a revised 15-year contract covering the period 2010-2025 was offered to the landowners. Although the 15-year contract attracted a 90% acceptance rate by the landowners, some 35 of them did not agree to the 15-year contract option and these 35 individuals were offered the option of a five-year contract, as a result of a series of protracted negotiations that followed between this splinter group of landowners and the consortium of commercial tourism operators.

## 4.2. PES conditionality

The OOC land lease agreement (dated 1 May 2010) developed under the Registered Lands Act (Cap 300) of the Laws of Kenya, states that the OOC land should be used "solely for wildlife conservation purposes and activities ancillary thereto including the operation of a commercial eco-tourism facility". It further includes a provision that the landowner should not "use or permit the Premises of any part thereof to be used to graze livestock save in accordance with a grazing management plan set out by the Tenant" (Raffman Dhanji Elms Virdee Advocates, 2011). In effect, the OOC landowners have to exclude settlements and livestock from the Conservancy land.

As a semi-nomadic community, the Maasai settlements in the MME have historically consisted of temporary livestock camps and semi-permanent houses traditionally referred to as "bomas" (Lamprey and Reid, 2004). Figure 2 shows the temporary livestock camps and bomas recorded in the study area for eight different years between 1950 and 2012. The temporary livestock camps show some of the areas where the Maasai have traditionally grazed their livestock, including parts of the area currently occupied by the OOC and some parts of the Mara Reserve. The temporary livestock camps are only mapped for 1950, 1961, 1967 and 1974 (Figures 2a-d). The semi-permanent/permanent bomas are relatively long term structures and



**Figure 2.** Temporary livestock camps and permanent bomas (settlements) within a portion of the Maasai Mara Ecosystem encompasing the Olare Orok Conservancy.
*Note*: The periods 1950, 1961, 1967, 1974 include temporary livestock camps and bomas and the periods 1983, 1999, 2005 and 2012 include bomas only.
*Source*: ILRI.

these were mapped for all of the eight different years for which data were available (Figures 2a-h).

The progressive increase in the number of bomas in the study area since 1974 (Figure 2d) follows the privatization of land in the MME which started in 1970 with the establishment of group ranches coupled with the increase in human population leading to sedentarization of Maasai families from a formerly semi-nomadic pastoral lifestyle. The OOC successfully enforced the conditionality of settlement exclusion because, by 2012, no Maasai settlements were recorded in the Olare Orok area (Figure 2h).

A partial dataset for the OOC livestock grazing violations shows that between April 2010 and June 2011, some 10 households, half of which are enrolled in the OOC, violated the conservancy livestock grazing rules and were collectively fined KES 150,000 (US$ 1,660).[8] A key informant reported that at the peak of the drought in 2011,

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[7] These households that withdrew had land on the edge of the Conservancy and were lured by rival tourism operators to establish tourist camps but their payments were based on bed-night fees, and the camps collapsed during the 2007-2008 post election violence in Kenya. Some of them later requested to return to the OOC and were accepted.
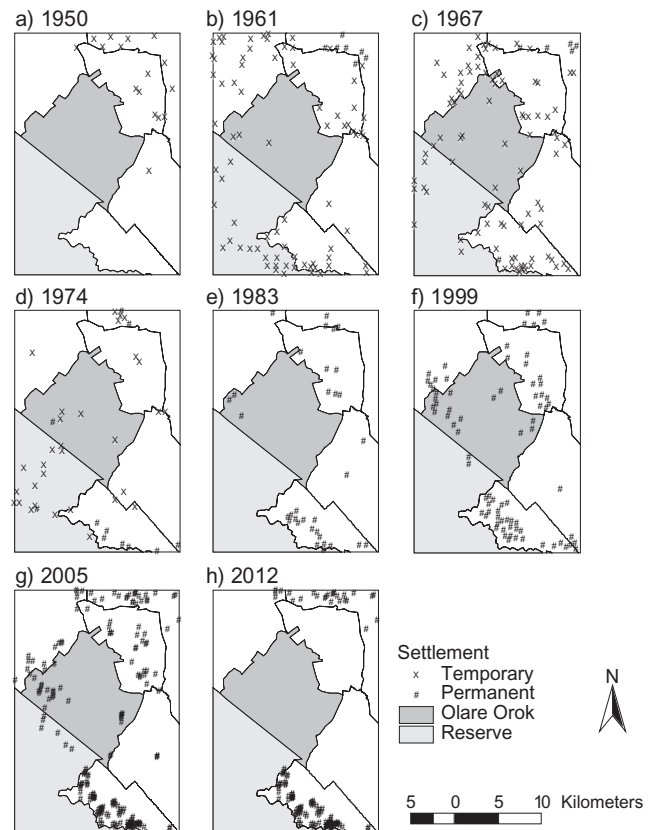
[8] The partial data on grazing violations were obtained from the records kept by Ol Purkel Ltd., which manages the Olare Orok Conservancy.

**Table 1. Summary statistics (mean) for the households surveyed in the Maasai Mara ecosystem**

| | (1)<br>OOC households | (2)<br>Non-OOC households | *t*-statistic<br>(*p*-value) |
|---|---|---|---|
| **Continuous variables** | | | |
| Cattle in 2008 (TLU) | 116.9 (121.1) | 79.3 (79.4) | −1.852 (0.0665)* |
| Cattle in 2009 (TLU) | 109.3 (141.7) | 69.0 (73.7) | −1.7620 (0.0807)* |
| Sheep and goat in 2008 (TLU) | 40.4 (44.4) | 28.1 (26.9) | −1.674 (0.0969)* |
| Sheep and goat in 2009 (TLU) | 40.8 (46.2) | 30.4 (33.2) | −1.316 (0.191) |
| Gross income in 2008 in KES (mean) | 363,741.4 (230,517) | 242,563.3 (189,417.6) | −2.9621 (0.0037)** |
| Gross income in 2009 in KES (mean) | 363,082.5 (298,807.5) | 184,455.6 (210,721.5) | −3.5061 (0.0006)*** |
| Total land owned (ha) | 71.1 (28.2) | 46.0 (34.9) | −4.2743 (0.0000)*** |
| Household size (adult equivalent) | 17.1 (8.6) | 17.6 (11.5) | 0.2711 (0.7868) |
| Child dependency ratio (ratio) | 1.8 (0.9) | 1.5 (0.8) | −1.8868 (0.0617)* |
| **Categorical variables** | | | **Chi-square test (DF)** |
| Educational level (%) | 18 | 38 | 5.86 (0.016)** |
| No. of household in sample (n) | 73 | 45 | |

*Note*: * *p* < 0.1; ** *p* < 0.05; *** *p* < 0.01; standard deviations in parenthesis in columns (1) and (2).
*Source*: First author's survey.

there were an estimated 50 grazing violations per month with more than three-quarters of these violations by non-OOC households.[9] The fine per unauthorized livestock grazing is KES 5,000 (US$ 55.30) per violation irrespective of the number of cattle in a herd. This can be difficult to enforce because some households herd livestock together which allows them to split the costs of the fine imposed per grazing violation. Drought can also increase the pressure by herders to be allowed grazing access inside the Conservancy and this happened in 2009.

### 4.3. Poverty and wealth inequality

Save for the household size and total sheep and goats owned in 2009, the OOC households were significantly different from their non-OOC counterparts in terms of land owned, cash income (in both 2008 and 2009), cattle (again in both 2008 and 2009) and sheep and goat owned in 2008. Significant differences were also recorded in child dependency and in educational levels (Table 1). Overall, the OOC households had more livestock (cattle, sheep and goats), land and higher income than non-OOC households. The exception was education, where the percentage of non-OOC households with some education was significantly higher than that of OOC households. The cash income for OOC households remained relatively stable in 2008 and 2009 whereas for non-OOC households it declined substantially in 2009.

### 4.3.1. Cash and livestock poverty

Close to half of all surveyed households were income poor, with a recorded poverty prevalence difference of 7% between 2009 and 2008 (Table 2). Differences in income

poverty prevalence in 2008 and 2009 were also observed among both the OOC households and non-OOC households. However, the change in the percentage of households falling below the poverty line between 2008 and 2009 was much higher among non-OOC households with a 15% increase compared to only a 3% increase for OOC households (Table 2). This suggests that PES prevented some OOC households from slipping below the rural poverty line.

The overall livestock poverty prevalence across all the surveyed households was generally low (Table 2). Similar to income poverty, livestock poverty prevalence among surveyed households was also higher in 2009 compared to 2008 but there were no distinct differences between the OOC and non-OOC households in terms of the percentage of households falling below the livestock poverty threshold between 2008 and 2009 (Table 2).

Figure 3 shows the distribution of all the surveyed households in the MME into three livelihood groups based on the combination of cash income and livestock holdings in 2008 and 2009, respectively. An analysis of the data underlying Figure 3 shows that in 2008, 35% of all the households surveyed fell in the wealthy group (W) with above median livestock holdings and cash income. Another 34% fell in the poor group (P) with below median livestock holdings and cash income. The remaining one-third (31%) fell in the middle livelihood group consisting of the M1 and M2 sub-groups. The M1 sub-group with above median livestock holding but below median cash income accounted for 15% of all households, and the M2 sub-group with below median livestock holding and above median cash income accounted for 16% (Figure 3). The changes (declines) in both cash income and livestock holdings among all surveyed households between 2008 and 2009 are shown in Figure 3 by the shifts in the median values compared to 2008 (Figure 3).

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[9] Personal communication, Ron Beaton, 13 August 2011.

**Table 2. Income and livestock poverty among OOC and non-OOC households surveyed in Maasai Mara ecosystem, 2008 and 2009**

| | | | 2008 | | | | | | 2009 | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | All HHs | | OOC HHs | | Non-OOC HHs* | | All HHs | | OOC HHs | | Non-OOC HHs* | |
| | | | No | (%) | No | (%) | No | (%) | No | (%) | No | (%) | No | (%) |
| **Income poverty** | Kenya rural poverty line (KES 1,562/AE/month) | Poor households | 60 | (46) | 32 | (44) | 27 | (52) | 70 | (53) | 34 | (47) | 35 | (67) |
| | | Non-poor households | 71 | (54) | 41 | (56) | 25 | (48) | 61 | (47) | 39 | (53) | 17 | (33) |
| | | *Total* | *131* | *(100)* | *73* | *(100)* | *52* | *(100)* | *131* | *(100)* | *73* | *(100)* | *52* | *(100)* |
| **Livestock poverty** | Livestock poverty threshold is 4.5 TLU | Poor households | 46 | (35) | 24 | (33) | 19 | (37) | 52 | (40) | 27 | (37) | 22 | (42) |
| | | Non-poor households | 85 | (65) | 49 | (67) | 33 | (63) | 79 | (60) | 46 | (63) | 30 | (58) |
| | | *Total* | *131* | *(100)* | *73* | *(100)* | *52* | *(100)* | *131* | *(100)* | *73* | *(100)* | *52* | *(100)* |

*Note*: The conversion rates used are US$ 1 = KES 63.20 (June 30, 2008) and US$ 1 = KES 73.98 (30 June, 2009; www.oanda.com); TLU = Tropical livestock unit (TLU); * Excludes six households that were previously enrolled but reported to have dropped out of the OOC.

**Table 3. The Gini index for gross cash income in the MME, including land, cattle, sheep and goat ownership, in 2009**

| | Group | Estimate | SE[1] | 95% LCL[2] | 95% UCL[3] | DIG[4] | P > \|t\| |
|---|---|---|---|---|---|---|---|
| **Gross income in 2009** | Non-OOC households | 0.485 | 0.058 | 0.371 | 0.599 | (1.84) | 0.071** |
| | OOC households | 0.352 | 0.043 | 0.266 | 0.438 | | |
| | All households | 0.424 | 0.035 | 0.354 | 0.494 | | |
| **Land ownership (surveyed households)** | Non-OOC households | 0.387 | 0.058 | 0.272 | 0.502 | (6,046.36) | 0.000*** |
| | OOC households | 0.175 | 0.027 | 0.121 | 0.228 | | |
| | All households | 0.261 | 0.030 | 0.202 | 0.319 | | |
| **Land ownership (OOC)[5]** | | 0.153 | 0.045 | 0.065 | 0.241 | | |
| **Cattle ownership (TLU)** | Non-OOC households | 0.477 | 0.051 | 0.376 | 0.578 | (−1.31) | 0.196 |
| | OOC households | 0.558 | 0.035 | 0.490 | 0.627 | | |
| | All households | 0.543 | 0.032 | 0.481 | 0.606 | | |
| **Shoats ownership (TLU)** | Non-OOC households | 0.475 | 0.055 | 0.365 | 0.585 | (−0.41) | 0.682 |
| | OOC households | 0.504 | 0.040 | 0.424 | 0.583 | | |
| | All households | 0.500 | 0.033 | 0.435 | 0.564 | | |

*Note*: ** $p < 0.05$; *** $p < 0.01$. [1] SE: Standard Error; [2] LCL: Lower Confidence Limit; [3] UCL: Upper Confidence Limit: [4] Differences in Gini coefficient (degrees of freedom [DF] = 57) [5] Ol Purkel Ltd. (data for 146 households enrolled in OOC).
Among surveyed households and all households in OOC in 2010.
*Source*: First author's survey.

### 4.3.2. Wealth inequality

Among all surveyed households, inequality was highest in terms of cattle ownership (Gini index, GI = 0.543), followed by sheep and goat ownership (GI = 0.5), cash income in 2009 (GI = 0.424), and land ownership (GI = 0.261) in that order (Table 3). The inequality in cash income and land ownership was less among the OOC than among non-OOC households with significant differences in the GI for both variables recorded between the two groups (Table 3).

### 4.3.3. Effect of PES on cash income and expenditure

The households enrolled in the OOC had a higher mean cash income than their non-OOC counterparts in both 2008

and 2009. Even though both groups recorded a drop in their total income in 2009 compared to 2008 (Figure 4 and Table 4), the total income for the OOC households dropped by proportionally less (18% compared to 34% for non-OOC households) largely due to the cushion provided by PES income (Figure 4).

Livestock remains the mainstay of all pastoral households, and it accounted for the highest share of cash income for both the OOC and non-OOC households in 2008 and 2009. Although the share of livestock income among the OOC households declined between 2008 and 2009, it remained more or less stable among non-OOC households (Table 4). Among the OOC households, PES ranked second to livestock in terms of the share of the total cash income in both 2008 and 2009 (Table 4 and Figure 4), and had the
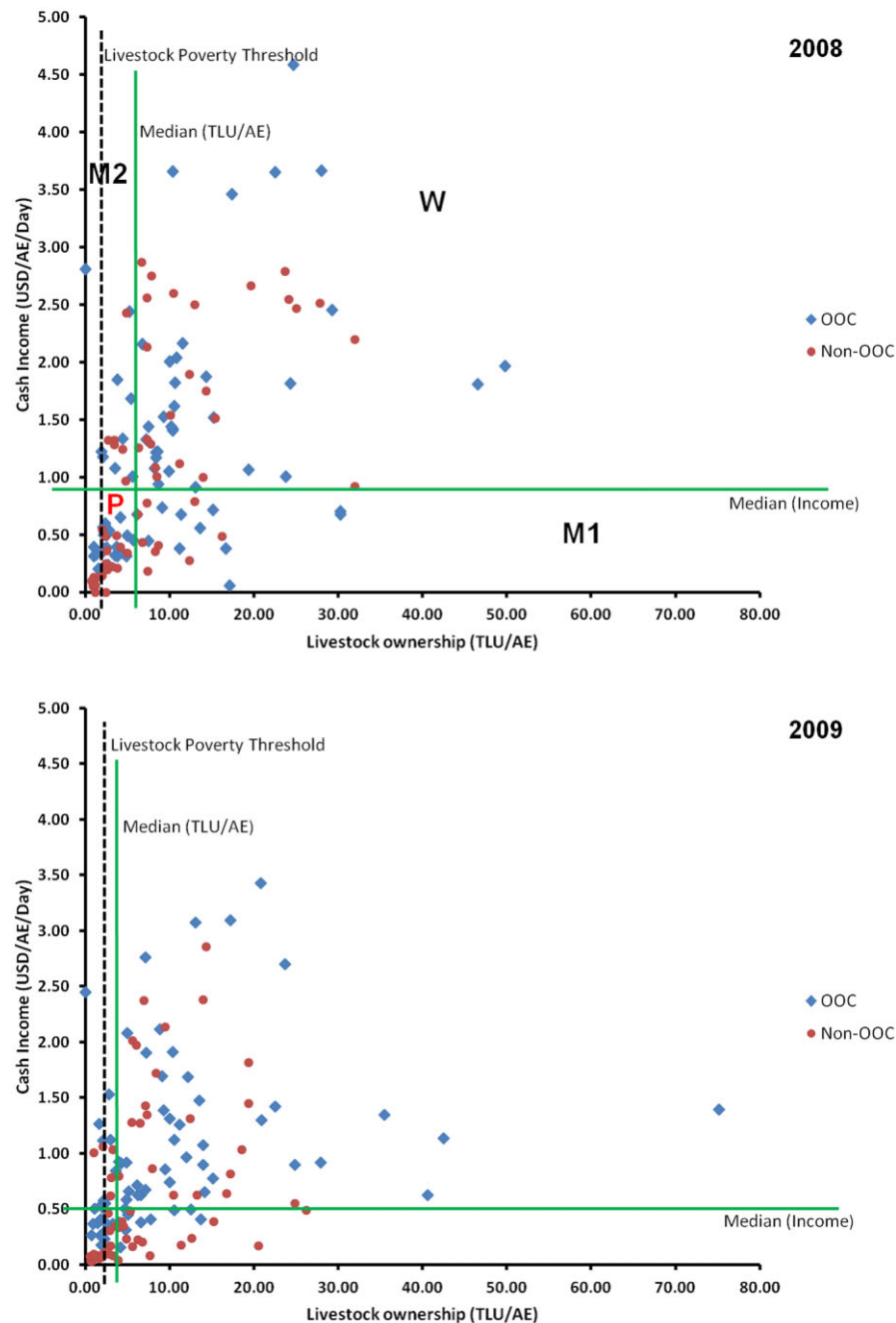
**Figure 3.** Distribution of OOC (diamonds) and non-OOC (circles) households based on a combination of cash income (US$/AE/day) and livestock holdings (TLU/AE) taken as a proxy for wealth/poverty status for 2008 and 2009.

*Note*: The four livelihood groups are represented by the capital letters: P represents the poor group; W represents the wealthy group; and M1 and M2 represent the two middle groups.

*Source*: First author's survey.

lowest co-efficient of variation (CV), at both the household level and the per capita levels of the three income sources considered in 2008 and 2009. The CV of PES income per capita was much higher because the household size varied markedly (Table 4).

Our results show that among the OOC households, basic needs accounted for the highest per capita PES expenses,

averaging US$ 75, followed by livestock related expenses which averaged US$ 66 in 2009 (Table 5). The households that are more reliant on PES (where PES >25% share of household income) have a higher per capita spending on basic needs, followed by livestock and education (Table 6). In contrast, those that rely marginally on PES (where PES <25% share of total income) have a higher per capita

**Table 4. Mean revenue, percentage of income and coefficient of variation (CV) from three sources of income for PES and non-PES households**

| Income source | | Year | Mean (US$) | | Percentage (%) | | CV | |
|---|---|---|---|---|---|---|---|---|
| | | | HH/yr | AE/day | HH | Individual | HH | Individual |
| Livestock | OOC | 2008 | 3,182 | 0.66 | (55) | (55) | 94.20 | 109.19 |
| | | 2009 | 2,283 | 0.44 | (46) | (44) | 152.06 | 124.95 |
| | Non-OOC | 2008 | 2,844 | 0.70 | (74) | (75) | 83.86 | 102.96 |
| | | 2009 | 1,833 | 0.46 | (73) | (75) | 129.01 | 131.94 |
| PES | | 2008 | 1,725 | 0.38 | (30) | (32) | 27.39 | 87.64 |
| | | 2009 | 1,858 | 0.40 | (37) | (40) | 28.09 | 77.52 |
| Other income combined | OOC | 2008 | 919 | 0.17 | (16) | (14) | 253.73 | 276.88 |
| | | 2009 | 870 | 0.16 | (17) | (16) | 253.18 | 268.33 |
| | Non-OOC | 2008 | 994 | 0.23 | (26) | (25) | 183.09 | 180.49 |
| | | 2009 | 675 | 0.15 | (27) | (25) | 132.21 | 156.75 |
| Total | OOC | 2008 | 5,827 | 1.22 | 100 | 100 | 63.25 | 77.96 |
| | | 2009 | 5,010 | 1.00 | 100 | 100 | 79.13 | 74.86 |
| | Non-OOC | 2008 | 3,838 | 0.93 | 100 | 100 | 78.09 | 93.04 |
| | | 2009 | 2,508 | 0.61 | 100 | 100 | 113.10 | 113.81 |

*Notes*: Revenue = US$ per household (HH) per year and US$ per Adult Equivalent (AE) per day; PES households enrolled in OOC: N = 73, non-PES households: N = 45.
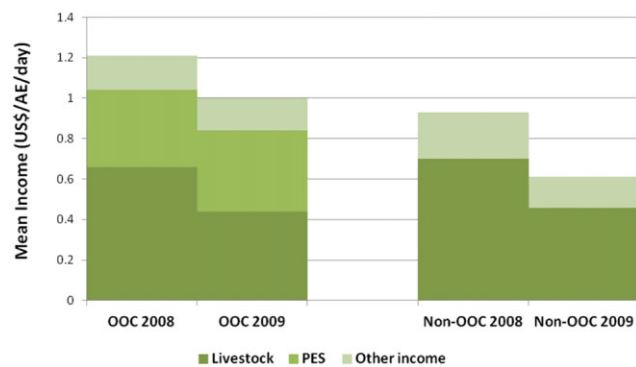*Source*: First author's survey.



**Figure 4.** Mean per capita income (US$/AE/day) for OOC households and non-OOC households in the MME, by income share accounted for by livestock, PES and other sources, 2008 and 2009.
*Source*: First author's survey.

spending on livestock, followed by education and basic needs (Table 6).

## 5. Discussion and conclusion

This paper explores why the Maasai landowners have chosen to keep lions instead of livestock on their sub-divided lands in the Olare Orok Conservancy and the attendant implications on wildlife and biodiversity, pastoral livelihoods, poverty and tourism. Although the assessment of the biodiversity impact of the OOC PES scheme is beyond the scope of this study, there are high expectations that alongside other conservancies, the OOC will help stall the current high decline in wildlife populations in the

MME (Ogutu *et al.*, 2011). This expectation stems from the claim that voluntary resettlement, like that at play in the OOC, may lead to the recovery of wildlife and the restoration of biodiversity in the currently abandoned land (Young, 2006). Indeed, there are already early indications that conservancies have opened up wildlife migration corridors and dispersal areas adjacent to the Mara Reserve, allowing for species dispersal between their wet and dry season concentration areas (Bhola *et al.*, 2012). There is a risk that the unregulated establishment of conservancies in the MME and the resultant displacement of settlements and livestock may lead to leakages, as households crowd on the currently un-subdivided communal pastoral lands and livestock encroach in the Mara Reserve (Ogutu *et al.*, 2011).

Our results affirm that livestock remains the mainstay of pastoral households in the MME, providing the largest share of cash income. This supports similar conclusions from other studies of the area (Seno and Shaw, 2002; Thompson *et al.*, 2009). The direct and indirect impacts of the OOC PES scheme vary between the poor and non-poor households, among both participants and non-participants (Table 7). Among the PES participants, cash income diversification is the most direct positive impact affecting both poor and non-poor households, and PES is shown to be particularly invaluable during a period of severe drought, like that which occurred in 2008 and 2009. Furthermore, unlike other income sources such as livestock and crops, which are highly seasonally variable, the land-based PES payments provide regular and relatively stable income across seasons. In addition, not accounting for the opportunity costs, the magnitude of the PES cash transfer to

**Table 5. Per capita expenditure of PES income by OOC households in 2009**

| | Household PES expenditure | |
| --- | --- | --- |
| Bundle of goods and services | Mean (US$/AE/yr) | Standard deviation |
| Basic needs expenses (food, cloths, etc.) | 74.74 | 85.01 |
| Livestock expenses (stock purchase, vet services and hay purchase/lease of grazing rights)[1] | 66.25 | 90.59 |
| Educational expenses (books, fees, etc.) | 40.22 | 60.42 |
| Human health expenses (drugs, hospital fee) | 24.34 | 36.44 |
| Purchase of water for domestic consumption | 0.79 | 3.62 |

*Note*: [1] The mean annual per capita expenditure by the different categories of livestock expenses were: US$ 34.81 for veterinary costs, US$ 29.60 for purchase of livestock (cattle, sheep and goats), and US$ 1.84 for the purchase of hay/lease of land for grazing rights.
*Source*: First author's survey.

the OOC households is, on average, sufficient to close the estimated maximum poverty gap of 20% in the MME (Central Bureau of Statistics, 2005).[10] It should be noted that the poverty gap is an average figure which may conceal the variation inherent in the depth of poverty, but it is nevertheless useful in exploring practical linkages between PES and poverty through the establishment of Payments for Ecosystem Services and Poverty Alleviation (PESPA) programmes (Rodriguez *et al.*, 2011).

A few households also benefit directly through the employment of members in the tourist camps located within the OOC; members serve as community scouts to enforce the PES conditionality and to provide security to visitors. The poor participants have in addition benefited directly through increased access to financial markets. All OOC households were required to open bank accounts, and this has opened up opportunities for these households to access lines of credit (Table 7).

PES has had a positive indirect impact on OOC households; many of them use the income to pay for basic needs, education, health, and livestock restocking and treatment — all of which help to strengthen human and physical capital. Concerning livestock and PES, our results concur with the suggestions that livestock herders participating in PES schemes that involve the interaction between wildlife and livestock are likely to spend PES income on veterinary services (Horan *et al.*, 2008) and that the Maasai pastoralists may invest PES income on livestock herds (Bulte *et al.*, 2008). The OOC households falling in the poor and middle livelihood groups have benefited indirectly from the PES, which helps to reduce their vulnerability to drought by mitigating the resulting drop in the household share of livestock income (Osano *et al.*, 2013).

There are also negative impacts of the OOC PES scheme affecting both participants and non-participants directly and indirectly (Table 7). The PES participants are inevitably face having to make the trade-off of a reduction in the area available for livestock grazing, in order to conform to the Conservancy land use regulations. This can directly affect both the poor and non-poor participants and may potentially amplify their vulnerability to the recurrent droughts (Galvin, 2009; Osano *et al.*, 2013). Indirectly, the displacement of livestock to the pastoral commons and the resulting crowding therein could worsen the degradation of pastoral areas due to overgrazing. This can also lead to potential conflicts among the herders over pastures, since high disparity in livestock ownership is common among the Maasai (Homewood *et al.*, 2009). Livestock poor households are thus likely to be negatively affected not only by the restrictions on grazing inside the OOC but also by the resulting crowding of the pastoral commons.

Voluntary resettlement from the OOC could have negatively affected the households falling in the poor livelihood group — and to some extent those falling in the middle level livelihood group — as they may have lacked alternative land for settlement. And some were settled temporarily in the un-subdivided pastoral areas and on land belonging to relatives (Sorlie, 2008). While the poor households did not incur the costs of resettlement which were paid for by the tourism operators and the wealthy landowners supporting the OOC (Sorlie, 2008), they have ended up as "free-riders" on others' land, a fact which is likely to pose a challenge when land sub-division of the whole of MME is completed.

Although we did not estimate the opportunity and transaction costs to landowners, the low dropout rate observed so far, coupled with the high acceptance rate of the 15-year PES contracts, suggests that the majority of OOC households see the benefits outweighing the opportunity costs. These costs are likely to be low for two reasons: the area occupied by the OOC has historically not been very attractive for livestock grazing because of tsetse presence (Lamprey and Reid, 2004); and the current OOC payments of US$ 41/ha/yr are higher than the estimated returns from livestock of about US$ 38/ha/yr in areas with an annual rainfall of 800mm or less. While agriculture may yield higher returns than PES (Norton-Griffiths *et al.*, 2008), the cost of monitoring wildlife infractions may be

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[10] On average, a poor person in a locality with a 20% poverty gap will require an additional monthly income of KES 248 to move above the rural poverty line of KES 1,239. The OOC PES provides an annual payment of KES 3,750/ha (in 2011), which translates to a monthly payment of KES 313/ha. The mean land enrolment among some 146 households in the OOC is 56.75 ha, so the OOC PES transfers — on average a monthly per capita cash income of KES 17,734 — is of a magnitude above what is required to lift all households found in locations with a poverty gap of 20% above the rural poverty line.

**Table 6. Per capita expenditure of PES income by OOC households, disaggregated by the relative importance of PES as a share of total household cash income, 2009**

| PES share of household income | Households | | Household expenditure on PES income (US$/AE/year) | | | | |
|---|---|---|---|---|---|---|---|
| | Count | Percentage | Basic needs | Water | Health | Education | Livestock |
| PES (<25%) | 11 | 15 | 34 | 2 | 23 | 67 | 94 |
| PES (26-50%) | 31 | 42 | 87 | 0 | 32 | 44 | 68 |
| PES (51-75%) | 17 | 23 | 83 | 1 | 19 | 30 | 62 |
| PES (>75%) | 14 | 19 | 69 | 0 | 16 | 22 | 46 |
| **Total** | **73** | 100 | | | | | |

*Source*: First author's survey.

too high due to the proximity to the Mara Reserve.[11] It is also possible that the poor households in the OOC are facing higher opportunity costs due to the unseen pressures acting upon household decisions such as peer pressure, coercion, the increased cost of not participating,[12] and the need for immediate cash income. These pressures may force poor households to enroll involuntarily to meet cash needs in the short-term at the expense of their long-term well-being, including giving up critical pasturelands.

Our results showed that although inequality in cash income is relatively high among all surveyed households, it is lower among the OOC compared to non-OOC households with a statistically significant difference in the Gini index between these two groups. This suggests that while PES is the most equitable source of income for participating households, it may at the same time reinforce the existing income inequities between poor and non-poor participants.

The implementation of PES can also generate side-effects and impacts on non-participants, both poor and non-poor (Wunder, 2008). The poor migrant and landless households that were living in the area currently occupied by the OOC prior to the land sub-division in the Koyake group ranch were involuntarily displaced and it is not clear whether these households were allocated land elsewhere (Courtney, 2009). The displacement of these households cannot be solely attributed to the OOC but rather is an outcome of the land sub-division (Lamprey and Reid, 2004) that preceded the establishment of the OOC PES scheme. So far no study has assessed the ongoing process of land subdivision in the MME, and this requires urgent research. Our results show that the level of inequality in land

ownership is, in general, low among all surveyed households, but is significantly lower among the OOC households. This situation is in contrast to other pastoral areas in southern Kenya where land sub-division so far has been highly inequitable leading to gross inequality in land ownership ( Rutten, 1992; Mwangi, 2007b).

The implications of the OOC and other conservancies in the MME on tourism are far reaching. In a survey conducted prior to land sub-division in the MME, 82% of the Maasai respondents reported that they planned to continue raising cattle, and 53% of them that they were going to cultivate crops on their sub-divided plots. Only 27% cited tourism as a potential post sub-division land use option and a mere 2% considered leasing land as an option at all (Seno and Shaw, 2002). Contrary to these findings, this study found that the OOC landowners have fully adopted wildlife tourism and are not keeping livestock or cultivating crops on their sub-divided lands. So why keep lions instead of livestock in the sub-divided lands? The choice to lease land for wildlife tourism and exclude livestock in the OOC does not necessarily mean that the participating households have abandoned pastoralism altogether but rather that they have shifted livestock grazing away from the Conservancy from which they obtain PES payments to the pastoral areas, and in some cases, also to the Mara Reserve. PES now ensures that participating households are able to directly derive relatively higher income from wildlife tourism, in contrast to the pre-land subdivision period when the distribution of wildlife tourism revenues was highly skewed in favour of the wealthy households (Thompson and Homewood, 2002; Thompson *et al.*, 2009).

Within the OOC, challenges to the sustainability of tourism include: the need for facilitating livestock herders' access to Conservancy land especially during periods of drought; the lack of tourism awareness of the ecological and socio-economic benefits of integrating livestock and wildlife (Riginos *et al.*, 2012); and the proliferation of Conservancies in the MME, the number of which has increased from two in 2006 to eight in 2010 with little coordination and without an integrated landscape planning framework, resulting in unregulated tourism development

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[11] Although small-scale and commercial agriculture might provide other alternative land use for the landowners, the Olare Orok area is not as agriculturally productive as other parts of the MME (Lamprey and Reid, 2004), and would have high costs in terms of wildlife damages to crops.
[12] The OOC is located on one contiguous block of land consisting of multiple land holdings. If a landholding belonging to a poor household is located in the middle of the Conservancy for instance, then the costs of not participating could be much higher if the land owner is unwilling to be enrolled. This is due to the difficulties involved in accessing land and the costs of monitoring livestock to avoid infractions on Conservancy land.

**Table 7.  Qualitative analysis of the effects of the OOC PES scheme on participating and non-participating households in the MME**

| PES status | Livelihood category | Direct impacts | Indirect impacts |
|---|---|---|---|
| PES participants (OOC households) | Poor (P) | • Cash income diversification and poverty prevention (+)<br>• Employment opportunities (+)<br>• Access to financial markets (+)<br>• Lack of options for alternative settlement (−)<br>• Reduction in area available for livestock grazing (−) | • Reduced vulnerability to climate shocks (e.g. drought) (+)<br>• Increase in human, physical and social capital (+)<br>• Increase in land value (+/−)<br>• Inequity between poor and non-poor participants (−)<br>• Crowding of pastoral commons (potential conflicts) (−) |
| | Middle (M1 and M2) | • Cash income diversification (+)<br>• Limited options for alternative settlement (−)<br>• Reduction in area available for livestock grazing (−) | • Reduced vulnerability to climate shocks (e.g. drought) (+)<br>• Increase in human, physical and social capital (+)<br>• Increase in land value (+/−)<br>• Crowding of pastoral commons (potential conflicts) (−) |
| | Wealthy (W) | • Cash income diversification (+)<br>• Reduction in area available for livestock grazing (−) | • Increase in human, physical and social capital (+)<br>• Increase in land value (+/−)<br>• Crowding of pastoral commons (potential conflicts) (−) |
| PES non-participants (non-OOC households) | Poor (P) | • Employment opportunities (+)<br>• Displacement of landless squatters (−) | • Social services through OOC Trust (+)<br>• Crowding of pastoral commons (potential conflicts)(−)<br>• Increase in income inequality between participants and non-participants (−) |
| | Middle (M1 and M2) | • Employment opportunities (+) | • Social services through OOC Trust (+)<br>• Crowding of pastoral commons (potential conflicts) (−)<br>• Increase in income inequality between participants and non-participants (−) |
| | Wealthy (W) | • Employment opportunities (+) | • Social services through OOC Trust (+)<br>• Crowding of pastoral commons (potential conflicts) (−) |

*Note*: (+) positive effect; (−) negative effect; (+/−) uncertain effect which could be positive or negative depending on circumstances.
*Source*:  Authors' elaboration.

and the saturation of tourism facilities (Ministry of Tourism, 2009). In the long term, the vulnerability of the Kenyan tourism industry to political, financial and economic shocks (World Bank, 2011) plus the current threat posed by international terrorism, poses a risk to the sustainability of PES schemes that are dependent on wildlife tourism. As a mitigation measure, the tourism partners in the OOC established a Contingency Fund and provided payments to the OOC households even in 2007/2008 when the tourism industry in Kenya was on the verge of collapse, following the post-election violence.[13] In future, consideration should be placed on insurance underwriting to cover risks resulting from such tourism downturns, complemented by the expansion of the conservancy revenue base outside of tourism to ensure financial sustainability.

[13] Personal communication, Rob O'Meara, Manager Ol Purkel Ltd, 13 August 2011.

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