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THE PRACTICE AND PERCEPTION OF BATIDA (GROUP HUNTING) IN A MAYA COMMUNITY OF YUCATAN, MEXICO

Mariana Rodríguez, Salvador Montiel, María D. Cervera, María T. Castillo and
Eduardo J. Naranjo

*The batida, or traditional group hunting, practiced by the Maya of the Yucatan Peninsula provides hunters with wild meat to sustain their families. Our study of batida hunting trips in the Los Petenes community during a 6-month period (2008–2009) provided information on the participants, the practices, and the results. Maya peasant-hunters targeted deer (*Odocoileus virginianus*, 81%) and peccary (*Pecari tajacu*, 19%), obtaining on average 2.3 kg of meat per participant. In Los Petenes the batida is open to all adult men who wish to participate within its merit-based hierarchical structure, organized by two hunters recognized for their outstanding abilities. Interview data indicates that in addition to meat, the batida provides its participants with a reinforcement of their cultural identity as Maya peasant-hunters, a sense of belonging to the group and the community, and the chance to gain prestige as hunters. We argue that these social dimensions of the batida, complemented by the practical goal of meat provision, maintain this practice in the community, and very possibly in other communities of Maya heritage.*

Key words: batida, subsistence hunting, social benefits, Yucatan, Mexico

*La batida o cacería tradicional en grupo, practicada por los mayas de la Península de Yucatán, provee a los cazadores de carne silvestre para el sustento familiar. Nuestro estudio de las salidas de caza en batida en la comunidad de Los Petenes durante un periodo de seis meses (2008–2009) aporta información sobre los practicantes, la práctica y los resultados de la misma. Los campesinos cazadores consiguieron venado (*Odocoileus virginianus*, 81%) y pecari (*Pecari tajacu*, 19%), obteniendo en promedio 2.3 kg de carne por participante. En Los Petenes, la batida está abierta a todos los hombres adultos que deseen participar dentro de su estructura jerárquica y meritatoria, organizada por dos cazadores reconocidos por sus habilidades sobresalientes. Los datos de las entrevistas indican que además de la carne, la batida otorga a sus practicantes una confirmación de su identidad cultural como campesinos-cazadores mayas, un sentido de pertenencia al grupo y a la comunidad, así como la oportunidad de ganar prestigio como cazadores. Argumentamos que esos aspectos sociales de la batida complementan el fin práctico de obtener carne, manteniendo esta práctica en la comunidad y muy posiblemente en otras comunidades de herencia maya.*

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Introduction

Indigenous wildlife use in Mesoamerica involves deep traditional knowledge and represents a subsistence strategy of many rural populations (Barrera-Bassols and Toledo 2005; León and Montiel 2008). Historically, several wild animal species formed part of the resource complex managed by traditional Maya practices (Barrera-Bassols and Toledo 2005), and were important elements in their cosmovision of the natural world (Anderson and Medina 2005; Chacon 2012; Sánchez 2000). Hunting practices are of critical importance to the development and implementation of conservation programs that have recently begun to collaborate with traditional, community-based wildlife management strategies (Gardner et al. 2009; Liu et al. 2007) in many protected areas in the Mesoamerican region. Most of these were established in the 1980s and 1990s in areas traditionally used by indigenous peoples (for background information see Chapin 2004; Chapin et al. 2005; De Souza 1992; Smardon and Faust 2006).

At least 12 terrestrial animal species are hunted and trapped for different purposes (but mainly for food) by the Maya of the Yucatan Peninsula (Jorgenson 1995; Montiel et al. 1999; Naranjo et al. 2010; Quijano-Hernández and Calmé 2002). Unlike hunting individually or in pairs, which usually provides 4 to 20 kg of meat per hunter, León and Montiel (2008) reported that group hunting or *batida* is a traditional extractive strategy that generally provides only a moderate portion, around 2 kg, of wild meat for each participating hunter. Group hunting involves extreme physical exertion (e.g., searching for animals in secondary vegetation areas; Mandujano and Rico-Gray 1991; Montiel et al. 1999), and includes the risk of firearm accidents (Terán and Rasmussen 1994). However, because it is a group practice, the *batida* also offers a set of social benefits to participants, such as socializing, transmitting intergenerational knowledge and reinforcing group identity. Such benefits may contribute to the maintenance of this group hunting modality in contemporary Maya communities, despite smaller returns than those achieved by individuals or pairs of hunters (Arias 1995; Montiel et al. 1999). In an effort to explore the multiple meanings of *batida*, we studied its practice and participant perceptions in a Maya community in the Yucatan Peninsula, where wildlife use is a current social practice.

Study Area and Community

The study was carried out in Los Petenes, a Maya community near Los Petenes Biosphere Reserve (LPBR, 20° 51'–19° 49' N, 90° 45'–90° 20' W) located in the northwest coastal region of the Yucatan Peninsula, Mexico (Figure 1). The regional climate is warm with an average monthly temperature of 26 °C and a mean annual rainfall of 819 mm (Yañez-Arancibia 1996). Rainfall is clearly seasonal with a dry season from December to May (mean monthly precipitation of 13.2 mm) and a rainy season from June to November (mean monthly precipitation of 149 mm; Montiel et al. 2006).

Established in 1999, LPBR constitutes a federally protected area of 282,858 ha (36% terrestrial and 64% marine area), including a very ecologically and socially

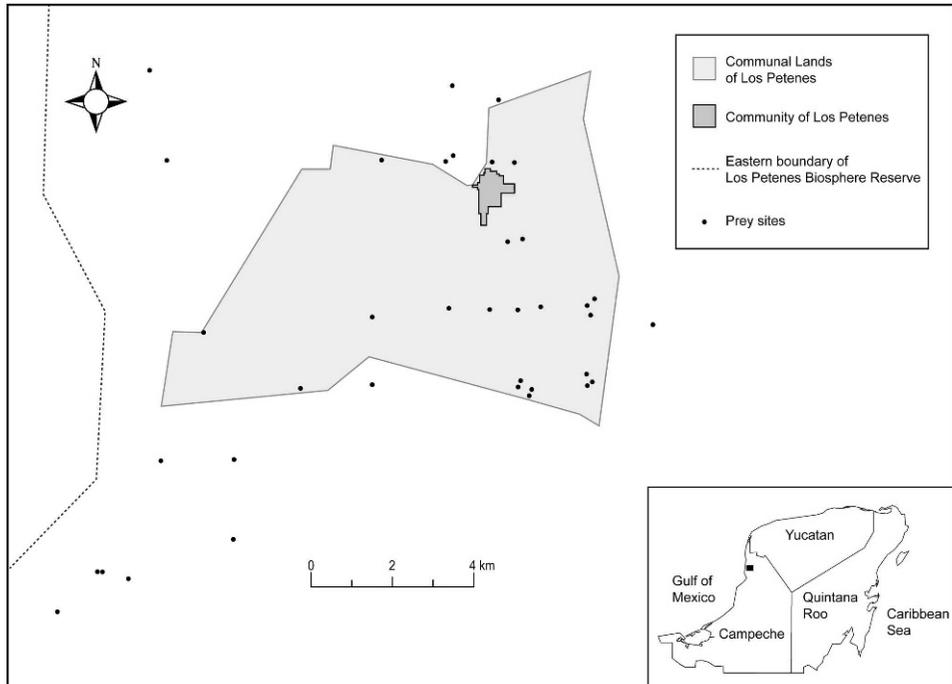


Figure 1. Location of prey sites ($N = 37$) recorded inside and outside the communal lands of Los Petenes during the 6-month dry period (December 2008–May 2009). Note that the 14 prey sites outside the communal lands are also external to the limits of Los Petenes Biosphere Reserve.

important coastal wetland (Montiel et al. 2008; Yañez-Arancibia 1996). The paucity of human settlements within this protected area also represents a distinctive feature of LPBR (Garcés and Ruiz 2010). However, at least 16 neighboring Maya communities (including Los Petenes) maintain agroforestry and fishery practices within the reserve (CONANP 2006).

Regional vegetation includes naturally formed forested mounds, locally known as *petenes*, within a forest-mangrove and grassland matrix. The forested mounds include sub-deciduous forest. There are also secondary vegetation patches (*hubches*), xerophytic bush, seasonally flooded grasslands and agricultural fields (Flores and Espejel 1994). Vertebrate fauna in the region is represented by approximately 462 species, including birds (66%), mammals (17%) and amphibians and reptiles (17%) (Yañez-Arancibia 1996). Of these vertebrates, white-tailed deer (*Odocoileus virginianus*), collared peccary (*Pecari tajacu*), paca (*Agouti paca*), iguana (*Ctenosaura similis*) and ocellated turkey (*Agriocharis ocellata*) have been reported as the main target species in Maya communities near the LPBR (León and Montiel 2008; Montiel 2010).

At the time of this research in 2009, the community of Los Petenes had a population of 905 inhabitants (54% men, 46% women), all of them bilingual Mayan/Spanish speakers with Mayan as their primary language (Rodríguez 2010), and communal lands of 10,542 ha. The men often defined themselves as peasant-hunters (78%), but in addition to seasonal agriculture and subsistence

hunting, they engaged in charcoal production, apiculture, wood extraction, and in some cases, small-scale cattle ranching. Some community members (22%) also engaged in periodic wage work, usually outside the community (León 2006; Rodríguez 2010).

León and Montiel (2008) conducted oral history interviews in this community to document more than a century of hunting complementing other productive activities. Four hunting modalities are recognized locally: *batida* group hunting or *p'uuj*; stalking or *ch'uk*; night-light hunting or *ts'on*; and opportunistic hunting while engaged in farming or *ximba ts'on*. Only *batida* involves multiple participants and a social organization. Generally there are 15 to 20 participants coordinated by two experienced hunters. Practiced primarily during the non-agricultural, dry season (December–May; León and Montiel 2008), *batida* hunting is focused on white-tailed deer and collared peccary, two ungulates usually found in grasslands and agroforestry areas in the region (Moreno-Rodríguez 2007; Reyna-Hurtado and Tanner 2007; Rodríguez 2010; Tejeda-Cruz et al. 2009).

Methods

As a prelude to the study described here, we made short visits to the community in order to develop and reinforce relationships, as trust was necessary for successful fieldwork. A local hunter trained in data collection for this study recorded the requested data during each *batida* hunting trip from December 2008 through May 2009. The data included trip duration, number of human participants, number of hunting dogs, the species and sex of the game killed, and the geographic coordinates (by GPS) of the prey site (where hunters killed the animals). Using a community map (*sensu* Smith 2003) of Los Petenes (Moreno-Rodríguez 2007), a subset of prey sites ($n = 22$ of 28) that were definitely associated with agroforestry areas surrounding the community were identified as forest patches (sub-deciduous forest and secondary vegetation), agricultural areas, and cattle ranches. These agroforestry areas were fully confirmed by local hunters in community meetings and in field trips before this study (see Montiel 2010). Distance in kilometers between prey sites and the community's nearest border was calculated using Google Earth version 5.0 (Google Maps 2010).

Rodríguez stayed in the community for five months (May–June for the dry season and September–November for the rainy season, both in 2009) to identify local hunters and conduct the structured and semi-structured interviews required to gather information on the organization and social benefits of the *batida*. Additionally, during this period, participant observation was carried out in order to interact with hunters and their families, with Rodríguez taking field notes on daily facts related to game species in the community. During the first stay in the community (May–June), all peasant-hunters who took part in the *batida* were identified and participated in structured interviews to document their age, education level, religion, main occupation, and family size and type. Based on the participant observation by MR and information previously reported by León and Montiel (2008) from in-depth interviews on traditional hunting in Los Petenes, we designed a set of questions for semi-structured interviews (as per

Bernard 1995) to define the socio-cultural context of the *batida*, including perception, organization, motives, and limitations of hunter participation. From September to December 2009, questions were posed during interviews with nine men identified by their peers as outstanding *batida* hunters. For each interviewee, permission was granted to audiotape the entire conversation for subsequent analysis. Among the questions were: How is a *batida* carried out? Why do you hunt in *batida*? Why do some men prefer to hunt alone or with one other person? What does a person need to know to hunt in *batida*? Is *batida* a dangerous activity? Is there any ritual associated with *batida*?

Following Creswell (1998), the tape-recorded, semi-structured interviews on *batida* were transcribed, printed and reviewed through the content analysis technique. The answers were categorized into 1) process and organization, 2) motives for participating, and 3) motives for not participating. In accordance with guidelines for qualitative approaches (Rodríguez et al. 1999; Taylor and Bogdan 1996), these three categories of information from the interviews were examined for patterns and interpreted with reference to our field notes from participant observation and to the in-depth interviews previously reported by León and Montiel (2008).

Comparisons of 1) the number of prey by species and 2) the number of successful *batida* hunting trips (one prey minimum) per month were done with a G independence test for each case (Francis et al. 1994). Number of animals killed, distance to hunting site, group size, and hunting trip duration were analyzed through individual Spearman rank-order correlation tests (Zar 1996). Based on the mean angle of recorded prey sites in a polar coordinate system, their orientation was estimated by applying a Raleigh test (Zar 1996). Average weight for adult individuals per species (deer and peccary) was taken from the literature (León and Montiel 2008). In all cases, calculation of average game biomass, including both species, per hunter per trip included data from all hunting trips, even unsuccessful ones. A significance level of $\alpha = 0.05$ was used in all statistical analyses.

Results

Batida Hunters

An all male group of 40 peasant-hunters was identified by community members as the usual *batida* group in Los Petenes. The average age (\pm SE) of participants in this group was 39 ± 11 years and they had completed 4.5 ± 3.1 years of elementary education at the time of the study. Most of them were Catholics (60%) and some were Protestant (10%), but there were also hunters that did not practice any religion (30%). As with most other men in the community, 80% of the hunters were members of nuclear families (father, mother and an average of 4 children), 13% were single and 7% were widowers. Seasonal agriculture and other traditional subsistence activities, such as apiculture, charcoal production, wood extraction, and individual hunting, were commonly reported by the *batida* hunters. However, 45% of hunters also engaged in wage labor (mainly outside the community) to supplement their income when traditional agroforestry practices were insufficient for family subsistence.

Prey Types and Hunting Sites

During the 6-month period of this study, local hunters carried out 28 *batida* hunting trips that consisted, on average, of 19 hunters and 4 dogs and lasted 8.0 ± 2.0 hours (Table 1). Seventy-five percent of these hunting trips were successful (monthly average capture rate = 1.2 prey per hunting trip), yielding a total of 37 white-tailed deer (81%) and collared peccary (19%). Based on the number of male and female animals obtained (18 vs. 12 individuals for deer and 4 vs. 3 individuals for peccary), a sex ratio of 1:1 was assumed for deer ($\chi^2 = 1.2, p > 0.05$) and peccary ($\chi^2 = 0.1, p > 0.05$) kills (Table 1). According to hunters, this nearly even proportion in the sex of prey is mainly due to the difficulty in discriminating the sex of potential prey in dense tropical forest.

Prey sites averaged 5.6 ± 3.5 km southeast of the community ($Z_{0.05, 37} = 10.08, p < 0.05$), and were mainly (57%) recorded in communal lands of Los Petenes (Figure 1). In this area, GPS coordinates of 22 sites indicate that 50% of the kills were in agricultural areas, 23% on cattle ranches, and 27% in forest patches. The number of prey per hunting trip was positively correlated with distance to hunting sites ($r_s = 0.50, p < 0.05$) and group size ($r_s = 0.88, p < 0.05$), but negatively correlated with hunting trip duration ($r_s = 1.82, p < 0.05$).

Twenty-two trips were recorded for the first half of the research period (December–February) as opposed to six for the second half (March–May) (Table 1). There is a very high probability that this difference would not occur by chance ($\chi^2 = 7.58, p < 0.05$). The peasant-hunters acknowledged that they limited their hunting during the second half of the dry season, when an increased presence of the Mexican army as part of regular surveillance practices in the region was observed on access routes to the community. Fear of official sanctions for illegal firearm use was the main factor limiting hunting during this period.

Batida Execution and Social Benefits

In Los Petenes, the *batida* is an activity open to all peasant-hunters in the community. However, there is preferential recruitment of hunters who perform best. Responding to a local announcement, hunters who wish to participate in the *batida* meet at around 8:00 am at a designated place and depart when they reach the minimum group size of 12. When the hunters and their accompanying dogs arrive at the hunting location, they first pray and burn the resinous wood, copal (*Protium copal* Schltdl. & Cham.), to ask “the lord of the forest,” Yum K’aax, for permission to hunt and for success in the hunt. According to Maya cosmovision, this spirit being protects peasant-hunters in their daily activities.

Two hunting leaders, locally known as *chingones* (singular *chingon*; a term used in Mexico to refer to ‘a very competent person in an activity or knowledge area’ (Royal Spanish Academy 2001), who have prestige and experience in the *batida*, make decisions and coordinate the hunting activity during the day. One 38-year-old hunter noted, “Those *chingones* are guys who really know the terrain and search for the deer’s path. They position and direct everyone to fit them in... They’re real aces at the *batida*.” Another hunter, 39 years old stated, “Yeah, that guy ... he’s good. Yesterday he shot a big deer...really big, his head and nose really big... That deer, man, was really fat! That’s the way to shoot!” To carry out

Table 1. Quantitative measures of prey species and hunting parameters during the 6-month study period (December 2008–May 2009) in Los Petenes, Campeche, Mexico.

Species and hunting parameters	Months						Total	Mean values per month
	D	J	F	M	A	M		
Number of prey <i>Odocoileus virginianus</i> (σ/\varnothing)	12 (8/4)	6 (3/3)	7 (2/5)	3 (3/0)	0	2 (2/0)	30 (18/12)	
Number of prey <i>Pecari tajacu</i> (σ/\varnothing)	2 (0-2)	3 (3-0)	1 (1-0)	0	1 (0-1)	0	7 (4/3)	
Total prey (both species)	14	9	8	3	1	2	37	
Number of hunting trips (with/without prey)	8 (7/1)	5 (5/0)	8 (5/3)	2 (2/0)	2 (1/1)	3 (1/2)	28 (21/7)	
Estimated game biomass (kg)	534.6	301.5	309	125.1	17.1	83.4	1370	
Capture rate (ind./hunting trip)	1.8	1.8	1	1.5	0.5	0.6		1.2
Hunters per hunting trip average (range)	19 (12-24)	25 (14-30)	22 (13-27)	17 (16-20)	13	17 (15-17)		19
Biomass per <i>capita</i> by hunting trip	3.5	2.4	1.7	3.7	0.66	1.64		2.3
Average hunting trip duration (hours)	9 (7-11)	9 (7-10)	7 (5-9)	7 (7-8)	9	6 (4-9)		8
Distance to the kill site (km)	7.3 (1-14)	4.4 (2-10)	3.7 (1-6)	4 (3-5)	10.3	4 (4-4)		5.6
Number of dogs used per hunting trip	5 (3-6)	4 (3-6)	3 (1-4)	3	3	3		4

batida rounds, they divide the group into two subgroups: *tiradores* (shooters), who are skillful hunters with rifles (12, 16, and 20 caliber); and *pujeros* (from the Mayan word *p'uuj* or *batida*), who are usually strong, young hunters with limited firearm experience who beat the bush to drive out animals.

During the first round, one *chingon* positions the *tiradores* (with firearms unloaded) along animal trails forming a semicircle at one end of the hunting area. According to local hunters, ungulates and other animals leave prints, scat or hair, which can usually be detected by experienced hunters as they move through the forest. Maintaining their position (now with loaded rifles), the *tiradores* wait for the animals to be flushed out by the *pujeros*, who usually do not carry rifles in order to avoid firearm accidents. At the other end of the hunting area, the *pujeros* move through the bush with their dogs, searching for potential prey, shouting and whistling as they move ahead to flush animals towards the *tiradores*. Although deer and peccary are the target species, *pujeros* are occasionally able to capture –by hand or with the help of dogs– small-sized prey such as coati (*Nasua nasua*) and rabbit (*Sylvilagus floridanus*) that are not necessarily shared with other group members.

For the *batida*, there is a set of verbal rules to avoid potential shooting accidents and to promote 'safe practices' during each hunting trip. However, a perception of high risk (firearm accidents) might limit the participation of some local hunters. According to interviewees, these rules include: 1) avoid carrying loaded rifles before the hunt, 2) *tiradores* must not move from their assigned positions, and 3) *pujeros* must communicate with each other by whistling during the 'area sweeping.' If a man disobeys these rules, the group selects a punishment, usually requiring him to buy drinks and snacks for the other *batida* group members.

At the end of the first round, the hunters estimate the amount of meat acquired and the *chingones* decide whether or not to continue with another *batida* round. Usually two to three *batida* rounds are carried out per trip with the goal of acquiring at least one kilogram of raw meat per hunter. After all hunting has been completed, each raw prey is shared among group members by a hunter assigned to this task. One 38-year-old hunter told us, "He is good for his ability to share (distribute fairly), this guy is very good. Everyone gets their little piece." While the prey is being divided, hunters eat a small portion of raw meat from the animal's ribs. The head, one leg and the stomach are given to the hunter that shoots the animal. This allows the shooter to look for the highly prized talisman called "deer stone" (*tunich ceh*, a bezoar) in the animal's stomach. One hunter (64 years old) explained, "It is the stone the deer has in its stomach. It's so you can shoot 100 deer. When you get such a stone, you're going to shoot deer everyday and not miss. Yeah, there is a limit, you have to throw the stone away when you have 100 deer because if you don't, you'll get sick." Then, the rest of the prey is divided equitably among the other group members, including the dogs. Finally, the raw meat is transported to the community where it is subsequently cooked by women, mainly the wives and daughters of hunters.

The interviewed *batida* hunters (two *chingones*, two *tiradores*, two *pujeros*, two ex-participants and one hunter who burns the copal) mentioned two motives for engaging in this group hunting modality. One motive is that through the *batida* a

hunter ensures access to venison, a meat greatly appreciated by family members. Since hunters are less likely to get venison if they hunt on their own, a successful *batida* trips ensures hunters access to venison. One 65-year-old hunter explained, "It's venison, because even though we have chicken sometimes, people prefer venison. That meat is like no other. People like to eat that meat! It's not like you get much; you only get a little, maybe 1 or 2 kilos." Although venison is mainly eaten by the hunter's family, he commonly shares it with neighbors and friends as a form of reciprocity. Occasionally, he offers the meat at religious celebrations as a means to reciprocate blessings from spirit beings.

Another motive for the *batida* is that it gives the hunter the opportunity to spend time with friends and learn through this modality of group hunting. The social interactions among hunters from the *batida* extends into the community when they return home and share their experiences with other hunters, as well as with their families. One 61-year-old hunter said, "We go back, buy soda and everyone heads home to eat venison with the family, with their children, with the kids." Another 21-year-old told us, "When we get back to town we hang around for a while talking about what happened out in the bush and have some sodas. We get together there in the park where the smokestack is and drink them there, then afterwards everyone heads off home."

According to interviewees, emigrant hunters returning to the community usually participate in the *batida* as soon as they can. One hunter (43 years old) explained "Yeah, but people like it (the *batida*). What's more, if there's no work like in Campeche and they're rural people, then they go. They like to go. Even if they have job and they come back and have time, they go on the *batida*. That happens with the people who come back from Canada." Another peasant-hunter (46 years old) reminisced about his own experience: "It was like nine years ago. I went off to work as a builder but always came back to the bush. When I stayed, we spent time together and went out on the shoot together."

Discussion

Batida Social Benefits

In Los Petenes, as in other communities on the Yucatan Peninsula, the *batida* is a group activity for men only (Arias 1995; Montiel et al. 1999; Segovia and Hernández 2003; Terán and Rasmussen 1994). The hunters' primary or secondary productive practice is agriculture, thus, the *batida* emphasizes the identity of its participants as Maya peasant-hunters, who combine farming and subsistence hunting as part of their diversified strategies for using natural resources (León and Montiel 2008; Ojasti 2000).

Just as reported by Eiss (2002) for productive practices in Tetiz, Yucatan, by participating in the *batida*, emigrants who previously migrated outside their community in search of work and returned to Los Petenes renew a sense of belonging to their community and forest, as well as reconnecting with local traditions. It also strengthens the ties between an emigrant and the *batida* group, whose members are generally neighbors or members of his extended family, and between all hunters and the local forest, which forms part of their cultural inheritance and family history. The forest is not only hunting territory but also an

area where small plots are periodically cleared in a long-cycle form of swidden agriculture.

Socialization among participants and community members is also an important element that promotes the group hunting modality. Locally, this socialization begins when hunters organize hunting trips as they analyze the best strategy for a successful hunt, and continues as they interact and share their experiences upon returning to the community. *Batida* hunters extend their social networks by sharing meat with their family and neighbors, similar to the effects of sharing of meat hunted specifically for Maya religious ceremonies in northern Yucatan (Eiss 2002).

The *batida* is usually coordinated by two leaders who are expert hunters, fully acknowledged as such by their peers. Whereas in Los Petenes these leaders are called *chingones*, in other communities of the northern Yucatan Peninsula they are known as *maestros* (Montiel et al. 1999). Two of the most difficult skills for hunters to develop are the ability to track prey and the marksmanship required to shoot and kill moving animals (Gurven et al. 2006; MacDonald 2007). This partially explains the prestige that *chingones* have among their peers, who acknowledge them as excellent marksmen and expert trackers with a deep knowledge of their prey's biology and behavior. Other hunters can gradually gain prestige by having good hunting dogs, being good marksmen, or sharing game meat fairly. In addition, since *batida* is a hierarchical group activity, participants can increase their symbolic capital (e.g., status and prestige as a hunter), a social strategy found in indigenous communities from other latitudes (Meriam of Torres Strait, Australia; Bliege and Smith 2005).

Smith et al. (2000) have observed that hunters improve their skills as a way of gaining acceptance from their peers and building social alliances. Our results support this observation because if a *batida* hunter fails to kill an animal or endangers other hunters, then he is scolded and insulted by group members, losing prestige. Failure to kill a clearly visible animal can lead to his immediate or later reassignment to the *pujeros* subgroup. However, in recent years such reassignment has been replaced with forms of payment in kind, such as providing drinks and snacks for the group. In some cases, hunters have felt so embarrassed by a mistake that they abandon the group and prefer to hunt alone thereafter. One hunter (28 years old) explained, "No, if the deer gets away from you they make a lot of fun of you, even insulting you. That's why I don't want to go to the *batida* because if you're nervous you'll miss."

Prey Types, Sites, and Hunting Technologies

Locally, the *batida* targeted deer and peccary, two species that are not included in any Mexican protected category (NOM-059, SEMARNAT 2001). Such ungulates produce a greater amount of meat per trip in comparison to the smaller prey (e.g., coati, iguana, rabbit), usually obtained by individual hunting modalities (stalking or opportunistic) practiced regionally (León and Montiel 2008; Peres and Palacios 2007; Reyna-Hurtado and Tanner 2007). For the *batida* hunters of Los Petenes, game biomass per trip is usually double that considered the minimum (1 kg) for an individual hunter to take home for family consumption. The interviewees mentioned that this 'guaranteed' provision of wild meat through the *batida* is the main reason for their participation.

Reliable estimates of the impact of hunting on historically targeted species in the Yucatan Peninsula are limited due to the scarcity of published quantitative studies in this region (León and Montiel 2008; Ramírez-Barajas and Naranjo 2007). Our study contributes to filling this lacuna by quantifying hunting efforts at the local level. During the 6-month study period, the 28 *batida* hunting trips and 37 animals obtained were quantitatively similar to those reported during a previous hunting season in Los Petenes (32 hunting trips and 40 prey; Montiel 2007). Together, the data from the previous study and this one suggest that the number of prey (deer and peccary) acquired seasonally per hunting trip remains relatively constant (capture rate = 1.25 individuals/trip for 2006 and 1.32 individuals/trip for 2008). Thus, during the hunting season (December–May), the *batida* peasant-hunters of Los Petenes are apparently capable of securing year after year for their families at least 2 kg of wild game per hunting trip. However, the ecological implications of this extractive activity need to be explored by demographic studies of the targeted animal species (Naranjo 2008).

In the Neotropics, subsistence hunting areas are usually located within 12 km of human settlements (Jorgenson 1995; Ojasti 2000; Quijano-Hernández and Calmé 2002) including forest patches and agricultural areas (Escamilla et al. 2000; Segovia and Hernández 2003). In agreement with these earlier studies, the *batida* hunting sites in Los Petenes were commonly located in agroforestry areas less than 6 km from the community and mainly within its communal lands.

As in other Neotropical communities (Koster 2009), dogs are considered hunting partners in Los Petenes since they help in tracking, capturing and killing prey. The number of dogs used in Los Petenes *batida* groups was approximately half that of those reported by Mandujano and Rico-Gray (1991) for *batidas* in other communities of central Yucatan. In Los Petenes we found that local hunters are highly selective with respect to their dogs since they are considered part of the group and receive a similar portion of meat as the humans. This highlights the collective nature of the *batida*, in which all participants, regardless of species, are considered group members.

Rituals and Beliefs

In pre-Hispanic codices (e.g., Madrid Maya Codex and Maya Dresden Codex; Colas 2006; Vail 1997) and in the art found on buildings in ancient Maya archeological sites, there are references to rituals associated with the practice of deer hunting and *batida* among the Maya (Montolú 1976), an historical practice that remains in effect today in rural communities of the Yucatan Peninsula (Eiss 2002; Evia 2006; Mandujano and Rico-Gray 1991; Montiel et al. 1999). Among the Maya, natural elements do not belong to humans but to guardian spirits from whom permission to hunt must be requested through prayers and offerings (Emery and Brown 2012; Villa-Rojas 1978). The copal ritual in the *batida* preserves such ancient elements (Pohl 1981). In Los Petenes, contemporary *batida* groups offer copal to the spiritual lords of the bush before hunting. We found that only elderly hunters carry out the traditional ritual. However, three young hunters (less than 40 years old) practiced this ritual without praying, only burning the copal. Loss of ritual prayers by young hunters may be associated with processes of acculturation and a generalized loss of the Mayan language (Ramírez 2006). In

turn, burning the copal can reflect a local teaching-learning process through observation and active participation, one practiced for many purposes in rural Maya communities (Euán 2008).

Some anthropologists argue that beliefs concerning the deer stone, a highly valued hunting talisman, function as a way of regulating resource use among the Maya (Evia 2006; Terán and Rasmussen 1994), similar to hunting charms or *namurs* used by the Achuar of Ecuador (Chacon 2012; Descola 1996). In Los Petenes, according to custom, if the owner of a deer stone (*tunich ceh*) does not respect the 100 deer prey limit, then the “spiritual owner of the deer” will punish him with various diseases (Evia 2006; Terán and Rasmussen 1994; Villa-Rojas 1978). This belief may function as a reminder of the limits of hunting and the need to respect the deer population in general. In Los Petenes the symbolic limit of prey per hunter is higher than that (5 to 10 animals) reported in other Maya communities (Evia 2006), which may be explained by the abundance of deer when the myth was established locally. However, there are no data on population dynamics and habitat use of game species that can be used in order to ascertain if the limits set by local hunters are indeed adequate to maintain deer and peccary populations under present circumstances.

Final Considerations

Our study showed that the *batida* is hierarchically organized and offers peasant-hunters a set of social benefits including an emphasis of their cultural identity as Maya peasant-hunters, a sense of belonging to the group and the community, and the chance to gain prestige as hunters. People in Los Petenes have preserved aspects of indigenous identity and a long-standing ecological knowledge of their environment that allows hunters to engage in a traditional pattern of resource use, clearly represented by the practice of the *batida*. This practice has social importance and carries multiple meanings in contemporary Maya communities, where several terrestrial vertebrates still contribute to the subsistence of local families. Social dimensions of the *batida*, complemented by the practical goal of collective meat provision, maintain this practice in Los Petenes, and very possibly in many others of Maya heritage.

This conclusion highlights the importance of traditional Maya practices for the implementation of the official conservation programs recently started in many biosphere reserves of the Yucatan Peninsula, as is the case of LPBR (CONANP 2006), with zoning to integrate productive practices of neighboring Maya communities. This integration requires the definition of community-based wildlife management strategies that acknowledges not only the interests of local stakeholders, but that also respects their cosmovision and takes their traditional ecological knowledge into account. In the last decade, research efforts in Los Petenes (Montiel 2010) have emphasized the inclusion of information on the relative importance of traditional hunting modalities, hunting cultural roots and meaning, hunting areas and temporality, access capability to subsistence resources, and legal use of hunting technologies in regional conservation plans. Such an approach will promote indigenous communities’ participatory inclusion in conservation strategies and collaboration with government authorities,

non-governmental organizations and scientific research groups (Durand and Lazos 2008; Fernández-Giménez and Fillat 2012; Sievanen et al. 2012). This approach to the conservation and management of cultural and biological diversity in biosphere reserves of Mesoamerica (Smardon and Faust 2006) constitutes a common challenge for the functioning of these protected areas in the Yucatan Peninsula.

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