Uncertain coexistence: jaguars and communities in montane forests of Mexico

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A study of the potential for community conservation of jaguars in the Sierra Norte of Oaxaca, Mexico.

In Mexico, the conservation of the jaguar (*Panthera onca*) has mainly focused on large public protected areas. However, existing protected areas are not always effective for species and habitat conservation, and Mexico's widespread common property land tenure limits opportunities for declaring new areas. Thus, protection for the jaguar, as for many other forms of wildlife, needs to be focused on larger landscapes where high biodiversity coexists with human activities. In recent years, there has been a significant movement towards community-based biodiversity conservation, including the establishment of indigenous/community conserved areas (a category established by the International Union for Conservation of Nature and Natural Resources [IUCN] in 2004 and recognized legally in Mexico since 2008).

Jaguar conservation issues were examined in four communities with over 32 000 ha of territory in the Chinantla ethnic region of the Sierra Norte in the state of Oaxaca, which is dominated by montane tropical forests. The region's biodiversity is among the highest in Mexico, and 95 percent of the territory is under common property governance regimes, largely by indigenous peoples. Because "negative attitudes and perceptions by humans towards jaguars are clearly the greatest imminent threat to the species' survival" (Rabinowitz, 2005), the study combined both ecological and social methods.

Camera-trap surveys in the region established the presence of at least two jaguars and 10 species of prey animals (Table 1). Human-jaguar interactions were explored through semi-structured and structured interviews in over 100 households in the four communities during 2007/08. Interviewees were legal community members aged 17 to 93 years old. Most (152 individuals) were crop farmers; 18 of these also engaged in small-scale cattle ranching. Only three were women, since few women are legal community members under Mexico's agrarian laws. Legal community members under the age of 60 are obligated to participate actively in decisions about natural resources management, land use and conservation, among other community governance issues. The interviews explored knowledge about jaguars, prey, wildlife and hunting, jaguars in traditional culture, livestock predation and conservation.

A total of 103 jaguar sightings were documented by 67 individuals – 83 since 1990 and 60 since 1999. The most common prey species mentioned were coati, armadillo, red brocket deer and peccary, all considered to be abundant both in forests and in agricultural areas (where they are considered pests). Notably, 79 percent of the interviewees valued jaguars for biological control of these pest animals.

Most farmers expressed positive (68 percent) or mixed (20 percent) attitudes towards

Jaguar sighted by a camera trap

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TABLE 1. Potential jaguar prey species photographed by camera traps in the study communities

Spanish common name	English common name	Scientific name	National endangered category
Armadillo	Armadillo	*Dasypus novemcinctus*	Yes: low risk
Hocofaisán	Great curasow	*Crax rubra*	Yes: threatened
Mapache	Racoon	*Procyon lotor*	No
Mazate	Brocket deer	*Mazama americana*	Yes: low risk, use restricted
Pecari	Collared peccary	*Tayassu tajacu*	Yes: low risk
Serete	Central American agouti	*Dasyprocta mexicana*	Yes: extinction risk
Tejón	Coati	*Nasua narica*	Yes: low risk, use restricted
Tepezcuintle	Paca	*Agouti paca*	Yes: low risk
Tlacuache	Possum	*Didelphis marsupialis*	No
Venado	Deer	*Odocoileus virginianus*	No

jaguars. The 12 percent that expressed negative attitudes were those with cattle: As in most regions, predation on livestock and domestic animals was the principal source of conflict between humans and jaguars (Table 2). Jaguar predation was commonly mentioned as a reason for a decline in the number of cattle in the four communities from a peak of around 300 in the 1980s to about half that in 2007/08. Lethal control of jaguars by humans had occasionally occurred. Respondents reported the killing of seven jaguars and one puma in past years, nearly all in retaliation for livestock predation.

The study confirmed that the Chinantec people have a deeply rooted cultural connection with jaguars, particularly manifested in a belief in *nahuales*, human beings who can change themselves into jaguars. Nearly 50 percent of the respondents said that they had heard stories about jaguars from parents or grandparents, and 63 percent – irrespective of age – said that they believed in *nahuales*.

The interviews suggested that a new awareness is emerging which may favour jaguar conservation. Interest in agriculture and cattle ranching has declined with outmigration, and the communities are attempting to turn to ecotourism and other conservation-oriented activities to raise income. Today the jaguar image is used as an icon for recent conservation-related institutions and cultural practices. In 2005 the communities declared community conserved areas, where hunting is banned, in nearly 80 percent of their territories; they also approved new community statutes which ban the hunting of red brocket deer as well as other jaguar prey species unless they are pests in agricultural areas. The statutes also ban the killing of jaguars but do not specifically prohibit retaliation killings. Most respondents (92.5 percent) were aware of the community statutes, and most felt that they received benefits from conservation, mostly from a programme for payments for hydrological services administered by the Mexican Government.

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Today the jaguar image is used as an icon in the region – as seen in this football shirt worn by a Chinantec villager

TABLE 2. Attacks on livestock and other domestic animals attributed to jaguars in four study communities during the past ten years

Animals attacked	Events reported[a]	Deaths reported	Events with jaguar sighting[b]	Deaths with jaguar sighting
Calves, cows	10	17	2	6
Chickens, turkeys	4	24	1	1
Dogs	10	16	3	6
Mules, donkeys, horses	4	5	0	0
Sheep	4	11	2	4
Total	**32**	**73**	**8**	**17**

[a] Reported by 28 farmers.
[b] Reported by 7 farmers.


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Communities are turning to ecotourism to raise income, building on the jaguar as a conservation image (jaguar sculpture near an ecotourism cottage)

These results suggest the possibility of positive prospects for conservation of large charismatic carnivores such as jaguars in community-dominated landscapes beyond protected areas. Jaguars still remain vulnerable to retaliation killings by those whose livelihoods are most directly affected; but the potential of alternative economic activities may further diminish the economic importance of cattle. Future research will need to establish the connectivity of this region with other adjacent regions which may also provide viable jaguar habitat, and the viability of economic alternatives to cattle for the few people who have them.

Bibliography

Rabinowitz, A. 2005. Jaguars and livestock: living with the world's third largest cat. *In* R. Woodroffe, S. Thirgood & A. Rabinowitz, eds. *People and wildlife: conflict or coexistence?*, pp. 278–285. Cambridge, UK, Cambridge University Press.