In the mid-1980s, I travelled extensively throughout the most remote areas of Mexico’s tropical wet forests. These forays were motivated by a desire to locate a place where the mammalian fauna would be maximally conserved and that could be used as a point of reference to describe and interpret what can happen to vegetation in the absence of mammalian herbivores – a situation I have termed “defaunation ecology”. Given the cryptic nature of defaunation, there is a danger that tropical ecologists might inadvertently be studying the ecology of plant communities in “empty” forests and may possibly arrive at conclusions that, although important, do not realistically represent the ecology of those ecosystems. I suspected that this was the situation in what had been, up until then, my primary study site – Los Tuxtlas, in the eastern state of Veracruz – regarding my own work on herbivory and forest regeneration.

So on my last expedition, together with my colleague Alvaro Miranda, I visited, for the first time, the forest around the Chajul Field Station (Montes Azules Biosphere Reserve) in the state of Chiapas. At that time, Chajul was the most remote and isolated rainforest site I had come across in my travels. This, of course, was a promising characteristic for our search for a well-preserved forest. To assess whether Chajul should indeed be our selected site, we first needed to gauge the mammalian “situation” of this remote place – an exciting adventure for us, especially because in those days there were rarely any visitors to the station. To that end, and with machete in hand, we established a roughly 2-km trail (transect), along which we conducted two types of observations: footprint detection and both diurnal and nocturnal animal sightings. For the former, we established small quadrats on the ground, each covered with finely sieved sand, to detect animal tracks. These “footprint stations” were visited twice a day; at the same time, we conducted the transect-based sightings. As the days progressed, we developed a consistent routine of silently moving along the trail, recording sightings and animal tracks. We recorded footprints whenever we came across them while walking along the transect, and then smoothed the quadrat’s surface so as to avoid repeat recordings. Once we had completed the entire transect, we walked back to the station. This routine soon revealed the existence of a rich mammalian bestiary at this site. This was a thrilling personal experience for me, since I was accustomed to working (without knowing it) in a heavily defaunated forest at Los Tuxtlas.

On one particular day, having reached the end of the transect, we discovered, as we walked back, a set of fresh tracks on some of the stations we had just smoothed over. To our astonishment, we identified them as the footprints of a large jaguar (Panthera onca), which had been moving – for who knows how long – in the same direction, right behind us, essentially stepping on our shadows! Since then, I have frequently tried to imagine – not without a certain flare of emotion, given the man-hours I’ve spent in this and other forests – how many instances there must have been of jaguars stepping on my shadow.

As fieldwork in this amazing place progressed, I gradually began to learn to listen to the “music” of the evenings. I was able to recognize the low-pitched call of the jaguar, accompanied by the bizarre songs of frogs,
toads, and other nocturnal vertebrates, as well as a cacophony of insect sounds. The realization that, although alone, we were surrounded by an exuberant – if secretive – accompanying fauna was an incredibly exciting and humbling experience.

The metaphor of “jaguars stepping on one’s shadow” is an affirmation of forest ecological integrity: if the forest sustains populations of jaguars (the pinnacle of the Neotropical terrestrial food web), such places are probably healthy (meaning they retain all the components that allow the functioning of the ecosystem). Furthermore, tropical ecosystem integrity can be reflected in a variety of spectacular manifestations, both ecological and emotional, as exemplified in the following instance from Chajul.

On one occasion when I was walking through the forest, I saw a tapir (Tapirus bairdii) in the distance, moving along the margins of the Chajulillo River. Quite oblivious to geopolitical protocol, it crossed the (unmarked) border and ventured into Guatemala. As I wanted to get close to the tapir, its displacement enticed me – having the same ignorance as the animal – to also move into the neighboring country. Fortunately, I did not have to go very far before the tapir generously presented me with a copious deposition of dung, which was much more than I had hoped for, because it allowed me to examine the remarkable dual capacity of this animal to be a foliage eater and a seed-dispersal agent – in addition to being one of the prey species of jaguars.

The metaphor of jaguars stepping on one’s shadow also provides several important lessons for conservation ecology. In some sense, the decline of jaguar populations is to tropical ecologists what canaries are to coalminers: indicators of dangers (ecological dangers in this case) resulting from habitat fragmentation, illegal hunting, and the host of synergistic calamities to which top predators are sensitive. The jaguars’ absence from tropical forests may, in turn, augur the unleashing of a host of cascading effects; for example, defaunation may also lead to the absence of insolent tapirs and the risk of certain plants not being dispersed by such animals. On the other hand, in the absence of jaguars (even in extensive forests), it is possible for tapirs, peccaries, agouties, mazama deer, or pacas to increase in abundance and potentially devastate the seeds and seedlings of several understory plant species, consequently affecting forest regeneration patterns. Furthermore, if defaunation is so intense that rodents are the only unaffected fauna, then, as we are already beginning to see in some tropical areas, the proliferation of these small mammals may represent a risk to humans, given that rodents can be important disease vectors.

My comment on the possible connections between defaunation and increased risk of human diseases leads me to a final recollection, this time of the human inhabitants of those remote tropical locations and their traditional knowledge. I recall the full-day hikes in distant locations within Chiapas, accompanied by Mayan (sensu lato) indigenous guides who were willing to show me how they assessed the situation of the fauna in their forests. From them I learned how to look for evidence of the presence of tapirs, peccaries, deer, felines, agouties, and other forest mammals. In addition, I learned about their survival skills. For example, after several hours of hiking, when hunger and diminished energy forced us to pause, I was astonished to see how easily my guide could make himself at home in the forest. He would diligently organize a comfortable spot for us to sit on; from his modest bag, he would pull out a small package of a corn powder of sorts (that had been kept in a neat folder of banana leaves) onto which he would then pour some fresh water, to furnish a tasty and surprisingly filling pozol drink. This drink, as I came to realize, was the equivalent of the almuerzo (lunch meal) for him. If necessary, we would repeat this beautiful ritual once more during the day. This feeding regime kept us going until sunset – when we returned to the original village or arrived at a different village to spend the night, and where we would finally enjoy a full meal, featuring corn tortillas with some chili sauce and forest fruits for dessert. The wisdom, strength, rituals, and survival skills of these indigenous people represent one of the most treasured memories of my life as a field ecologist exploring tropical forests.

In a very real sense, the threat to biodiversity that characterizes the Anthropocene – dramatically or cryptically manifested by tropical deforestation and defaunation – also represents a threat to the survival of ecological processes and interactions upon which we humans so much depend, as well as a hazard to the survival of traditional knowledge (including language and survival skills) of the peoples of the tropics. In sum, one of the most important lessons I learned through these travels is that ecologists need to engage in the study (and ideally, in so doing, help contribute to the preservation) of two of the most beautiful decorations of our planet: biological and cultural diversity.

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