



# Game masters and Amazonian Indigenous views on sustainability

Álvaro Fernández-Llamazares<sup>1,2</sup> and Pirjo Kristiina Virtanen<sup>1,3</sup>

Throughout the Amazon, notions of ownership and mastership shape the use of natural resources among many Indigenous communities. These ideas are reflected in the figure of *game masters* (i.e. spiritual beings who own the animals), which are widespread among Indigenous peoples across the Amazon Basin. In this paper, we explore the diverse biocultural manifestations of this socio-cosmology, focusing on the game masters' dynamic roles, histories and functions. Our review highlights the breadth and depth of ideas, practices, and rituals used to regulate humans' relations with these non-human agencies. It illustrates how the relations established between Indigenous communities and animals reflect both reciprocity and other asymmetrical types of dependency. This complex and sophisticated socio-cosmology underpins Indigenous understandings of sustainability in the world's largest tropical rainforest.

## Addresses

<sup>1</sup> Helsinki Institute of Sustainability Science (HELSUS), University of Helsinki, Finland

<sup>2</sup> Organismal and Evolutionary Biology Research Programme, Faculty of Biological and Environmental Sciences, University of Helsinki, Finland

<sup>3</sup> Indigenous Studies, Faculty of Arts and Humanities, University of Helsinki, Finland

Corresponding authors:

Fernández-Llamazares, Álvaro ([alvaro.fernandez-llamazares@helsinki.fi](mailto:alvaro.fernandez-llamazares@helsinki.fi)),  
 Virtanen, Pirjo Kristiina ([pirjo.virtanen@helsinki.fi](mailto:pirjo.virtanen@helsinki.fi))

Current Opinion in Environmental Sustainability 2020, 43:21–27

This review comes from a themed issue on **Indigenous conceptualizations of 'sustainability'**

Edited by **Pirjo Kristiina Virtanen, Laura Siragusa and Hanna Guttorm**

For a complete overview see the [Issue](#) and the [Editorial](#)

Available online 25th February 2020

Received: 26 August 2019; Accepted: 25 January 2020

<https://doi.org/10.1016/j.cosust.2020.01.004>

1877-3435/© 2020 The Authors. Published by Elsevier B.V. This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>).

## Introduction

Ideas of mastery and ownership of the natural environment, beyond the human, are manifested in the ontologies of many Amazonian Indigenous communities, in which several lifeforms (human and non-human) are

considered to be inter-connected [1,2<sup>••</sup>,3<sup>•</sup>,4<sup>••</sup>,5,6<sup>••</sup>,7]. For many Indigenous peoples, the world is governed by not only principles of reciprocity [8–10], but also other forms of asymmetry, such as predation or mastery [5,7], creating different relations of mutual interdependence between humans and non-humans. Consequently, many Indigenous groups have specific rules, restrictions, practices and rituals to regulate people's behavior in their relationships with non-human spirit agencies and the resources they protect (e.g. Refs. [11,12<sup>•</sup>,13,14]).

Complex webs of relations are therefore established with numerous non-human agencies, including the different spirits that are considered to inhabit the forest and own its resources, commonly referred to as game owners, chiefs of the forest or supernatural gamekeepers [15–17,18<sup>•</sup>,19,20<sup>•</sup>]. These *game masters* are spiritual beings considered to exist in different forms and places, in both visible and invisible forms, typically granting hunting success to those who adhere to various culturally prescribed rules and rituals established to lure, avoid, attract and/or show respect towards these non-human agencies [5,6<sup>••</sup>,7,17,18<sup>•</sup>,19,20<sup>•</sup>,21]. While the study of non-human subjectivity is a classic theme in Amazonian anthropology and ethnobiology [1,2<sup>••</sup>,3<sup>•</sup>,15,20<sup>•</sup>,22<sup>•</sup>], the last two decades have witnessed substantial advances in our ethnographic understanding of mastery relations in Amazonian social worlds [5,7], as the research focus has gradually shifted from symmetrical relations (e.g. reciprocity, mutuality) to asymmetrical ones (e.g. mastery, predation). Moreover, a growing number of studies have started to discuss the relevance of the mastery relations and game masters in the current context of widespread defaunation and unsustainable wildlife hunting across the Amazon (e.g. Refs. [11,15,16,18<sup>•</sup>]).

This paper revisits this body of literature, presenting the state-of-the-art of the complex and sophisticated Amazonian social order of mastership, and how it relates to patterns of hunting and forest resource use by Indigenous communities across the Amazon. More specifically, we analyze how the figure of game masters is reflected in Amazonian Indigenous customary institutions for wildlife management and how it shapes Indigenous understandings of sustainability in the largest tropical rainforest of our planet. We explore these questions through the lenses of onto-ethico-epistemological approaches as well as ethnobiological theory. Our review draws from *relational ontology*, based on the idea that existence is a result of entities' complex webs of relations with other subjectivities.

## Game masters: temporal and cross-cultural continuities

While the study of game masters has been significant in the Amazon, the figure of game masters has also been explored in other parts of the world (e.g. Ref. [23\*,24,25]). Archaeological and ethnographic studies trace a long historic continuity in hunting ceremonialism in relation to game masters [26,27], arguably preceding and transcending cultural divides [28]. As a case in point, rock art associated with hunting alludes to the existence of game masters amongst the Khwe people in Namibia [29]. Similarly, early iconography of animal guardians is very prominent in Ancient Mayan art [30], as well as in the early imagery of several Indigenous communities in North America (e.g. Ref. [31]).

Mastery relations, including spiritual entities similar to the figure of game masters, have been documented amongst many contemporary Indigenous communities around the world, including the Ainu of Japan [25], the Yukpa in Colombia [32] or the Yshiro in Paraguay [33], as well as several Indigenous groups across Siberia [34,35] and Mongolia [36]. Along these lines, ethnobiological accounts of animal guardians are common amongst many contemporary Mayan communities in Guatemala, Mexico, Honduras and Belize [24,28]. Similar ideas have been documented among many Indigenous groups in other parts of the world [23\*,37,38]. For instance, many Cree believe that unsuccessful hunts are a result of a person's failure to treat game spirits with respect [23\*].

Oral narratives of game masters are very common in the Amazon. There is growing evidence that the figure of game masters exists amongst many Amazonian Indigenous groups, such as the Tukano [19], the Makuna [9], the Siona-Secoya [13], the Achuar [2\*,21], the Mundurucu [39], the Tsimane' [15,17], the Mosekene [18\*], the Matsigenka [12\*], the Yagua [10], the Apurinã [40], the Manchineri [41], the Yanomami [3\*], and the Araweté [4\*\*], amongst many others. These game masters are known by a variety of names, including generic names such as *el Duende* in Bolivia, *Chullachaqui* in Peru or *Curupira* in Brazil [20\*]. In some cases, they are also known by culturally specific names. For the Apurinã of western Brazil, the game master is often known as *Awaru* or *Matatari*, but it can also be called 'the leader (*awetexi*) of the peccaries' (*irary*)=*iraryawēte* [40]. Amongst the Tsimane' of Bolivian Amazonia, animal masters are locally known as *a'mo*, but each of them has a specific name, such as *Jājābā*, game master, and *O'pito*, fish master [14,15]. For the Achuar in Ecuador, their gamekeeper spirit being is named *Amasan* [21].

Despite the wide diversity of game masters and the substantial variability in the manifestations of this complex socio-cosmology, there are a number of discernible patterns that transcend cultural divides, namely with

regard to: (1) mastery relations; (2) the rituals that are performed to negotiate with, and relate to, game masters; and (3) their axiological underpinnings. It is against this background that many Indigenous peoples' understandings of sustainability should be understood. Here we posit that, although the term 'sustainability' is relatively new to many of these communities, its core idea is deeply entrenched in the Amazonian Indigenous ontologies, epistemologies, and value systems around game masters.

## Mastery relations in Amazonian life-worlds

The existence of master spirits in Amazonian Indigenous life-worlds can be understood as a materialization of mastery relations. A common feature of all these cosmologies is that they extend agency and social institutions to animals, plants and other lifeforms [5]. The forest is therefore seen as an extended web of social relations, which entails the recognition that nature is endowed with agency and power [18\*,22\*,41]. Yet their relations with these subjectivities need to be carefully balanced and managed by an owner. Similar relationships exist in pet-keeping, between shamans and their auxiliary spirits, parents and their children, as well as leaders and their followers. In fact, many game masters are recognized as leaders of those who are dependent on them, and are therefore called 'chiefs' of the entities of their domains [40,41].

The ideas of ownership and mastery are present in many aspects of Indigenous Amazonian socio-cosmologies, meaning that when entities are owned by someone, they are dependent on them. Yet, at the same time, these entities can be cared for, looked after, fed, and nourished by their masters or owners [5,17,42]. Several authors note that the idea of ownership in Amazonia is not characterized by possessive individualism or domination, but rather by specific relationships between subjects, so that they belong to a domain of particular human and non-human beings [6\*\*,43]. In other words, objects become property by virtue of having been transformed, or made by, their owners. In the Bolivian Amazon, this idea of ownership is reflected in Tsimane' and Mosekene socio-cosmologies, in which game masters own big corrals or ranches where they keep, herd and breed wild animals [15–17,18\*]. Among the Matsigenka of Peru, the *Saangariite* guardian spirits ('invisible ones') raise all game animals as pets (i.e. curassows are the chickens, peccaries are the pigs and the jaguar is their watchdog; [44]). When hunters follow certain culturally prescribed rules and rituals, the owner spirit releases animals into the forest, making them visible to hunters [see also Refs. 15,18\*].

Master spirits, including game masters, are considered to have both control and authority over others, including their reproduction [1,12\*]. As a case in point, there are the master spirits of certain trees, stones or places that are often called their 'chiefs' [18\*], using in fact the same terminology used to refer to the chiefs of communities,

such as the *kuraka* among Quechua speakers, which refers to both the chiefs of humans and non-humans (e.g. Ref. [43]). Similarly, the Apurinã use the word *aw̃te* for their leaders or masters of various elements, including the owners of festivities. For example, the master spirit of the moriche palm tree (*Mauritia flexuosa*) is called *kinhar-yaaw̃te*, which literally means ‘chief of *Mauritia*’ [40].

These beings are not without history, and among the Runa people, for instance, game masters have similar features to early chiefdoms [45]. Moreover, in Amazonian myths and socio-cosmologies it becomes evident what T.S. Turner has called ‘the reflexive production of production,’ a reflexive process of meta-objectification that sustains and eventually loses maintaining life forces, usually obtained from animals [46•]. The way in which people interact with non-humans shows that the social positioning of beings as established by oral histories and Indigenous knowledge guides everyday actions and decisions [18•,19,20•]. The historicity of Amazonian peoples is embedded in the ways in which the ideas of ownership are defined, and historical processes as well as rapid social-ecological transformations (e.g. overhunting, overfishing) can also be reflected in the social organization of the spiritual world [40].

The notions of Amazonian Indigenous groups often differ from those of environmentalists and many others, and this difference is largely ontological (see Ref. [33] for an example from Paraguay). As such, the ideas of mastery of Amazonian Indigenous communities often clash with the framings under which conservation is generally implemented [18•]. V. Hirtzel has discussed different understandings of defaunation in Bolivian Amazonia, highlighting how conservation practitioners often see defaunation as a result of unsustainable hunting practices (e.g. commercial hunting), whereas the Yuracaré consider that animals escape because their master spirits are not carefully approached by the shaman to please them [47]. Similarly, for many Tsimané’ elders defaunation is a result of the discontentment of animal deities over the use of firearms by younger generations, which undermine the mutual pact between humans and spirits [15]. Among the Matsigenka, local faunal extinctions are said to occur when guardian spirits get upset over too much killing [44].

Given that many Indigenous communities think that natural and supernatural powers control to a large extent the relation between humans and nature, they often associate their own concepts of sustainability with rewards and retributions from non-human agencies. The symbolic dimensions of defaunation are therefore of direct relevance to any initiative aiming for sustainable wildlife management in the Amazon [15,16,18•].

### Negotiation with game masters

Shamanic rituals provide an opportunity to communicate with game masters, get first-hand information from non-

human agencies, and establish reciprocal relationships with them. Negotiation and communication with game masters requires intermediation through several material and non-material means, including specific objects, music, places, and natural substances, amongst other things [10,14,41]. Furthermore, different techniques, such as the use of voice, gestures, dreaming and/or silence (all of which are highly contextual), determine how to lure, attract, please or expel game masters and other owner spirits, instead of becoming their prey [42,48,49]. Here it is important to point out that for many Amazonian Indigenous communities, animals do produce language and speech, even if that language might not always be audible to humans [1].

Some studies have documented how some shamans in particular can accurately imitate the sounds of animals not only to lure game when hunting, but also to communicate with game masters [43,50]. Imitation and chanting, for instance, address both visible and invisible actors, and require deeply reflective processes from the subject in order to relate with non-human entities. In the negotiation with game masters, the shaman is often regarded as relating with what is called ‘the double’ (i.e. the human dimension of other beings). This dimension allows the shaman to adopt a different perspective, and therefore perspectivism is closely related to hunting activities, besides those activities that are associated with shamanism [1,42,48]. The enforcement of rules and rituals in relation to game masters has largely been in the hands of shamans or other shamanic knowledge holders, who perform a variety of functions, including healing, storytelling, enforcing law and order, and acting as wildlife managers [13,15].

Through chanting, shamans often implore the spirits to facilitate the hunt or show gratitude after a successful hunting trip [14,50]. The process is highly ritualized, and only through specific training can a novice learn to understand the indexical relations of chanting and its associated language, as well as the codes that refer to mythical knowledge [48]. Many of these ritual songs illustrate the powerful bonds of reciprocity that Amazonian Indigenous peoples have traditionally maintained with game masters and help to cultivate a philosophy of wildlife stewardship [42,50]. However, the role of song in the transmission of Indigenous knowledge and values is still an underresearched area [14,48–50]. Furthermore, the gender perspective of master spirits should also receive much more attention, as well as the gender differences in the negotiation with them.

### Axiological underpinnings of game masters

The basic premise underlying the socio-cosmologies around game masters is that they are entangled in a cosmic web of social relationships [41]. Such social relationships are respected through a set of culturally prescribed rules and guidelines that are encoded in Indigenous knowledge (see Ref. [16]). Through

traditional forms of pedagogy, younger generations are educated to respect and protect master spirits and acknowledge their presence when they are in the forest [9,51]. Myths and oral histories explain the origin of the different animals and their masters, and give detailed accounts of the negotiation established with game masters over many generations [18\*,40]. As a result of these acts of negotiation and following certain practices, humans can enjoy continual hunting success, and thus establish reciprocal relationships with game masters [15].

Game masters generally have ambivalent roles (see Ref. [6\*\*]): they can either lead hunters to places with abundant wildlife if they act respectfully towards them, or bring sickness or even death in response to conducts that are disrespectful towards the animals and/or their spirits, usually involving excessive use of forest resources [4\*\*,40,41]. These highlight Amazonian elemental values of reciprocity, care, and conviviality, which guide the moral acts of humans, as well as those of other lifeforms, most of which are considered to be sentient beings (e.g. Refs. [40,46\*\*], see also Ref. [52]).

Unbalanced relations with non-human agencies are thought to materialize particularly when a person becomes sick, or when a person undergoes corporeal puberty changes, as these moments are considered to be openings to the spiritual world [27]. Therefore, such times are controlled by various behavioral and alimentary restrictions during seclusion (i.e. when the person has restricted interaction with others), as then the person's body is vulnerable to permanent transformations. Corporeality is a central theme in Amazonian Indigenous thinking. As such, hunting practices generally require diets, corporeal purification, the use of medicinal plants, and moral behaviors that are associated with a particular type of body, capable of acting and relating with non-human entities on which hunters depend [11,12\*].

In Amazonia, human and non-human lifeforms are considered to depend on each other [41]. In other words, it is impossible to have a life at all if one is separated or detached from other human or non-human agencies. The whole concept of life is intertwined with ideas of movement, creativity, and circulation, as in order to have life, things need to be inter-connected and balanced [27]. Creativity in this context refers not only to individual creativity, but also to the effects of many other subjectivities on the individual [42,53]. These ontological aspects, involving different ways of knowing and value systems, play a crucial role in shaping Indigenous ideas of sustainability across the Amazon.

### Amazonian Indigenous conceptualizations of sustainability

There has been much debate around the sustainability (or lack thereof) of the hunting practices of Amazonian

Indigenous communities (e.g. Refs. [16,54,55,56]). While some research has shown how such relational ontological regimes can foster sustainable game harvests over the long term (e.g. Refs. [9,13]), others have argued that cultural factors (e.g. food taboos, cultural restrictions) do not always suffice to prevent game overharvesting and resource exhaustion (e.g. Refs. [21,57]). Furthermore, some authors have claimed that the loss and erosion of the cultural and spiritual values underpinning wildlife management have pushed Amazonian Indigenous peoples towards increasingly unsustainable hunting practices [16,58].

The contradictory results may arise because of research methods. Studies are based either on quantitative ecological data overlooking cosmological and symbolic dimensions of hunting [59,60], or on anthropological accounts that may fall short in acknowledging the rapidly changing relationships of Indigenous peoples with wildlife, as firearms and shotguns become widely available [60,61]. Deeper interdisciplinary dialogue is needed to fully understand the different ways in which socio-cosmologies around the figure of game masters adapt to, and/or get shaped by, new hunting practices both by Indigenous communities and outsiders [61]. With growing concerns over the fate of Amazonian biodiversity, research on the cultural, symbolic and cosmological dimensions of hunting should engage more closely with studies assessing the biophysical dimensions of hunting, and *vice versa* [60,61].

Although we are aware that Amazonian hunting practices might not always result in a sustainable model of wildlife management (e.g. Refs. [21,54]), we see that the moral values grounded within Amazonian Indigenous ontologies and axiologies construct and mobilize what is culturally understood as 'sustainable' hunting practices in many Amazonian Indigenous communities. Despite rapid social, economic, and ecological transitions [59,60]), Indigenous peoples across the Amazon continue largely to see the environment as a world of subjectivities in dialogue with human societies, where people must negotiate with animal masters in order to hunt or fish [6\*\*,58]. These masters are therefore fundamental actors that structure the relation between hunters and the subjectivities of the environment, influencing and regulating the use of natural resources [20\*,41].

Some authors contend that the cultural dimensions of hunting could be losing importance as firearm use becomes the norm across the Amazon [57]. Yet, research has shown that many Indigenous hunters still appear to avoid spiritual sites in their hunting trips, particularly those that are thought to be inhabited by game masters and/or other dangerous creatures [61,62]. Most of these sites continue to be associated with a specific material and immaterial cultural heritage (see Ref. [27] for an example from the geometric earthwork landscapes of the Upper



Purus, in the Brazilian Amazon), with hunting being generally prohibited in them [61]. While firearms have substantially transformed some aspects of Indigenous peoples' relations with wildlife [15,59,60], there seem to be significant levels of cultural continuity in socio-cosmologies around game masters [61,62]. Such socio-cosmologies should therefore be understood not as cultural isolates, but rather as complex, adaptive practices that continue to be interwoven into the fabric of Indigenous cultures in nuanced, subtle and often inconspicuous ways. In many communities, hunting continues to be conceived as a process of reciprocal exchange between hunters and non-human beings [18\*,40], even in those cases where hunting practices might not necessarily be sustainable.

We argue that the webs of domains of dependence, relationality and reciprocal relations in which several Amazonian Indigenous societies regard themselves enmeshed (i.e. not only with other human communities, but also with animals, plants and their spirits), underpin Indigenous understandings of sustainability. Here it is important to highlight that the relationship between Indigenous Amazonian hunting and environmental sustainability is complex and often paradoxical, with certain practices being sustainable despite the fact that they might be based on complex ideologies of predation and mastery [e.g. Refs. 5,6\*\*,60]. As such, equating Amazonian hunting practices with a universal ethics of environmental sustainability, while politically expedient, may be problematic and unrealistic. Indigenous concepts of sustainability draw on the idea that subjectivities depend on each other and involve constant inclusion based on dependence (in which entities are strictly controlled by their masters), but also respect towards, and reciprocity with, other entities (see also Ref. [33]). In other words, sustainability is ensured through its focus on sustaining relations with other non-human forms (see also Ref. [33]).

That being said, even if 'sustainability' is a relatively new term in many Indigenous communities, it does seem to match closely with some of their long-term attentive nourishing practices and onto-ethico-epistemologies, which define their relational life with nature and the spiritual world [5,6\*\*,7,9]. Irrespective of whether or not they foster sustainable wildlife management over the long-term, our review shows that these cosmological understandings are at the very heart of Amazonian Indigenous conceptualizations of sustainability. In fact, discourses on sustainability by many Indigenous peoples' political movements across the Amazon increasingly highlight the interdependence that exists among human beings, animals, plants and their spiritual worlds [58,63]. Given that many Indigenous communities do not accept human domination over nature (e.g. Ref. [20\*]), it makes sense for them also to associate their own hunting behaviors with non-human agencies with

whom their actions should be negotiated. Our point here is that Indigenous axiologies and social orders around game masters create relationships that largely explain how sustainability is understood in Amazonia. Further research is needed to examine the extent to which these understandings do promote sustainable wildlife management over the long run, particularly in the context of firearm use [60], and when wildlife becomes scarce due to patterns of habitat loss and deforestation [40].

Emphasizing that humans and non-humans are entangled in complex bundles of relations (cf. [3\*,46\*\*,64]) could help to promote innovative ways of operationalizing, conceptualizing and achieving sustainability on both local and global levels [12\*,20\*]. Indeed, notions of relationality with non-humans do play an important role in creating or blocking incentives for the sustainable management of wildlife [33]. We therefore believe that Indigenous onto-ethico-epistemologies in relation to non-human actors should deserve much more scholarly and policy attention than they have received up to date. Adequately understanding and recognizing the epistemic, philosophical and cosmological principles behind Indigenous peoples' management practices is therefore critical for ensuring their long-term sustainability. Finally, we argue that Indigenous peoples should be part of any conversation or debate on policy options around sustainability issues. We consider that it is fundamental to engage Indigenous peoples in the design of sustainability policies across scales in order to ensure that their ideas, understandings and views, including notions of reciprocity and relationality, are integrated when sustainability goals and targets are defined and implemented.

## Conflict of interest statement

Nothing declared.

## Acknowledgements

We would like to express our deepest gratitude to all our Indigenous collaborators over the years, without whom this study would have ever been brought to completion. We would also like to thank the two anonymous reviewers for their insightful comments and suggestions. Fernández-Llamazares has been supported by the Academy of Finland (grant agreement nr. 311176) and the Kone Foundation. Virtanen acknowledges the financial support from the Academy of Finland (grant agreement nr. 297161) and the University of Helsinki.

## References and recommended reading

Papers of particular interest, published within the period of review, have been highlighted as:

- of special interest
- of outstanding interest

1. Viveiros de Castro EB: **Cosmological deixis and Amerindian perspectivism**. *J R Anthropol Inst* 1998, 4:469-488.
2. Descola P: *Par-delà nature et culture*. Gallimard; 2005

•• This book discusses four forms of ontologies, animism, totemism, analogism and naturalism, through a distinction of exteriority and interiority. It documents the lack of a nature-culture divide among the Achuar Indigenous Peoples.

3. Kopenawa D, Albert B: *The Falling Sky: Words of Yanomami Shaman*. Harvard University Press; 2013  
This book shows how animals, plants and other non-human actors are experienced through visions, dreams, and visible and material world among the Yanomami people.
4. Viveiros de Castro EB: *From the Enemy's Point of View: Humanity and Divinity in an Amazonian Society*. University of Chicago Press; 1992  
This book discusses Araweté people's concept of personhood through its multiple dimensions, including animal. It draws on the ideas of alterity and the process of 'becoming' in Tupi-Guarani socio-cosmologies as defining qualities of the human being, emphasizing that non-humans are necessary in the process of becoming humans.
5. Costa L: **The Kanamari body-owner: predation and feeding in Western Amazonia**. *Journal de la Société des Américanistes* 2010, **96**:169-192.
6. Fausto C: **Too many owners: Mastery and ownership in Amazonia**. *Mana: Estudos de Antropologia Social* 2008, **14**:329-366  
This paper discusses the interactions between humans and non-humans through the concepts of ownership and mastery. It takes an ethnographic outlook on reciprocal categories in Amazonian societies that show how entities come to exist through relationships.
7. Fausto C: **Feasting on people: eating animals and humans in Amazonia**. *Curr Anthropol* 2007, **48**:497-530.
8. McElwee P, Fernández-Llamazares Á, Thorpe MA, Powys Whyte K, Middleton BR, Reed K, Sy WC, Moldawer AM: **Indigenous ecologies**. *Oxf Bibliographies Ecol* 2018 <http://dx.doi.org/10.1093/OBO/9780199830060-0199>.
9. Århem K: **The cosmic food web: human-nature relatedness in the Northwest Amazon**. In *Nature and Society: Anthropological Perspectives*. Edited by Descola P, Palsson G. Routledge; 2003:185-204.
10. Chaumeil JP: **Des sons et des esprits-maîtres en Amazonie amérindienne**. *Ateliers d'anthropologie* 2010, **34** 4000/ateliers.8546.
11. Virtanen PK: **Fatal substances: Apurinã's dangers, movement, and kinship**. *Indiana* 2005, **32**:85-103.
12. Daly L, Shepard Jr G: **Magic darts and messenger molecules. Toward a phytoethnography of indigenous Amazonia**. *Anthropol Today* 2019, **35**:13-17  
Through a cross-cultural comparison of the Makushi and Matsigenka people, this paper underscores the centrality of plant agency in Amazonian socio-cosmologies.
13. Vickers WT: **From opportunism to nascent conservation: the case of the Siona-Secoya**. *Hum Nat* 1994, **5**:307-337.
14. Reyes-García V, Fernández-Llamazares Á: **Sing to learn: the role of songs in the transmission of indigenous knowledge amongst the Tsimane' of Bolivian Amazonia**. *J Ethnobiol* 2019, **39**:460-477.
15. Fernández-Llamazares Á, Díaz-Reviriego I, Reyes-García V: **Defaunation through the eyes of the Tsimane'**. In *Hunter-gatherers in a Changing World*. Edited by Reyes-García V, Pyhälä A. Springer; 2017:77-90.
16. Luz AC, Paneque-Gálvez J, Guèze M, Pino J, Macía MJ, Orta-Martínez M, Reyes-García V: **Continuity and change in hunting behaviour among contemporary indigenous peoples**. *Biol Conserv* 2017, **209**:17-26.
17. Daillant I: *Sens Dessus Dessous: Organisation Sociale et Spatiale des Chimane d'Amazonie*. Société d'Ethnologie; 2003. 518 p..
18. Gambon H, Rist S: **Worldview matters: Mosaic ontology and resource use in the Pilón Lajas indigenous territory and biosphere reserve in the Bolivian Amazon**. *Hum Organ* 2019, **78**:54-63  
This article illustrates how the relational ontologies of the Mosaic people shape their life-world and how they manage natural resources in a co-managed biosphere reserve in Bolivia. The authors provide a number of recommendations for bridging ontological asymmetries between Indigenous communities and conservation practitioners.
19. Reichel-Dolmatoff G: **Cosmology as ecological analysis: a view from the rain forest**. *Man* 1976, **11**:307-318.
20. Combetti C, Thornton T, de Echeverria VW, Patterson T: **Ecosystem services or services to ecosystems? Valuing cultivation and reciprocal relationships between humans and ecosystems**. *Glob Environ Change* 2015, **34**:247-262  
This paper presents the concept of 'services to ecosystems' and highlights the philosophies of reciprocity that characterize Amazonian Indigenous Peoples' forest management practices.
21. Chacon RJ: **Conservation or resource maximization? Analyzing subsistence hunting among the Achuar (Shiwar) of Ecuador**. In *The Ethics of Anthropology and Amerindian Research*. Edited by Chacon RJ, Mendoza R. Springer; 2012:311-360.
22. Lima TS: **Um Peixe Olhou Para Mim (O povo Yudjá e a perspectiva)**. *Editora Unesp* 2005  
This ethnography looks at the socio-cosmological system of the Yudjá in Brazilian Xingu. It shows how human and non-human properties of the cosmos create a 'system of relationships', and how humans originated from a continuous process of differentiation from non-humans.
23. Nadasdy P: **The gift in the animal: the ontology of hunting and human-animal sociality**. *Am Ethnol* 2007, **34**:25-43  
This article discusses how, in many Indigenous communities, hunting is perceived as a process of reciprocal exchange between hunters and non-human beings, and argues that such ontological understandings should not be viewed just as symbolic or metaphorical.
24. Emery KF, Brown LA: **Maya hunting sustainability: perspective from past and present**. In *The Ethics of Anthropology and Amerindian Research*. Edited by Chacon RJ, Mendoza R. Springer; 2012:79-116.
25. Yamada H: **The "Master of Animals" concept of the Ainu**. *Cosmos* 2013, **29**:127-140.
26. Tedlock D: *Popol Vuh: The Mayan Book of the Dawn of Life*. Simon and Schuster; 1985.
27. Virtanen PK, Saunaluoma S: **Visualization and movement as configurations of human-nonhuman engagements: the geometric earthwork landscapes of the Upper Purus, Brazil**. *Am Anthropol* 2017, **119**:614-630.
28. Brown LA, Emery KF: **Negotiations with the animate forest: hunting shrines and houses in the maya Highlands**. *J Archaeol Method Theory* 2009, **15**:300-337.
29. Tributsch H: **Shamanic trance journey with animal spirits: ancient "Scientific" strategy dealing with inverted otherworld**. *Adv Anthropol* 2018, **8**:91-126.
30. Taube KA: **Ancient and contemporary maya conceptions about forest and field**. In *The Lowlands Maya Area: Three Millennia at the Human-Wildland Interface*. Edited by Gómez Pompa A, Allen MF, Fedick SL, Jiménez-Osorio JJ. Food Products Press; 2003:461-492.
31. Dye DH: **Animal pelt caps and Mississippian ritual sodalities**. *North Am Archaeol* 2017, **38**:63-97.
32. Halbmayer E: **Amerindian sociocosmologies of Northwestern South America: some reflections on the dead, metamorphosis, and religious specialists**. *J Latin Am Caribbean Anthropol* 2019, **24**:13-31.
33. Blaser M: **The Threat of the Ymo: the political ontology of a sustainable hunting program**. *Am Anthropol* 2009, **111**:10-20.
34. Ingold T: **Hunting, sacrifice and the domestication of animals**. In *The Appropriation of Nature: Essays on Human Ecology and Social Relations*. Edited by Ingold T. Manchester: University Press; 1986:243-277.
35. Willerslev R: **Not animal, not not-animal: hunting, imitation and empathetic knowledge among the Siberian Yukaghirs**. *J R Anthropol Inst* 2004, **10**:629-652.
36. Pedersen MA: **Totemism: Animism and North Asian indigenous ontologies**. *J R Anthropol Inst* 2001, **7**:411-427.
37. Brightman R: *Grateful Prey: Rock Cree Human-Animal Relationships*. University of California Press; 1993.

38. Siragusa L, Westman CN, Moritz SC: **Shared breath: human and non-human co-presence through ritualized words and beyond.** *Curr Anthropol* 2020, **61**.
39. Murphy RF: **Mundurucú religion.** *Univ Calif Publ Am Archaeol Ethnol* 1958, **49**:1-154.
40. Virtanen PK: **The death of the chief of peccaries – the Apurinã and scarcity of forest resources in Brazilian Amazonia.** In *Hunter-gatherers in a Changing World*. Edited by Reyes-García V, Pyhälä A. Springer; 2017:91-105.
41. Virtanen PK, Saarinen S, Kamppinen M: **How to integrate socio-cultural dimensions into sustainable development: Amazonian case studies.** *Int J Sustain Soc* 2012, **4**:226-239.
42. Cesarino PN: **Donos e duplos: propriedade e replicação entre os Marubo.** *Revista de Antropologia* 2010, **53**:147-199.
43. Gutierrez Choquevilca AL: **Sisywaytii tarawaytii: sifflements serpentins et autres voix d'esprits dans le chamanisme quechua du haut Pastaza (Amazonie péruvienne).** *Journal de la société des Américanistes* 2011, **97**:179-221.
44. Shepard GH: **Primates in Matsigenka subsistence and world view.** In *Primates Face to Face: The Conservation Implications of Human-nonhuman Primate Interconnections*. Edited by Fuentes A, Wolfe LD. Cambridge University Press; 2002:101-136.
45. Kohn E: **Animal masters and the ecological embedding of history among the Avila Runa of Ecuador.** In *Time and Memory in Indigenous Amazonia: Anthropological Perspectives*. Edited by Fausto C, Heckenberger M. University Press of Florida; 2007:106-129.
46. Turner Terry S: **The crisis of late structuralism. Perspectivism and animism: rethining culture, nature, spirit, and bodiliness. Tipiti.** *J Soc Anthropol South Am* 2009, **7**:3-42  
 This article is a critical review of structuralist studies of animism and perspectivism in Amazonia. It notes that a detailed and critical look on myths and oral histories can shed light on the code of logical oppositions and identities that constitute the cognitive structures of Amazonian cultures.
47. Hirtzel V: **Les gardes-parc et les maîtres des animaux. Protection, souveraineté et politique ontologique.** *Cahiers d'anthropologie sociale* 2007, **3**:65-80.
48. Déléage P: **Mythe et chant rituel chez les Sharanahua.** *Ateliers d'anthropologie* 2010, **34** <http://dx.doi.org/10.4000/ateliers.8566>.
49. Brabec de Mori B: **Sonic substances and silent sounds: an auditory anthropology of ritual songs. Tipiti: J Soc Anthropol Lowland South Am** 2015, **13**:25-43.
50. Fernández-Llamazares Á, Lepofsky D: **Ethnobiology through song.** *J Ethnobiol* 2019, **39**:337-353.
51. Fernández-Llamazares Á, Cabeza M: **Rediscovering the potential of indigenous storytelling for conservation practice.** *Conserv Lett* 2018, **11**:e12398.
52. Turner NJ: *The Earth's Blanket. Traditional Teachings for Sustainable Living.* University of Washington Press; 2005.
53. Santos-Granero F: **Beinghood and people-making in native Amazonia. A constructional approach with a perspectival coda.** *HAU: J Ethnographic Theory* 2012, **2**:181-211.
54. Sirén A: **Natural resources in indigenous peoples' land in Amazonia: a tragedy of the commons?** *Int J Sustain Dev World* 2006, **13**:363-374.
55. Ohi-Schacherer J, Shepard GH Jr, Kaplan H, Peres CA, Levi T, Yu DW: **The sustainability of subsistence hunting by Matsigenka native communities in Manu National Park, Peru.** *Conserv Biol* 2007, **21**:1174-1185.
56. Levi T, Shepard GH Jr, Ohi-Schacherer J, Peres CA, Yu DW: **Modelling the long-term sustainability of indigenous hunting in Manu National Park, Peru: landscape-scale management implications for Amazonia.** *J Appl Ecol* 2009, **46**:809-814.
57. Jerozolinski A, Peres CA: **Bringing home the biggest bacon: a cross-site analysis of the structure of hunter-kill profiles in Neotropical forests.** *Biol Conserv* 2003, **111**:415-425.
58. Le Tourneau FM: **The sustainability challenges of indigenous territories in Brazil's Amazonia.** *Curr Opin Environ Sustain* 2015, **14**:213-220.
59. Peres CA: **Effects of subsistence hunting on vertebrate community structure in Amazonian forests.** *Conserv Biol* 2000, **14**:240-253.
60. Shepard GH Jr, Levi T, Neves EG, Peres CA, Yu DW: **Hunting in ancient and modern amazonia: rethinking sustainability.** *Am Anthropol* 2012, **114**:652-667.
61. Read JM, Fragoso JMV, Silvius KM, Luzar J, Overman H, Cummings A, Giery ST, de Oliveira LF: **Space, place, and hunting patterns among indigenous peoples of the Guyanese Rupununi Region.** *J Latin Am Geogr* 2010, **9**:213-243.
62. Riu-Bosoms C, Vidal T, Duane A, Fernandez-Llamazares Á, Guèze M, Luz AC, Paneque-Gálvez J, Macia MJ, Reyes-García V: **Exploring indigenous landscape classification across different dimensions: a case study from the Bolivian Amazon.** *Landsc Res* 2015, **40**:318-337.
63. Stetson G: **Oil politics and indigenous resistance in the peruvian amazon: the rhetoric of modernity against the reality of coloniality.** *J Environ Develop* 2012, **21**:76-97.
64. Virtanen PK: **Ancestors' times and protection of Amazonian biocultural Indigenous heritage.** *AlterNative: Int J Indigenous Peoples* 2019, **15**:330-339.