International Journal of Research and Review in Applied Science, Humanities, and Technology
Vol 3, Issue 2 April-June 2026 ISSN: 3048-975X
https://ijrasht.com/

Cultural Ethnozoology: A Comprehensive Review of Traditional Animal-Based Knowledge Systems

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Abstract: Since the beginning of recorded history, faunal resources have been involved in many aspects of human life. Apart from their practical significance, animals have been acknowledged in various cultural contexts such as literature, music, art, religion and expressions of humans. A lower or higher pressure on the populations of exploited species is linked to the uses of animals and the methods by which they are exploited by humans, as well as to cultural aspects that govern interactions between people and animals. This can either reflect in the sustainable use of the exploited species or even contribute to their extinction. The field of ethnozoology, a subfield of ethnobiology that studies the knowledge that human societies have amassed about animals and their significance and applications, focuses on the variety of interactions that occur between humans and animals. Studies on ethnozoology can be very helpful in expanding our knowledge of the traditional, social, cultural, and economic roles that animals play. They play a major part in management and conservation in this setting. The primary forms of human-faunal interactions throughout history, their ecological ramifications, and the function of ethnozoology in animal conservation are reviewed in this work.

Keywords -Ethnozoology, Ethnoornithology, Ethnoherpetology, Historical ethnozoology, Ethnochthyology, Folk lore Ethnozoology, Traditional knowledge

1. Introduction

Throughout history, people and animals have had incredibly close relationships (Alves, 2012). One of the earliest documented human occupations is hunting, and animals have been hunted for practical purposes as well as protection from enormous predators (Ferreira et al., 2012). Products derived from fauna have a variety of uses, including food but they are also utilized as tools, clothes, and medicines (Inskip & Zimmermann, 2009). Many species, particularly birds, mammals, and, more recently, reptiles and amphibians, have been kept as pets (Posey et al., 1984). Strong spiritual ties have existed between the worlds of people and animals since ancient times; therefore, these links with animals go beyond simply utilitarian reasons (Verschuuren, 2006). Mythologies are found in all human civilizations, and they all demonstrate a strong integration and bond with animals. Human perceptions of animals changed long before people made the first attempts to depict them in art and history, and scientific research on them didn't start until much later. The preservation of biodiversity and natural resources is essential for both maintaining genetic diversity and ensuring the survival of large populations worldwide (Alves et al., 2010). However, the effects of human use of animals the subject of ethnozoological studies must be taken into account in order to develop effective conservation strategies for animals (Alves & Albuquerque, 2012). Currently, ethno-zoologists and other researchers are focusing their efforts on the following research areas, cultural perception and ethnozoological classification systems (Mourão et al., 2006), the significance and existence of animals in stories, myths, and beliefs (Ceriaco et al., 2011), biological and cultural aspects of animal use by human societies (Dias et al., 2011), techniques for obtaining and preparing organic substances extracted from animals for cosmetic,

ritualistic, medicinal, or food uses (Neto et al., 2011). Domestication, looking at the biological effects and cultural foundations of long-term management of faunal resources (Baenninger, 1995), biological heterogeneity and the cognitive processes involved in managing and conserving natural resources (Gillingham, 2001), collection methods and their effects on animal populations (Albuquerque et al., 2012). Native American communities possess a profound understanding of the environment and the biological resources they utilize and interact with, as demonstrated by ethno-biological research (Begossi et al., 2008). All cultures have traditional or local zoological knowledge, which is derived from the material or spiritual interactions between people and the local fauna. This information is acquired in parallel with academic knowledge, but both come from the same source the methodical observation of nature even though the interpretation of these observations varies depending on particular cultural contexts (Alves et al., 2005). Sadly, traditional knowledge has historically been disregarded by the scientific community (Ceriaco et al., 2011). Nevertheless, scholars from various fields are now realizing the value of traditional knowledge and are stepping up their research on this topic (Bagde & Jain, 2015).

2. Review of literature

It is inconceivable in this context to develop animal conservation strategies without considering people and their interactions with other animals, underscoring the significance of ethnozoological research. The primary historical and contemporary human-faunal interactions, their ecological ramifications, and the function of ethnozoology in animal conservation are reviewed in this work.

3. Relationships between humans and animals

Since the beginning of time, humans and animals have had a relationship that has taken many forms, reflecting influences from both the natural world and human culture. Depending on its intended importance and related cultural elements, a single species can be important for different societies in different ways and for different purposes. Animals typically interact with human communities either because of the risks they pose or because of their importance. Furthermore, a great deal of mythology, proverbs, and stories derived from these interactions have been transmitted orally from generation to generation, shaping the way the locals view animals. The primary channels of communication between humans and wildlife, which have been the subject of ethnozoology, are briefly covered here.

Animals as food: Since prehistoric times, people have utilized wildlife as food (Morris & Suckerman, 1976). Numerous fish, mollusks, birds, mammals, reptiles, and amphibians have all been eaten by humans, according to archaeologists (Emery, 2007). According to (Dias et al., 2011), there is evidence that humans hunted Mastodon at least 13,800 years ago, indicating the age of hunting practices. The search for these resources is evident in the evolution of several methods and approaches that define fishing and hunting, two of humankind's oldest pastimes. Indeed, due to their size and potential to provide a higher return on energy expended in hunting, mammals are the preferred food source (Santillán et al., 2019). It should be noted that other vertebrates may have an equivalent or even higher hunting significance in regions lacking in larger-sized mammals (Pareja et al., 2020). Around the world, populations of humans have relied heavily on reptiles as a source of protein. While crocodiles, snakes, and lizards may be significant local food sources, turtles are the most extensively exploited reptiles for human consumption. Freshwater turtles were a significant source of food for people living in the Amazon region even before European settlers arrived, as mentioned by (Nishida et al., 2006), particularly during the dry season. Amphibians have long been consumed and utilized culturally throughout Africa, examples can be found in Gabon (Ceriaco et al., 2011). Bushmeat is a valuable source of animal protein in both rural and urban settings, regardless of the animal group consumed (Newing, 2001). Hunting is important for many families, even in societies where the economy is based on agriculture and livestock; in some rural communities, hunting accounts for up to 80% of the meat consumed (Moloney & McGee, 2023). For instance, the annual consumption of reptiles, birds, and mammals by the rural population in the Brazilian Amazon alone ranges from 9.6 to 23.5 million, with an estimated total biomass of 67,173 to 164,692 tons. Every year, one to three million metric tons of dressed wild meat is consumed in the moist forests of the Congo Basin, Africa (Schönfeldt et al., 2013). Bushmeat as a matter of preference or as a luxury item/delicacy on special occasions; others eat it because they cannot afford them (Nasi et al., 2008; Newing, 2001). In fact, aquatic-based subsistence has been essential to the establishment of human populations in large geographic areas of the world, including the Caribbean and the insular Pacific, according to archaeological, historical, and ethnographic data (Rosa et al., 2005). Almost every contemporary human society in history has made use of aquatic resources,

such as lakes, streams, and oceans, to some extent. According to (Rosa et al., 2011), fisheries contribute significantly to the world's food supply by directly providing at least 15% of the animal protein. People eat and indirectly assisting in the production of food through the aquaculture and livestock industries (Castello, 2004). Given the rapidly growing human population and the developing countries' increasing demand for animal protein, it is anticipated that the market for fish will expand (Begossi et al., 2008).

4. The impact of wildlife on human health

According to (Alves & Rosa, 2013), throughout human history, there has been evidence linking animals and human health, from disease prevention to disease curing. People have connected the emergence of specific illnesses and outbreaks to the existence or impact of animals that are believed to portend misfortunes, illnesses, and demise (Wendimu & Tekalign, 2023). Nearly every type of blood-sucking arthropod is a vector for this disease, including deer and horse flies, biting midges, kissing bugs, bed bugs, black flies, lice, and fleas. Zoonoses are illnesses and infections that naturally occur between humans and vertebrate animals (Friant et al., 2022). Humans can be exposed to zoonoses in a variety of ways. These include well-known or well-understood direct transmission routes, like bites and rabies, as well as less evident pathways, the risk factors or potential exposure routes of which are linked in a network of relationships between humans, animals, and the environment and are difficult to recognize (Gbogbo & Daniels, 2019). Roughly 75% of newly discovered infectious diseases are zoonotic (Chomel et al., 2007). In certain instances, the animals function as carriers of the pathogens without exhibiting any symptoms (Alves, 2012). Eating animal products or using them in traditional medicine can spread dangerous and contagious zoonoses like rabies or tuberculosis (Barros et al., 2023). One other noteworthy example is the avian influenza (Influenza A) viruses, which can cause acute illnesses that are highly contagious in humans, pigs, horses, marine mammals, and birds (Health et al., 2023). From invertebrates to mammals, the exotic pet trade deals with a growing variety of wild animal species (Hassan et al., 2023). It is thought that wildlife markets may have been the source of epidemics like the avian influenza H5N1, SARS (severe acute respiratory syndrome) and monkey pox (Brown, 2004). Human activities such as handling bushmeat have led to the emergence of infectious diseases that pose a growing threat to humans and other animals (Nasi et al., 2008). Animals serving as human health sentinels as was previously mentioned, animals and humans experience a similar range of illnesses (Schönfeldt et al., 2013). As a result, animals may be sensitive environmental hazard indicators and serve as an early warning system for public health interventions (Loko et al., 2019). For instance, despite warnings of an impending human outbreak from monitoring of Ebola deaths in primate sentinels, insufficient preventive health measures were implemented, leading to an Ebola outbreak in central Africa (Schönfeldt et al., 2013). According to (Scotch et al., 2009) public health professionals are unlikely to react to animal mortality incidents that are not obviously caused by the West Nile virus or other recognized zoonoses, like rabies.

5. Conventional medicine

Humans have been known to consume or wear animal parts believed to have therapeutic or protective properties since the beginning of recorded history (Wendimu & Tekalign, 2023) this illustrates how the use of faunal elements for food and medicine are intertwined. In the same context, (Marcus, 2013) noted that the use of animal remedies to treat illnesses is a very old practice, with the carnivore diet being the most distant antecedent. Most traditional medical systems worldwide rely primarily on plants and plant-derived materials for their ingredients, whole animals, animal parts, and animal-derived products also play a significant role in the Materia medica (Mahawar & Jaroli, 2008). Zootherapy is a significant alternative to the numerous other recognized therapies that are used throughout the world in modern societies. Hooves, skins, bones, feathers, and tusks are just a few examples of the byproducts from domestic and wild animals that are used to make medicinal remedies that are protective, curative, and preventive (Adeola, 1992). Europe also employs zootherapeutic techniques. The need for traditional medicines has grown and it has been clear in recent years that traditional medicine contributes to the extinction of some species (Nishida et al., 2006). The use of wildlife for medicinal purposes puts additional strain on many species and has been linked to population declines. Therefore, it is important to take into account both the exploitation of these animals by the pharmaceutical industry as well as their use in popular medicine (Ceriaco et al., 2011).

6. Fauna as a drug source

Studies on the use of fauna as a source of drugs have only recently been produced, but they have shown the enormous potential of fauna as a source of natural products and drugs (Albuquerque et al., 2012; Chivian, 2002). Based on a comparison of the quantity of research conducted per species, plant chemistry has been studied 7000 times more than insect chemistry, despite the fact that there are at least 16 times as many insect species as there are plant species (Nakanishi, 1999). Since many people believe that harvesting reef organisms for the purpose of discovering and developing pharmaceuticals is unsustainable and poses a threat to conservation, there is growing concern about this practice (Sukarmi & Sabdono, 2008).

7. Animals in biomedical studies

The use of animals in scientific research has a significant positive impact on science and technology advancement by helping to identify preventative measures and treatments for human diseases over time (Bagde & Jain, 2015). Animals are used to develop new surgical techniques, evaluate the safety of novel chemicals used in the food industry, assess the effectiveness and potential side effects of novel drugs, ascertain the preventative and curative qualities of novel medicines against diseases, and verify the quality of novel drug and medicine batches (Palmer et al., 2023). Also animals include the identification of insulin, the creation of vaccinations to prevent various illnesses, and the manufacturing of serum (Health et al., 2023).

8. Pet animals

Pet ownership was widespread in hunter-gatherer societies as early humans discovered that relationships between humans and animals were essential to their own survival (Applebaum et al., 2023). It is known that many ancient societies kept, bred, and trapped animals as pets. Because of their close relationship, animals are now regarded as valuable members of human society and have helped people form strong bonds with some animals, as evidenced by the fact that many species have been and are currently kept as pets (Kirkwood, 1987). However (Park et al., 2023) offers what is arguably the broadest definition of domestication, encompassing not only companion animals but also wild animals that are tamed for human use and do not procreate in captivity. Parrots and macaws have been part of the domestic and international live bird trade since that initial contact (Gilbert et al., 2012). During this time, the commercialization of wild animals was not seen as illegal, and official correspondence contains records of numerous commercial orders (Gbogbo & Daniels, 2019). Birds and mammals (mostly dogs and cats) are preferred, other animals like amphibians, reptiles, and some groups of invertebrates are also becoming more and more popular as household pets (Palmer et al., 2023). Both tamed and wild animals are used in conjunction with medicine as co-therapists because they can help with a variety of crippling conditions and mental deficits (Melo et al., 2014). Interaction with animals has been shown to be an effective way to motivate and support people who struggle with mental illness, behavioral issues, or mobility issues. Children learn how to command respect, how to grow, and how to deal with new changes and situations when they play with pets like dogs, cats, and rabbits (Menache, 1998). Currently, among all the animals involved in the trafficking of wild animals, birds are the most traded group. Birds' vivid colors and vocal repertoire have long piqued people's interest, which is linked to this preference (Ferreira et al., 2012).

9. Animals in myth, religion, art, and symbolism

In addition to their economic value, people value animals because they have become part of our sense of place and are deeply ingrained in our cultural traditions (Silva et al., 2005). Among other significant facets of human culture, the significance of animals in culture has been expressed in literature, art, mythology, symbolism, and religion (James, 2023). According to (Frota & Casotti, 2023), artists have always been inspired by the grace and beauty of animal forms, and animals have been utilized by humans throughout history as symbols for religious, social, and political beliefs in literature and art. Religious practices and beliefs are among the most significant cultural traits that have long shaped how people view and use natural resources (Samakov & Berkes, 2017). Since ancient times, there has also been a supernatural aspect to the relationship between animals and humans (Alves & Souto, 2015). Animals have always been important to religions throughout history. Animals are revealed to play important roles in the formation of an individual's, clan's, and ethnic group's identity through totemic ideas and practices (Olupona, 1993). Animal gods gradually gave way to anthropomorphic goddesses and gods over millennia. Perhaps the most well-known figure in the Hindu pantheon is Hanuman, the monkey-god who fought alongside the hero Rama in the epic Ramayana (Frota & Casotti, 2023; Pareja et al., 2020). The Halloween "wicked witch," depicted with a devoted

spider by her side, is reminiscent of an ancient mother goddess (Alves et al., 2012; Kiehlbauch, 2018). With the shift from hunting and gathering to agriculture, figures with a combination of human and animal features became commonplace. Ancient Egyptian gods and goddesses frequently possessed the head of an animal a crocodile, baboon, jackal, cat, falcon, or ibis and the body of a human. The Hebrews had seraphim and cherubim, while the Greeks had their centaurs and satyrs. Garuda was the Hindu god Vishnu's carrier; he had an eagle's beak and wings but a man's torso and face. Al-Borak, the horse that Mohammed rode to heaven, was another amazing creature; she had the face and body of a woman and the ability to see the dead (Brady, 2010). The significance of animals in magic and religion has continued to this day, albeit on a lesser or larger scale and it differs substantially between cultures and their respective faiths. Though it is shared by major religions and a large number of people who do not practice any religion, indigenous people are most frequently linked to the belief in the spiritual value of nature (Kushwah et al., 2017). Numerous species have been and still are connected to religious rituals; in many nations across the world, altars and religious temples are decorated with animal remains; animals regarded as sacred, Zoomorphical, or Anthropozoomorphical gods are worshipped and participate in religious ceremonies (Neto & Alves, 2009). Animals have deep symbolic meaning they are good or evil, strong or weak, intelligent or stupid and are used as sacrificial offerings. Their body parts are also essential components of magical amulets and nasal ablutions (Moazami, 2005). In many regions of eastern and southern Asia, it is customary to release captive wild animals for spiritual or religious purposes (Gilbert et al., 2012). The practice, sometimes referred to as "prayer release," "merit release," or Feng Sheng in Chinese, has its roots in Buddhist teachings, though adherents of other faiths also partake in it to a lesser extent (Shiu & Stokes, 2008). Animal influence can also be seen in artistic and cultural expressions. The earliest known examples of human art are believed to be the animal-themed cave paintings. Early humans painted images of animals on pottery, rocks, and cave walls. According to (Spears et al., 1996) these animals served as symbols that could convey cultural meanings to both the people who drew them and subsequent generations. Animal sounds have both directly inspired and served as a source of inspiration for composers. Some people thought that animal songs and other natural sounds were the source of music as late as the 1500s (Turner & Freedman, 2004). Animal movements have influenced dance in many human communities, much like they do with music. Dances in which humans mimic the behaviors of apes and other animals are practiced today; these dances may have originated in the evolutionary past when Homo erectus developed the cognitive ability to deliberately imitate other animals (Borgi & Cirulli, 2016). Animals have been used by societies to symbolically convey significant cultural values, passing down morals through time (James, 2023). Most nations designate a closely related animal as their national emblem. In the folklore and mythology of the Andean regions of South America, for instance, the Andean Condor is a significant figure and the national symbol of Ecuador, Peru, Bolivia, Chile, Argentina, Bolivia, and Ecuador (Reid, 1957).

10. Animals in tools, decorations, ornaments, and other purposes

Humans have used easily obtained animal products, such as horn, bone, ivory, and antler, as ornaments and decorative materials since prehistoric times. The earliest humans coexisted with the creatures they hunted, consuming their flesh, making use of their hide, and crafting ornaments and weapons out of their bones and tusks (Kushwah et al., 2017; Potenza, 2023). Animals make a wide range of valuable contributions to this area of human welfare (Pritchard et al., 2005). Although less common than the use of stone and wood, the use of animal bones to make a variety of tools, artifacts, and everyday objects was already well known during the Old Stone Age (Paleolithic) in Palestine and many other parts of the Near East, as well as in areas far removed from those locations (Conard, 2003). Archaeological finds that have been interpreted by numerous renowned ethnologists and historians through their labors and observations serve as evidence of this (Alves et al., 2018; Sillitoe, 1988). Over the ages, many different wildlife products, such as ivory, coral, turtle and mollusc shells, reptile and other skins have been used as ornaments and decorations (Gössling et al., 2004). Among the primary groups whose products have been investigated for use as decorations or trappings are birds (Alves et al., 2018). Feathers were once thought to be a status symbol. They played a significant role in any tribal clothing found worldwide. Shamans or "witch doctors" in Africa wore feathered headdresses or necklaces, possibly paired with animal teeth and bird beaks. Native Americans believed them to have talisman powers and wore them as jewelry or headdresses. The quantity of eagle feathers worn on the bonnet denoted status even in Scotland, and even though it's an ancient. To emulate the qualities of the birds, some societies have incorporated the plumes of specific birds into their headgear. For example, it is thought that an owl's plumes could enhance one's ability to see in the dark (Sillitoe, 1988). Feathers are once again in style when it comes to jewelry these days; they usually hang from pendant necklaces or earrings. Since most birds with naturally exotic, colorful plumage are protected by conservation treaties, they are frequently dyed, though this does

not always stop their use. The majority of the feathers used are from game birds or domestic poultry like ducks (Almeida et al., 2023). Additionally, a variety of goods from marine animals are traded and used as trinkets, crafts, jewelry, souvenirs, and curiosities (Dias et al., 2011; Verma & Gupta, 2016). These trinkets and mementos are typically made from whole, dead marine animals or parts of them (Faulkner, 2001). Several hundred thousand seahorses are caught annually for trinkets. Dried seahorses are fashioned into earrings, brooches, and keychains and are popular curios in parts of Europe, Asia, and Latin America (Hunt & Vincent, 2006; Rosa et al., 2011). Additionally, various mammal products such as horn, leather, and teeth are utilized as decorations and trappings (Alves et al., 2018). Ivory was most likely the first organic material ever used by humans as ornaments. Science has discovered ivory sculptures from over 30,000 years ago (Conard, 2003). Although teeth or tusks from walruses, hippopotamuses, marine whales, dolphins, and members of the swine family like wild boar and warthogs have also been used, ivory is most commonly thought to have come from elephants (Drew, 2005). Elephant ivory has been prized for centuries and used to create jewelry, carvings, and other artifacts (Verma & Gupta, 2016). To make clothes and boots, numerous mammal, reptile, bird, and fish species' skins, furs, feathers, and fibers are traded internationally (Nweke, 2023).

11. Conservation and Ethnozoology

Simply put, humans are just one of the many species that make up the planet's biodiversity, connected by a web of interrelationships. In this sense, the human species affects its environment in the same manner as any other organism. However, due to a combination of cultural and genetic evolution, humans have emerged as the dominant species on Earth today (Melo et al., 2014), strengthening their hold on biodiversity. Humanity now faces a serious environmental crisis because of our actions. Because of this, the great majority of plant and animal species essential components of human life support systems are experiencing a decline in population, and many are already extinct (Mullu, 2016). Ethnozoological research is crucial to conservation efforts in this situation. The goal of conserving biodiversity is undoubtedly urgent and motivated by values, but conservation biology methods are grounded in science. Conservation needs a lot of different people to succeed. Not only does it need conservation biologists, but it also needs sociologists, political scientists, chemists, economists, psychologists, and humanitarians (Filho et al., 2023). Studies on ethnozoology that investigate how people view the species that are engaged in these conflicts could yield important insights into how to better conserve these species. The mythology surrounding vampirism is linked to negative attitudes towards bats (Prokop et al., 2009). Similarly, beliefs that the aye-aye *Daubentonia madagascarensis* is a harbinger of doom mean that it is frequently killed on sight, with some people believing that the entire village should be burned down and abandoned if an aye-aye is sighted. An additional illustration can be found in a study conducted by (Ceriaco et al., 2011) concerning folklore and traditional ecological knowledge of geckos in Southern Portugal. It is noted that the local populations have certain misconceptions about geckos, believing them to be poisonous and carriers of dermatological diseases. The persistence of these misconceptions has led to a fear and aversion towards geckos, which has resulted in direct persecution, which is currently one of the main conservation issues facing these animals. It is strictly forbidden to hunt or eat chimpanzees because they are a totem of the most powerful family in Bossou (Silva et al., 2005). World views support resource management systems and serve as the foundation for decision-making and action, along with values and norms (Robinson & Clausen, 2021). People who directly use these resources (i.e., hunters, fishermen, harvesters/collectors) are more likely to retain significant amounts of local or traditional zoological knowledge because the quality and reliability of their ecological observations has a direct bearing on how successfully they harvest or capture animals (Begossi et al., 2008). Studies on the uses of animals in each region can support plans for species conservation and environmental management that consider the social and economic realities of the affected human populations. These plans can also help to value the region's fauna from an ecological, economic, and social perspective (Teixeira et al., 2020). Many nations, particularly those in tropical regions with abundant wildlife, lose many species to the illicit wildlife trade, which drives them from their natural habitats.

12. Conclusion

An examination of the literature demonstrates our scant understanding of traditional animal medicine, even though most communities may use animals for medical purposes. A thorough examination of the literature reveals that almost every human society has utilized animals or their parts as therapeutic resources to treat and alleviate a wide range of illnesses. Ethnozoology has many aspects, the current study sheds light on its cultural aspects. Several ethnozoological topics, including folklore, omen indicators, weather indicator, animal-based folk songs, and human

animal relationships depict in fresco paintings. These factors must be documented because they are crucial to the conservation of animals and traditional knowledge which is vanishing with time. The literature mentioned above shows that while many researchers have focused their efforts on one facet of ethnozoology ethnomedicine very little research has been done on other, equally important, and still unexplored areas of the field.

13. Acknowledgement

We would like to express our sincere gratitude to the Department of Zoology, Maharshi Dayanand Saraswati University, Ajmer for providing the necessary resources and support for this review.

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