TRADITIONAL THERAPEUTIC USES OF ANIMALS AND ANIMAL PRODUCTS AMONG INDIGENOUS PEOPLE OF IDUKKI DISTRICT, KERALA, INDIA

by

SHIJITH S NAIR

(2019-17-012)

THESIS

Submitted in partial fulfilment of the

requirements for the degree of

MASTER OF SCIENCE IN FORESTRY

Faculty of Forestry

Kerala Agricultural University

DEPARTMENT OF WILDLIFE SCIENCES

COLLEGE OF FORESTRY

VELLANIKKARA, THRISSUR, 680 656

2021

DECLARATION

I, hereby declare that this thesis entitled **"TRADITIONAL THERAPEUTIC USES OF ANIMALS AND ANIMAL PRODUCTS AMONG INDIGENOUS PEOPLE OF IDUKKI DISTRICT, KERALA, INDIA" is** a bonafide record of research work done by me during the course of research and the thesis has not previously formed the basis for the award to me of any degree, diploma, associateship, fellowship or other similar title, of any other University or Society.

Shijith S Nair

(2019-17-010)

Place: Vellanikkara

Date:

CERTIFICATE

Certified that this thesis entitled **"TRADITIONAL THERAPEUTIC USES OF ANIMALS AND ANIMAL PRODUCTS AMONG INDIGENOUS PEOPLE OF IDUKKI DISTRICT, KERALA, INDIA"** is a record of research work done independently by Mr. Shijith S Nair under my guidance and supervision and that it has not previously formed the basis for the award of any degree, diploma, fellowship or associateship to him.

Place: Vellanikkara

Date:

Dr. M. Shaji
(Major Advisor, Advisory Committee)
Assistant Professor
Department of Wildlife Science
College of Forestry
Kerala Agricultural University
Vellanikkara

CERTIFICATE

We, the undersigned members of the advisory committee of Mr. Shijith S Nair, a candidate for the degree of **Master of Science** in Forestry with major in Wildlife Science, agree that the thesis entitled **"TRADITIONAL THERAPEUTIC USES OF ANIMALS AND ANIMAL PRODUCTS AMONG INDIGENOUS PEOPLE OF IDUKKI DISTRICT, KERALA, INDIA"** may be submitted by Mr. Shijith S Nair, in partial fulfilment of the requirement for the degree.

Dr M. Shaji
(Member, Advisory Committee)
Assistant Professor
Department of Wildlife Science
College of Forestry
Kerala Agricultural University
Vellanikkara, Thrissur

Dr P.O. Nameer
(Member, Advisory Committee)
Professor and Head
Department of Wildlife Science
College of Forestry
Vellanikkara, Thrissur

Dr. M. Krishnadas
(Member, Advisory Committee)
Assistant Professor (Agrl. Economics)
Dept. of Supportive and Allied Courses
College of Forestry
Vellanikkara, Thrissur

Mr. K. C. Ayyoob
(Member, Advisory Committee)
Assistant Professor
Dept. of Agricultural Statistics
College of Horticulture
Vellanikkara, Thrissur

ACKNOWLWDGEMENT

***Dr. M Shaji**, Assistant Professor (Wildlife Science), College of Forestry, has my deepest regard and appreciation for his direction, encouragement, regular evaluation, and remarks during the study period. I'd want to offer my heartfelt gratitude to him.*

*I'd like to express my gratitude to **Dr. P O Nameer**, Professor and Head (Wildlife Science), College of Forestry, for his insightful remarks and ideas throughout the research process.*

*I am grateful to **The Dean**, College of Forestry, for his moral support in helping me finish my research. I am grateful to **College of Forestry, Kerala Agricultural University** for providing financial and technical assistance for the completion of my project. I thank the **Kerala Forests and Wildlife Department** for permitting me to undertake field surveys in the state's numerous protected sites.*

*I am incredibly grateful to my advisory committee members **Dr. M. Krishnadas** (Assistant Professor (Agrl. Economics), Dept. of Supportive and Allied Courses, College of Forestry) and **Mr. K. C. Ayyoob** (Assistant Professor, Dept. of Agricultural Statistics, College of Horticulture) for their constant encouragement and constructive suggestions throughout the study period, and for the critical evaluation of the thesis.*

*I am extremely thankful to **Ms Shahina N N,** for giving valuable suggestions and constant support throughout the course of my work for my research. I would also like to thank **Sooraj Dev K, Sankara narayanan K, Mohamed Jaseel M, Sreehari P K** and **Arjun Anandan** for helping me in collecting data from the field. I also, extend my thanks to all teachers and staff in the College of Forestry for their support.*

*Special thanks to my dearest friends, **Ms PS Devika, Mr Sreehari K Mohan, Shifin S Ravuther, Mr Arjun MS, Adarsh V, Kavya T K and Mr Naveen Unnimenon** for their support, assistance and valuable comments.*

*I am very thankful to my friends **Ms Neha Tamhankar, Mr Vivek Noel, Mr Shibu C, Mr Azhar Ali, Mr Bhavane Akash Kailash, Mr Santhosh DT, Mr Sankar Thampuran, Ms Mamatha NA, Ms Devi SR, Mr Deepak Ranjan Sahoo** for continuous support. I will never forget the support and help rendered from **Ms Varsha, Ms Smisha, Ms Rajani, Ms Mini J** and **Ms Sobhana**.*

Apologies to those who were not mentioned above in person, and thanks to everyone who contributed to the successful completion of this research.

*Above all, I thank my **Family and relatives** for their blessings and guidance!*

Shijith S Nair

CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF PLATES

1 INTRODUCTION

Throughout history, people and animals have had extremely intimate relationships (Alves, 2012). Humans have always sought to comprehend animals, subjugate them, and harness their strength and might (Holley, 2009). For at least 1,500 years, archaeologists have discovered that humans have devoured a diverse range of fish, molluscs, birds, reptiles, mammals, and amphibians (Hamblin, 1985; Foster and James, 2002; Emery, 2007; Kysely, 2008) and maybe up to 4,000 years (Jorgenson, 1998). Rock paintings depicting wild animals like as horses, bison, and deer being pursued by human beings provide more evidence of early human-animal connections. This kind of data backs up Marques' (1995) claim that human-animal relationships have been a fundamental link in all communities throughout history.

Hunting is indeed one of the earliest known human occupations, and beasts have been pursued for both utilitarian and defensive purposes (Alves, 2012). Animal-derived goods are utilised in a variety of ways, including as food, clothes, and tools, as well as for medical and magical reasons (Alvard *et al*., 1997; Prins *et al*., 2000; Alves and Filho, 2007; Alves *et al.,* 2009; Inskip and Zimmermann, 2009). This long-term reliance has also aided the development of emotional bonds with specific animals, and numerous species, particularly mammals and birds, as well as amphibians and reptiles, have been kept (and continue to be maintained) as pets (Franke and Telecky, 2001; Alves *et al*., 2010). Since ancient times, there have been significant mystical links between the lives of animals and people , and these linkages with animals go far beyond simply utilitarian concerns (Alves, 2012 All human civilizations have myths, and they all reveal tight integration and relationships with animals. Totemic, ancestral, or mythical (imaginary) animals and animal-deities have existed throughout human history. (Allaby, 2010; Alves *et al.,* 2012).

Animal domestication is a great illustration of how important animals have been in human history. Early human cultures were able to supplement their meals with regular amounts of meat, milk, and skins because to this method. Later, as packs and riding animals, or for the pulling of ploughs and waggons, certain

domesticated animals supplied additional sources of physical energy, increasing men's productive capability while also their geographical mobility (Ribeiro, 1998).

As one can see, there have been millennia old interactions between fauna and people, and societies all across the globe have developed distinct methods of engaging with their local animals over time. Ethnozoology is indeed the investigation of the many connections (past and present) that human cultures have with animals. It is a field having origins as far back as the first human-animal partnerships. Human views toward animals evolved long before their first attempts to depict them in the history and arts, according to Sax (2002), and it was only much later when people began to study them professionally. As a result, ethnozoology may be regarded of as having its beginnings at the same time as humans, with the earliest encounters between our humanity and other organisms. Ethnozoology, in this perspective, is inextricably linked to human culture and civilization, despite the fact that they are not scientifically confirmed. Both good and bad elements of human-animal interactions can be found. On the plus side, many human communities develop a strong regard for animals, since these species play an essential role in their religions and philosophies because of their practical worth. Sacred sites with intrinsic spiritual or religious importance were commonly built by societies in Latin America, Asia, and Africa, and they were often natural biodiversity sanctuaries. Even though it is not their major motive, many traditional societies nevertheless regard particular animal species as holy and promote their protection (McNeely, 2001). Human groups, on the other hand, use animals and animal components in a variety of ways, and anthropogenic activities can have a significant direct or indirect impact on the local fauna (particularly target species), therefore these interactions must be addressed when conservation measures are being considered (Alves et al. 2010). Natural resource conservation and biodiversity are critical not only for preserving genetic diversity but also for ensuring the survival of large populations of people around the world (Alves and Souto, 2010). However, this will be impossible to develop meaningful animal conservation efforts without taking into account the effects of human animal usages, which is the priority of ethnozoological studies (Alves, 2012). As a result,

the current study provides a brief overview of ethnozoology, emphasising its relevance, historical context, and contemporary tendencies.

2. REVIEW OF LITERATURE

2.1 CONSIDERATIONS OF HISTORY

Although ethnozoological records such as rock art and historical inscriptions might be called ethnozoological records (Baker, 1941), written texts have more clearly preserved information about early human groups' contacts with local wildlife and their usage of those animals. Royal raids of wild bulls are well documented in ancient Egypt, such as, from the reign of Amenophis III in the late eighteenth dynasty (over 3300 B.P.) until these animals were regionally extinct. Horses, Cattle, and snakes, for example, became icons that were closely associated with strength or sexual functioning in these ancient cultures' (often exaggerated) religious views that certain faunal species shared significant factors with humans (Dodd Jr, 1993). In the cultural concepts of the period, animals were related to people in a variety of ways, and they helped to define royal institutions as well as consolidate nascent cosmologies that tied humans to celestial spheres, the earth, and the gods. Ancient cultures left behind hieroglyphs, papyrus papers, and other records that maintained their viewpoints.

While people and animals have a long history together, and humans have been learning about the fauna with which they connect for unimaginable generations, ethnozoology traces its roots to naturalists and explorers who spread across the globe beginning in the 16th century. As a result, some of the early ethnozoological texts include naturalists' works demonstrating interest in the wildlife as well as native people' zoological expertise. These naturalists gathered lists of native creatures, including their regional and scientific names, as well as explanations of their usage (Sillitoe, 2006). Since Columbus' first trip, information on the usage of wildlife by primitive populations in the New World has been collecting (Castetter, 1944). This practise persisted throughout the nineteenth and twentieth centuries, as evidenced by Darwin's journey on the HMS Beagle, throughout which he documented biological data regarding regional ecosystems, and Wallace's work in the Malaysian Archipelago. The zoological knowledge in these pioneering publications was also relied on Linnaeus' work - one of the well-known naturalists

of the period (Ellen, 2004). These publications might thus be interpreted as the origins of ethnozoology, since these European biologists and explorers aspired not only to focus on new parts of the world, but to also use its natural riches by identifying and documenting the animal species found there. However, some early ethnographers, such as Boas and Haddon, grew more interested in researching the local populations they met rather than the locations in which they found themselves (Sillitoe, 2006).

Naturalists' interests extended well beyond just recording how native communities used the fauna, and the active or passive assistance of these native communities was critical in the discovery of thousands of new life forms. As Moreira (2002) points out, 19th century naturalists dispersed over the globe and considerably expanded scientific knowledge at the time and the outcome of their scientific excursions was frequently reliant on the involvement of local or resident groups and their traditional wisdom. Naturalists systematised traditional knowledge, sifted it through the scientific worldview of the day, and then included it into the expanding universal scientific pool. In the particular circumstance of zoology, local populations were crucial in a variety of ways, including discovering, collecting, and labelling animals, arranging and preserving specimens, recognising "new" species, analysing their habits and practical features, taming certain "wild" animals, and developing methodologies and technologies for collecting and preserving them. Moreira (2002) highlights the significance of indigenous inhabitants for the scientific knowledge in a fascinating article by citing three prominent naturalists, Englishmen Henry W. Bates (1825-1892) and Alfred R. Wallace (1823-1913), and Swiss navigator Louis Agassiz (1807-1873), who all made expeditions to Brazil in the nineteenth century.

During their journeys, these scientists were extremely successful and made significant contributions to zoology by describing hundreds of species. During 11 years in the Amazon, Bates gathered 14,712 distinct species (mainly insects), with 8,000 of them being new to science. Businessmen, farmers, labourers, slaves, military personnel, Aborginals, and hunters are among the 135 persons named in his records across all walks of life who assisted him during field study and in the

localisation and collection of specimens throughout his excursions across the Amazon area. Similarly, numerous portions of Wallace's journey journals in Brazil, as well as many scientific studies based on these excursions, document local residents' assistance in collecting samples and mapping the Negro river. Wallace emphasised the value of native knowledge of the flora and fauna, as well as their geographic ranges, in his journals. Similarly, Louis Agassiz (who headed the Thayer Expedition from 1865 to 1866) emphasised the importance of local residents' contributions to the field work program's success by discovering and collecting Amazonian fish and documenting their behaviour.

It can therefore be shown that zoology and ethnozoology have overlapping histories, despite the fact that native communities' responsibilities have not always been fully acknowledged. Moreira (2002) noted that, despite numerous references to crucial assistance supplied by local residents in their trip logs and letters, this information was seldom widely disseminated due to the generally condensed character of scientific papers (books, reports, articles). This condition contributed to the formation of the image of scientists as "hero-explorers" who, by Herculean efforts, endured huge risks nearly alone, "discovering" large numbers of new species of animals and plants. Although it was frequently stated that these scientists had encountered hostile relationships between indigenous groups (which most likely occurred infrequently), little was said about the existence of these people, or how important their support and knowledge had been to the success of their scientific endeavours.

Native populations keep on going to provide much more than simple logistic assistance to zoologists and environmental scientists (research areas that frequently rely on native inhabitants) by indicating the best sites for mounting collecting equipment (and, in many cases, directly collecting specimens) - thus perpetuating the roles and practises that were available to early naturalists. Even today, however, the accomplishments of these indigenous people are hardly acknowledged. For example, Silvano and Valbo-Jorgensen (2008) noted that information drawn from local fishermen's ecological expertise assisted numerous later studies conducted by biologists and ecologists, despite the fact that these individuals were rarely directly

cited. These same authors asserted that ethnoecological input is frequently present (even if just between the lines) in research ostensibly focused on the environment (or zoological).

2.2 THE ORIGIN AND HISTORY OF ETHNOZOOLOGY

Ethnozoology is a branch of ethnosciences that aims to understand how people throughout the world have seen and interacted with faunal resources throughout history. Stearns (1889), the first article with an ethnozoological bent, described "ethno-conchology," the study of the usage of shell money (which would now be placed within the sub-area of ethnomalacology). The word ethnozoology, on the other hand, was first used in 1899 in Mason's piece Aboriginal American Zoötechny, which considered ethnozoology to be a branch of Zootechnology (Mason, 1899). Until the 1920s, the word ethnozoology appears to have been mostly forgotten (Santos-Fita and Costa-Neto, 2007). Ethnozoology was defined by Henderson and Harrington (1914) as "the study of existent cultures and their interactions with the animals in their environment.

Over time, several meanings of the word ethnozoology were improved. Ethnozoology, according to Overal (1990), is the study of human knowledge of animal uses. According to Marques (2002), it is the transdisciplinary study of human populations' ideas and perceptions (knowledge and beliefs), feelings (affective representations), and behaviours (attitudes) that serve as a bridge between human populations and animal species in the surrounding ecosystems.

Ethnozoology can be divided into sub-disciplines based on the animal taxon engaged in the study. Human interactions with other major animal taxa, such as insects (Ethnoentomology), fish (Ethnoichthyology), birds (Ethnoornithology), mammals (Ethnomastozoology), reptiles/amphibians (Ethnoherpetology), and primates (Ethnoherpetology), have resulted in several branches of ethnozoology (Ethnoprimatology).

Ethnozoology is a mixed-methods field that incorporates components from both scientific and social sciences. As a result, ethnozoological research studies,

whether in zoology, ethnography, ecology, or other related disciplines, aim to complement and more carefully monitor the complexities of human connections with their environments, shifting between open to interpretation Social Sciences methods and impartiality in the Biological Sciences. The histories of the evolution of ethnozoology and ethnobiology overlap since ethnozoology is a subset of ethnobiology. The history of ethnobiology may be split into three phases, according to Clément (1998): pre-classical, classical, and post-classical. This author observed that studies focused on gathering information about resource uses during the pre-classic period (which began around 1860), whereas during the classical period (which began in 1954), a significant number of linguistic studies and ethnobiological categorisation (most of which had an emic perspective) have been undertaken, with the growing use of anthropological methodologies. We are now in a post-classical period of ethnobiology, which began in 1981 (Clément, 1998) and is marked by the emergence of academic societies and specialised journals, as well as the convergence of many researchers on the study of natural resource management among various ethnic groups, promoting the integration of ethnobiology and conservation. In ethnobiology, the need of maintaining and controlling access to traditional/local knowledge, as well as sharing benefits from such information with people who contributed it, has recently been a hot topic.

Despite the fact that animals have played a significant part in all human societies since ancient times, animal-related studies have always trailed behind plant-related research. Henderson and Harrington (1914) coined the terms ethnozoology and ethnobotany in a ground breaking paper (the latter being a much older name). Although this study did not inspire much more research when it was initially published, a substantial corpus of knowledge concerning the use of animals by early civilizations could still be found in a range of publications that were not specifically focused on ethnozoology (Birket-Smith, 1976; Hornaday, 1889; Merriam, 1905).

The subsequent growth of ethnozoology within the academic sector was commonly coupled with research into ethno-scientific methodologies, notably the study of folk taxonomies, following the publication of the first publications clearly

focused on ethnozoology (Mason, 1899; Stearns, 1889; Sturtevant, 1964). Chamberlin identified the common names of animals used by the Goshute Amerindians of the United States in 1908, following the pre-classical trends of ethnobiology (Chamberlin,.1908). Ethnozoological studies concentrated on animal perception and classification in a later period. Malkin's ethnozoology of the Seri, Sumu, and Cora peoples of Mexico (Malkin, 1958) drew attention to the large number of taxa in folk taxonomies and to native knowledge of topics like sexual difference, development, and eating habits of local animals in this context. Various more ethnozoological research were conducted during this time period, exposing traditional civilizations' understanding of taxonomy, naming, and species identification principles. (Berlin *et al*., 1973; Bright and Bright, 1965; Diamond, 1966).

Ethnozoologists and other scholars are now focusing their attention on the following study areas:

a) Ethnozoological categorization systems and cultural perception (Fleck *et al.*, 1999**)**

b) Animals' significance and presence in stories, myths, and beliefs (Léo Neto *et al*. 2009)

c) The biological and cultural elements of human cultures' use of animals (Dias *et al.,* 2011;

d) Techniques for collecting and processing animal-derived organic compounds (for cosmetic, ritualistic, medicinal, or food uses, etc.) (Alves, 2009)

e) Examining the cultural foundations and biological repercussions of long-term faunal resource management is referred to as domestication (Digard 1992)

f) The cognitive processes involved in the management and conservation of natural resources are biological heterogeneity and cognitive processes (Alves and Nishida, 2002)

g) Techniques of collecting and their effects on animal populations (Alves *et al.* 2009).

2.3 THE IMPORTANCE OF ETHNOZOOLOGY

Native or local inhabitants have a strong understanding of nature and the biological resources they use/interact with, according to ethnobiological research (Alves et al., 2013). This knowledge has sparked interest throughout the world since it has been discovered that traditional information and methodologies may be used to supplement scientific understanding in areas such as environmental impact assessment, resource management, and sustainable development (Johannes, 1993).

Traditional or local zoological knowledge occurs in all cultures and is derived from the material or spiritual connections that humans have with the local wildlife (independent of the ethnic group involved). This knowledge coexists with academic knowledge, but both are obtained from the same source - methodical observation of nature - even if these findings are interpreted differently in different cultural settings. Both knowledge systems generate rich empirical data regarding natural occurrences and ecosystem component relationships (Alves and Nishida, 2002; Kimmerer, 2002; Nishida et al. 2006). Traditional knowledge has been traditionally marginalised by the scientific community (Tidemann and Gosler 2010), but its value is now being recognised by academics in several fields who are focusing their efforts on this topic (Kimmerer, 2002; Maffi *et al*. 1999).

People who directly use those resources (such as hunters, fishermen, harvesters/collectors) are more likely to retain significant local or traditional zoological knowledge, as their success at harvesting or capturing animals is inextricably linked to the quality and reliability of their ecological observations (Alves et al., 2009). As a result, these people have a wide range of biological knowledge that can supplement traditional academic knowledge in zoology, ecology, and biological conservation studies, and could be particularly useful in studies of population biology, ethnology, resource evaluation and management, patterns of climate and resource variations, interactions between species, relationships between abiotic factors and the fauna, ethnotaxonomy, and the sustainable use and adaptive adsorption of natural resources (Rosa *et al.,* 2005).

The study of local or traditional zoological knowledge not only provides fresh insights into biological processes, but also allows scientific assumptions to be cross-

checked (Nishida et al., 2006). For example, Alves and Nishida (2002) conducted ethnozoological study with "uçá" (Ucides cordatus) crab harvesters in Brazil. These tribes' livelihoods are inextricably tied to natural cycles, and they have a deep understanding of the species they rely on and the habitat (mangrove swamps) in which they collect. These scientists developed a hypothesis on the impact of tides on ecdysis (moulting) in U. cordatus based on crab harvesters' folk knowledge. Their findings showed that the process of ecdysis in this species occurs in its natural habitat for 28 to 29 days, which is significantly longer than the duration previously seen in laboratory experiments by Nascimento (1993). (who estimated that the moulting process took from 15 to 20 days). These contradictory results are most likely due to the difficulty of simulating tidal dynamics in a laboratory setting, which are common in estuarine ecosystems. As a result, the crab-harvesters' knowledge offered more exact data on ecdysis than was accessible in the technical literature. These fishermen also provided a wealth of information about the behaviour of these crustaceans during ecdysis and other critical stages of their life cycles, demonstrating how local zoological knowledge can not only subsidise but also complement academic knowledge by providing precise information about certain aspects of animal life cycles (especially economically important groups).

Ethnozoological data has aided in the study of taxonomy, inventories, and geographic ranges of animals, as well as the identification of new species in zoological research. The discovery of the hylid frog Litoria bulmeri was linked to the ethnoherpetological study of anthropologist Ralph Bulmer (who was also commemorated in the naming of the new species), according to Sillitoe (2006). To identify carnivorous mammals in the Reserva Natural del Bosque Mbaracayu in Paraguay, Zuercher et al. (2003) conducted genetic studies of Cytochrome-b found in the excrement of animals gathered by Amerindians and local residents. These writers emphasised the significance of local and indigenous knowledge in research efforts on regional animals and their interactions with their natural surroundings. Traditional zoological knowledge has also proven effective in estimating wild animal numbers quantitatively. Anadon et al. (2010), who worked with shepherds in southeastern Spain, are a wonderful example of this sort of initiative. These

researchers used the shepherds' traditional knowledge to collect data on the local abundance and population trends of the terrestrial tortoise Testudo graeca, quantifying the reliability of the shepherds' abundance estimates by comparing them to standard trapping techniques, and examining the complementary nature of these two approaches. Local knowledge was discovered to give high-quality, low-cost information regarding the distribution and abundance of T. graeca, as well as estimates of tortoise abundance, in an area much greater than that covered by the linear transects employed in their usual technique. Both techniques had similar abundance estimates, and cost assessments demonstrated that obtaining information through local knowledge was one hundred times less expensive than putting up and monitoring linear transects. Local knowledge might be used to supplement quantitative abundance monitoring programmes for a wide range of species, the scientists found, especially when population densities are low and typical field sampling methods are costly or difficult to implement.

Other work with fisherman have demonstrated the relevance of zoological knowledge kept by local communities, demonstrating that ethnoecology may offer meaningful biological data more quickly and at a lesser cost than typical field research methodologies (Lopes et al., 2010). Silvano et al. (2006), for example, found that Brazilian fisherman were well-versed on the diets and habitats of a variety of local fish species (some of which were barely known to conventional science). These same fishermen, on the other hand, lacked precise information about some species' reproduction, which could be due to a lack of contact with these fish during their reproductive periods (especially migratory species) or the fact that these species are typically caught before their first reproductive episode (Silvano et al. 2006). This fishermen's lack of information of fish reproduction does not negate the relevance of their understanding of other elements of these freshwater and saltwater species, such as nutrition and habitat preferences (Lopes *et al.,* 2010). For example, Marques (1991) developed a hypothesis (which did not appear to be particularly feasible at first) based on information supplied by fishermen concerning an important ingredient in an ariid catfish's diet. During his research,

the author was able to test this idea and contribute it to the increasing body of scientific knowledge regarding the trophic ecology of that species.

The findings of these and other studies support ethnozoology's importance as an essential instrument for conducting faunal inventories and zoological and ecological study. Investigations of regional animal uses can also help to value regional fauna from an ecological, economic, and social standpoint, as well as subsidise environmental management and species conservation plans that take into account the social and economic realities of the human populations that will be affected (Alves and Nishida, 2003). The last two elements are particularly beneficial during the early stages of developing programmes aimed at reviving endangered species (or those still poorly known). Local knowledge, despite certain inherent limitations, may be a valuable addition to academic research since it is based on long-term observations, is essentially free, assists in the identification of environmental problems, and welcomes the collaboration and excitement of local inhabitants.

Ethnozoological research can be conducted in both industrialised and non-industrialized civilizations, as well as traditional and non-traditional communities in rural and urban settings (Alves and Pereira Filho, 2007; Marques and Guerreiro, 2007). Overal (1990) attracted attention to ethnozoological occurrences inside our own culture when he stated that ethnozoology "begins at home" (as opposed to examining culturally distant societies). Animal trainers, people who "call in" cattle, pigs, and other animals, breeders of dogs and other pets, urban hunters, and breeders of fighting cocks and other animals kept for "sport" and betting purposes are among the groups and/or phenomena that could be studied from an ethnozoological perspective in both western and traditional cultures, according to this author.

Many live animals (both wild and domesticated) and various animal products can be found at public markets, making them ideal locations for ethnozoological research in urban areas (Alves et al., 2013; Williams et al., 2013). They are also traditional sites for exchanging and acquiring cultural information. These public marketplaces often feature separate areas where animals and animal parts are sold, depending on their size, and the merchants can give essential information about the

varied origins of such resources (Alves and Rosa, 2007). When reviewing conservation strategies for the same natural resources, information on the alien and native fauna of an area collected through public marketplaces should be highly beneficial (Almeida and Albuquerque, 2002; Alves and Pereira Filho, 2007; CITES, 2002).

Despite their cultural and economic significance, only a few ethnozoological studies have looked at these public marketplaces in depth (Alves et al. 2013). Legal considerations connected to the sale of wild animals (particularly those labelled as endangered) add substantially to the difficulties of openly accessing ethnozoological knowledge in public locations in many countries (such as Brazil).

The illicit trade in wild animals takes numerous species from their native habitats in various nations, particularly those located in tropical regions with diverse fauna. This is unquestionably one of the most serious threats to many native species, and ethnozoological studies are an invaluable tool for gaining a better understanding of the socioeconomic and cultural context in which the commercialization of wild fauna takes place, which is crucial for developing conservation proposals.

Ethnobiology is connected to (and has much to contribute to) natural resource management and conservation biology, as Begossi (2006) pointed out, especially since all conservation plans must address the issue of human uses of natural resources. Ethnoecology studies, according to Lopes et al. (2010), have made a number of contributions to conservation efforts, including: initiating dialogue between local communities involved in or affected by conservation initiatives; suggesting better resource-use strategies (and management alternatives); monitoring the abundance of resources used by human populations and the practical results of conservation management strategies; and a better understanding and interpretation of the results of conservation management strategies.

2.4 ETHNOZOOLOGICAL STUDIES IN INDIA

Because of the tremendous range in geographical and climatic circumstances that exist in India, the nation is endowed with vast faunal and floral biodiversity. There are around 45000 plant species and 81000 animal species (Borah, 2016).

Different tribal and ethnic tribes are spread throughout India, and members of these communities are quite educated about animals and their medical worth, as well as providing extensive information on the use of animals and their by-products as medicine. Because they live in outlying areas, there are no hospitals and other advanced medicinal facilities since they are rural areas, indigenous people are completely reliant on unique indigenous medicinal systems for health care. They use their traditional knowledge for medicinal purposes, which is passed down with the aid of oral communication through generations (Borah, 2016).

Although the Mount Abu wildlife sanctuary has done a lot of ethnobotany and medicinal plant research, there is a notable paucity of ethnobiological knowledge when it comes to animal products (Jaroli et al., 2010). In the Tadgarh-Raoli Wildlife Sanctuary in India, S. K. Sharma and Jain et al. conducted ethnomedicinal study among Garasiya people and identified various animal species used in traditional medicine (Jain *et al*. 2011).

Since the dawn of time, In the domains of zootherapy and traditional medicine, India has made significant achievements, which has been chronicled in works such as Ayurveda and Charaka Samhita. 24 Insects, 16 Reptiles, 21 Fishes, 41 Aves, and 41 Mammals are among the creatures described in the Ayurvedic system (Unnikrishnan, 1998). Animals and their products are used by many ethnic groups and tribal people in India today for the treatment of human illnesses.

Gupta et al. (2003) present the traditional knowledge of local populations in Gujarat's district Kachchh, identifying 34 animal and bird species that were employed in human and livestock primary health care Patil, 2003 discovered that tribals in Maharashtra utilise wild animal parts as well as plants as remedies. This

study evaluates 15 species of animals utilised as traditional medicinal resources by tribal peoples such as Bhils, Gamits, Koknas, and Pawaras. Different Naga tribes use twenty-six animal species and their products in their ancient technique of treating various diseases, according to Jamir and Lal (2005). In the vicinity of the Ranthambhore National Park (RNP) in India, 15 animal species were identified, with 20 medicinal applications (Mahawar, and Jaroli, 2006). A total of 38 species of animals from 16 groups were apparently being used in the medicinal purpose by the general population or the shoka community of Uttaranchal, India (Negi, and Palyal, 2007). In Arunachal Pradesh, India, Solanki, and Chutia conducted ethnozoological research and discovered numerous animal species utilised in traditional medical systems (Solanki and Chutia, 2009). 44 species of animals and associated products were recognized in the Attappady highlands of India's Western Ghats, which were used by the irular, mudugar, and kurumbar tribal people (Rajmohan *et al.,* 2017). Among the saharia tribes of Rajasthan, India, 15 animal species were identified as being employed for various ethnomedicinal purposes (Mahawar and Jaroli,2007). Jain *et al.* (2007) conducted an ethnomedicinal assessment among the several ethnic groups (Bhil, Meena, and Garasia) in India's Tadgarh-Raoli wildlife sanctuary and discovered many animal-derived compounds that may be used to treat a variety of diseases through traditional health care methods.

The Bhil tribe of Rajasthan uses animals to treat human and domestic cattle illnesses, according to Sharma (2002). In the Tirunelveli district of Tamil Nadu, ethno-entomological procedures indicated that roughly 11 species of insects were utilised to manufacture traditional medicine [Aja et al., 2004]. Honey, as a bee product, has numerous qualities, according to Banerjee et al. (2003), and has been utilised medically from time immemorial. It has promising antibacterial, anti-inflammatory, and wound-healing effects. Kalita et al. (2005) investigate the usage of plant and animal-based folk medicine in the Dibrugarh area of Assam for the treatment of eleven ailments. This research gathers data on the usefulness of 19 plant species and four animal speciesSolavan et al. (2004) conducted a survey among nine tribes in four districts of Tamil Nadu, India, to identify the traditional

medicinal applications of sixteen animal species, including six mammals, five birds, two reptiles, two arthropods, and one annelid, for the treatment of over 17 different maladies. Twelve mammals, one bird, one reptile, two amphibians, one fish, one mollusc, one annelid, and four arthropods are also used by the Chakhesang tribe of Nagaland to heal different maladies (Kakati and Doulo, 2002). He also conducted research with the Ao tribe of Nagaland, identifying twenty-five distinct vertebrate species for traditional medicinal purposes, some of which have been extinct (Kakati, 2006). Traditional healers and locals of the Bhopalpatnam district of Chhattisgarh, India, have reported on the therapeutic properties of three animals, according to Oudhia. These indigenous people have a wealth of traditional medical knowledge about common plants, insects, and other creatures (Oudhia, 2003). In Chhattisgarh, India, insects, mites, and spiders are utilised as remedies to treat both common and complex illnesses. The oil of the red velvet mite (Trombidium *grandissimum*), for example, is effective for paralysis. These mites are also known as Indian Viagra because of their propensity to boost sexual desire. (Oudhia P, 1995).

In Kerala, a total of 57 families, 66 genera, and 69 species of animals were identified, yielding 163 use techniques from Silent Valley National Park (Vijayakumar, 2015). An effort was also made to collect and acquire ethnozoological information of the indigenous native tribes of the Attappady hills in Palakkad district's Western Ghats regions (Rajmohan, 2017). Padmanabhan and Sujana (2008) recognised 44 animal species and their products, as well as the type of illnesses and treatment methods from Attappadi. A study conducted in the Wayanad district of Kerala recorded 29 animal species that are used for the treatment of 51 ailments (VinuMary *et al.,* 2019).

3. MATERIALS AND METHODS

3.1 Location of study

Idukki is a magnificent high range region in Kerala, recognized for its dense forests and mountainous hills. This second largest district of Kerala, in terms of size and tribal population, lies in the Western Ghats. Idukki has vast stretches of reserved and protected forests that cover more than half of the district.

The district is separated into 4 tahsils (Devikulam, Thodupuzha, Pirmed, and Udumpanchola), 8 blocks, 51 panchayats, and 64 villages making it one of Kerala's largest districts. The Western Ghats flank this picturesque district, which is bordered on the north by Kerala's Thrissur district and Tamil Nadu's Coimbatore district, and on the east by Tamil Nadu's Madurai and Ramanathapuram districts, Kerala's Pathanamthitta district lies towards south, while Ernakulam and Kottayam districts covers the west. Idukki, Kerala's most mountainous district, is named after the word "Idukku," which has a Malayalam meaning as "a small gorge". Beautiful mountains and beautiful green valleys make up the district.

Idukki is home to Anaimudi, southern India's tallest peak. High hills and forested valleys are braced by three main rivers (Thalayar, Periyar, and Thodupuzhayar) and their tributary branches in Idukki, an isolated region in Kerala. The Pamba River originates here as well. Idukki district is rich in protected areas which includes four national parks and four wildlife sanctuaries. This district is also home to Kerala's natural sandalwood forest sanctuary. Idukki is a rural area with little industrial development. It is not connected by air or rail. The district's primary source of revenue is tea cultivation. Pepper, rubber, cardamom, and coffee are the most important products produced in and supplied from Idukki.

3.2 People

Idukki is a rural area with minimal development of any kind. It is not connected to the rest of the world via air or train. Tea production is the district's main source of revenue. Pepper, rubber, cardamom, and coffee are the most

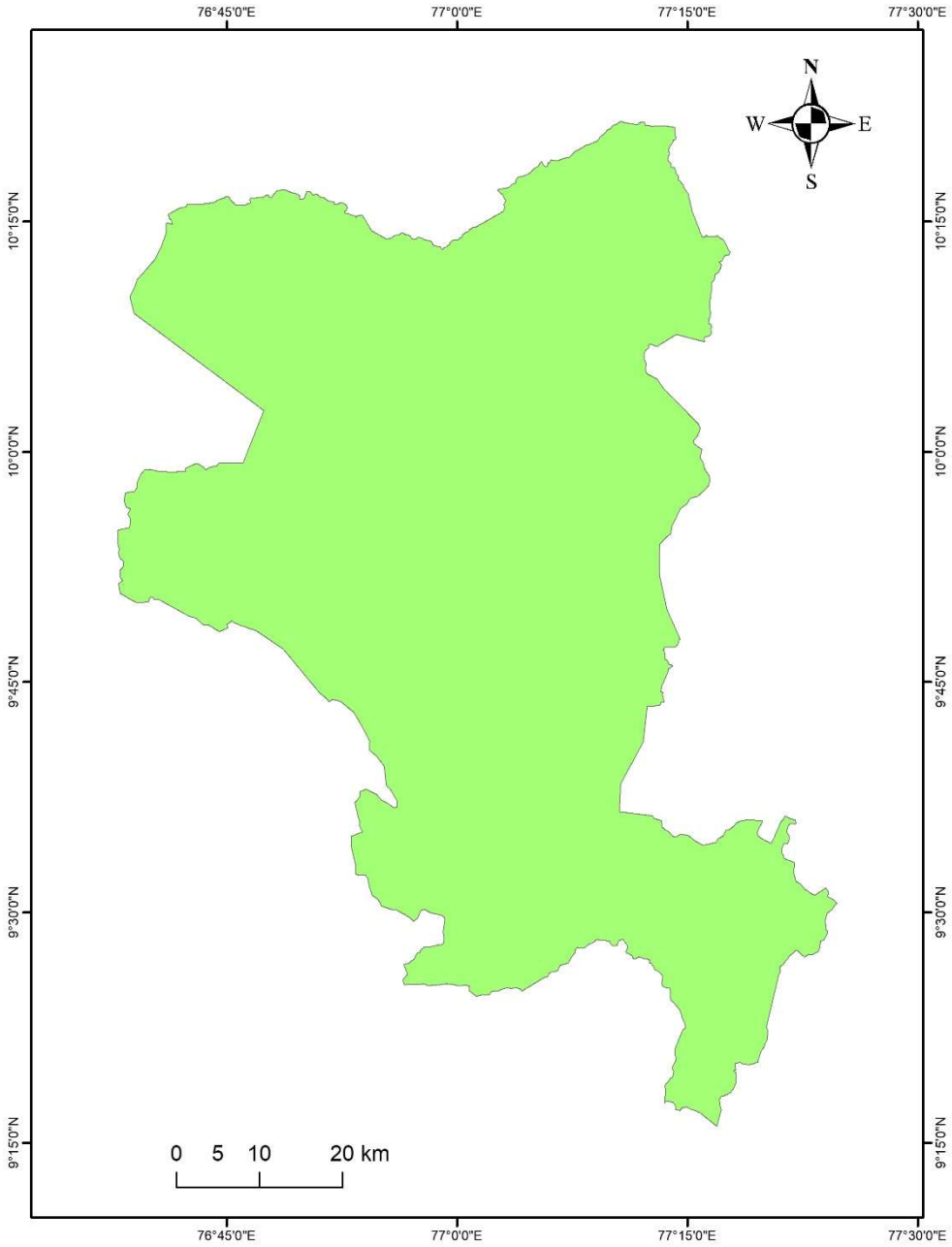

Plate 1. Map of study area- Idukki district, Kerala

Plate 2. Tribal settlements at Idukki district, Kerala

Plate 3. Tribal hut of Muthuvans

Plate 4. Tribal hut of Malapulayans





Plate 5. Tribal settlements of Malapandaram

important products produced in and supplied from Idukki. Between 1950 and 1970, a large movement of people from the plains (Tamil Nadu and other locations of Kerala) to this location happened (Manoj, 2001). Many of them who came to work as farmers and estate laborers stayed.

According to the 2001 census, the Idukki district has an overall population of 1,128,605 people, with a school enrollment of 89 percent. The natives practise Hinduism, Christianity, Islam, and tribal (animistic) beliefs. Over majority of the people is Hindu, roughly 40% is Christian, and a small minority is Muslim, according to the 1981 census.

Idukki is host to a sizable population of indigenous Proto-astroloid people (Manoj 2001). Only a handful of Idukki's tribal groups appear to be maintaining their ethnic distinctiveness. Many changes have occurred in the lives of these tribes as a result of education. Migrants from the plains have had a significant impact on their cultures and languages.

3.3 Languages

In the Idukki district, Malayalam, Tamil, and numerous tribal languages are used. Among those Malayalam is used to communicate with people from other communities. Some indigenous tribes, such as Muthuvan and Mannan, continue to communicate in their native tongues. Education in Malayalam and regular interaction with Malayalis, on the other hand, may induce or is causing a language shift in some indigenous communities. It indicates that among the Mala Arayan, Ulladan, and Urali, a transition to Malayalam has occurred or is occurring. These cultures' younger generations are assumed to be oblivious of their original language but would only know a few terms. The Paliyan and Mala Pulayan are supposed to speak Tamil-like dialects, although not with Malayalam or Tamil speakers. Menon (1996:141) claims that the Mala Pandaram's language is a blend of Tamil and Malayalam.

3.4 Tribes of Idukki

Idukki district is home to people from many indigenous tribes. In Idukki, the population of 30 distinct tribal groups was recorded in the 1991 census. The Integrated Tribal Development Programme (ITDP) says that nine main tribal groupings may be located here. Mala Arayan, Muthuvan, Mannan Urali, Ulladan, Paliyan, and Mala Pulayan are the biggest tribes. Mala Vedan and Mala Pandaram are also present in Idukki, although their numbers are far lower than the other groupings. The Muthuvan, Mannan, Paliyan, and Mala Pulayan are Tamil Nadu-related, but The Urali, Ulladan, and Mala Arayan tribes appear to have relocated to Idukki from other Kerala locations. In the current study, six major tribal groups were identified and surveyed. They are Muthuvans, Urali, Mannan, Mala Arayan, Mala Pulayan, and Mala Pandaram.

A detailed description of the identified tribal groups is given below.

3.4.1 Muthuvan

The Muthuvan are predominantly found in the Devikulam and Adimali blocks of Idukki's Devikulam tahsil. Some groups also live in the surrounding areas of the Udumalpet and Valparai tahsils in Tamil Nadu's Coimbatore district. There are several settlements in the Ernakulam district of Kerala, as a result of the recent division of the Idukki district. Muthuvan communities are commonly found on steep slopes in dense woods at elevations ranging from 3,000 to 6,000 feet MSL. Around Anaimudi, the highest hill in southern India, there are a number of Muthuvan villages (Singh, 1994).

Thurston (1909) cites a tale among the Muthuvan that claims they were originated from Madurai in Tamil Nadu. When Kannagi, a heavenly lady and the protagonist of the Tamil epic Chilappathikaram, departed Madurai after devastating it with her curse, she was accompanied by a group of people who went to the hills with her, their children, and their things on their backs (muthuku, in Malayalam). As a result, they became known as Muthuvan, which means "those who carry stuff on their backs." The Muthuvan continue to carry their children on their backs, which is unusual in Kerala.

Another theory is that the name is derived from the word mutu, which means "old" (Singh, 1994). Some writers use the spelling 'Muduvan' instead of Muthuvan. However, the spelling 'Muthuvan' will be utilised in this thesis. This organisation is not to be confused with 'Mudugar,' which is based in Palakkad, Kerala. Muthuvan is a scheduled tribe found in Kerala and Tamil Nadu. They are one of Idukki's most underdeveloped people groups. They also consider themselves superior to other tribes belonging to Idukki.

3.4.2 Mannan

The Mannan can be found in the Idukki district's Udumpanchola, Devikulam, and Pirmed tahsils. Their villages are strewn throughout the landscape. A few settlements can also be located in Tamil Nadu's Madurai district. The area has several hills and streams, and the majority of the communities are located inside wooded areas. Throughout the year, the Mannan rely on the forests for their survival. The villages used to be fully isolated and had no interaction with outsiders, but that is no longer the case.

Many of their settlements are situated at a height of about 1,000 metres above sea level. By the end of May, the southwest monsoon had arrived in their area, with the heaviest rains coming in June and July. In September, the northeast monsoon comes. The annual rainfall is around 250 millimetres (Menon, 1996).

Mannan is a hill tribe of Travancore, according to Thurston (1909). The Mannan are said to be Madurai kings' descendants, whom they accompanied to Neriya Mangalam. According to the Mannan's myths and tales, they came from Madurai, Tamil Nadu, to settle in their current territory. When compared to their original Madurai home, the hills of Travancore were lush with flora, wild animals, and birds. Their migration to the Cardamom Hills was prompted by a need for food.

"They were originally the dependents of the kings of Madurai," Iyer recounted in Menon (1996), citing one common narrative among them. They arrived to Cumbum Mettu and lived in the Cardamom Hills." The Mannan have unique characteristics and cultural heritage. The origin of the name 'Mannan' has

been explained in a variety of ways. According to Singh (1994), the Tamil word 'Mannan' signifies 'king.

'Mannan' is derived from'mannu' (which means 'earth' in Malayalam) and'manushian' (which means'man' in Malayalam):'sons of the soil,' according to Luiz (1994). The term'mannan' means 'leaders of the hill,' according to popular belief. The majority of Mannan people are small-statured, with short noses, thick lips, and dark eyes (Menon, 1996). The Mannan people of Kerala and Tamil Nadu are listed as a scheduled tribe.

3.4.3 Mala Arayan

'Mala Arayan' literally means 'lords of the hills.' The Mala Arayan were characterised by Thurston (1909) as a sophisticated hill people that resided on the slopes of high mountain ranges. Some of them are quite wealthy. They're mostly found in the Idukki and Kottayam districts' hilly areas. They are mostly found in the Idukki district's Ilamdesham, Idukki, Azhutha, Adimali, and Kattappana blocks. The Mala Arayan and Malayarayar communities are both scheduled tribes of Kerala, and their names are interchangeable.

Mala Arayan in Idukki has a population of 15,379 people, according to the 1991 census. According to the ITDP survey from 1999, Idukki has 4,432 Mala Arayan households. According to the 1991 census, the Mala Arayan community in Tamil Nadu has a population of 689 people. In the past, Mala Aryans spoke an unique dialect that was unintelligible to other Malayalis, but currently they speak the regional Malayalam dialect of their region (Menon 1996). Malayalam is their mother tongue, according to Singh (1994), and the same language is utilised for inter-group communication. The Malayalam script is used. According to one Mala Arayan, a few elderly persons living in remote areas may be familiar with their language. Their literacy rate was 77 percent in the 1981 census, the highest among Kerala's tribal populations. Christian missionaries established a number of schools in their region, which have given excellent educational opportunities for many years. According to the 1981 census, 53 percent of them are Hindus and 47% are Christians. Christians have a better financial situation.

3.4.4 Urali

Several Dravidian tribal groupings have been labelled as 'Urali.' The Urali people of Kerala live in the mountainous areas on the western slopes of the Idukki district's High Ranges. They are distinct and separated geographically from the Urali Kurumba of Kerala's Wayanad region, as well as the Urali of Tamil Nadu's Nilgiri district (Menon, 1996). They are mostly found in the panchayats of Upputhara, Kanchiyar, Vannappuram, Velliyamattom, and Ayyappankovil in the Idukki district. According to the ITDP data from 1999, the Idukki district has 1,295 Urali households. For years, both non-tribal and tribal individuals, such as Muthuvan and Mannan, have exploited the Urali people. Outsiders continue to defraud them by paying less for their agricultural products and forest collections (Shashi, 1946). Each village is made up of a single clan, each with its own kani (headman). Animism, totemism, magic, sorcery, and ancestor worship are all part of their faith. They believe in an eternal soul and a supreme god, Padachathampuran, who is formless and unknown and is the creator of the cosmos. Ayyappan and Kali are two Hindu gods they just accepted. According to the 1981 census, 96 percent of the population is Hindu, while just 4% is Christian. They bury their ancestors. To placate the soul, betel leaves and grains are placed in the mouths of the deceased.

The literacy rate among the Urali in Kerala was 56 percent in 1991, according to the census (49 percent among males and 42 percent among females). Malayalam is their mother tongue, and they utilise the Malayalam script, according to Singh (1994). According to Selvaraj (1999), Kerala's Urali Bhasha looks to be fading out as a result of the language transition to Malayalam.

3.4.5 Mala Pulayan

Mala Pulayan is a scheduled tribe mostly located in the Idukki district's Devikulam taluk. Hill Pulaya is the name given to them on the scheduled tribal list. According to the 1991 census, the Mala Pulayan have a population of 2851 (1463 males and 1388 females) in Kerala, and 2106 in Idukki (1079 males and 1027

females). According to the ITDP survey from 1999, the Idukki district has 860 Mala Pulayan households.

Kurumba Pulayan, Karavazhi Pulayan, and Pambu Pulayan are the three divisions among them. The Kurumba Pulaya assert supremacy by refusing to consume animal meat. Because they consume snakes, the Pambu Pulayan are regarded as the lowest. There isn't a lot of interaction between these two groups. Between these subgroups, there are differences in social practises and religious views. The muppan is the tribal council's headman among the Kurumba Pulayan. Their dead are buried in a sitting position. Kali, Mariyamma, Kottaparamma, Chaplamma, and Aragalinachi are the goddesses they adore.

Pongal, Thai Pongal, and Divali are their three major festivals (Menon, 1996). Mala Pulayan's Karavazhi and Kurumba subgroups both speak Tamil and write in the Tamil script. For inter-group communication, the Malayalam language and script are utilised (Singh, 1994). According to Menon (1996), the Mala Pulayan speak a dialect of Tamil that is incomprehensible to Tamil speakers and contains many Malayalam terms and phrases. They work in agriculture and harvest little amounts of minor forest products.

3.4.6 Mala Pandaram

Hill Pandaram is another name for Mala Pandaram. The bulk of them reside in Kerala's Kollam and Pathanamthitta districts, with the remainder in Tamil Nadu. Mala Pandaram has a population of 2839 people in Kerala and 1930 people in Tamil Nadu, according to the 1991 census. According to a 1999 ITDP survey, the Idukki district has only six Mala Pandaram households. They dwell in the Pirmed and Peruvanthanam panchayats in Idukki. The people claim to have migrated to Kerala from Tamil Nadu's Madurai and Thirunelveli districts. They stay in groups of three or four families for a period before moving on to another location. These locations are usually in the deep interior forests, far from any human settlements. They have a territorial chieftainship system, yet they are still among Kerala's poorest people. They are still seminomadic and at the stage of economic growth known as hunting (Menon, 1996). They speak a Malayalam dialect known as Pandaram Bhasha in the

area. The Mala Pandaram speak Malayalam and utilise the Malayalam script for communicating with others (Singh, 1994). They "speak a weak dialect with numerous Tamil and Malayalam words and phrases," according to Luiz in Menon (1996). Their faith is a blend of Hinduism and their ancestral beliefs. According to the 1991 census, 37% of Mala Pandaram residents are literate (44 percent of males and 31percent of females).

3.5 Data Collection

From November 2020 through July 2021, fieldwork was conducted. A total of 20 trips to the research region were made to gather data. Knowledgeable elders, local officials, and development agents nominated a total of 150 informants. A total of 90 people were chosen from a pool of 150, with 67 males and 23 women. Local residents between the ages of 20 and 65 years old were chosen as informants. The ethnozoological survey was conducted to obtain information on traditional animals used by local healers in the region to treat human diseases using traditional ways.

The survey was conducted utilising semi-structured interviews as well as group discussions. For conducting interviews and conversations, an English-language checklist of questions was produced. There were no formal questions in the questionnaire, and informants were free to speak freely and without being pressed. The local name of a particular animal, the types of diseases treated, the mode and method of remedy preparation, the parts of the animals used, the use of fresh or dry parts, the use of single or mixed animals for remedy preparation, the mode of administration, and the dose requirement were all key questions about animals. During the interview, sociocultural information about the informants was also gathered. The informants were questioned in their native tongue. The goal of the current study was also presented to each informant in order to alleviate any apprehensions they may have had and to reassure them that their information would be a valuable addition to the scientific literature.

3.6 Data Organization

The ethnozoological data was placed into an excel spreadsheet and summed up using graphical statistical approaches like percentages. The animals were classified according to their orders. Body fat, bones, honey, shells, and other parts employed by healers in the creation of ethnomedicines were divided into distinct groups. The route of administration was divided into oral and topical applications.

The basic categorization of the informants was carried out using data obtained from questionnaires such as sex, age group, and tribe.

3.7 Informant Consensus Factor (F_{ic})

The Informant consensus factor (Fic) was utilised to highlight animals of specific cultural significance and agreement in their usage in the examination of general animal use. The consensus of informants within a society and between cultural groups reveals which animals are commonly utilised, assisting in the selection of animals for pharmacological and phytochemical research (Teklehaymanot and Giday 2007). In order to employ this method, diseases were divided into groups, because animals with a high Fic are more likely to be pharmacologically efficient than those with a low Fic (Trotter and Logan, 1986). Fic values are typically in the range of "0.00 to 1.00." When a single or few animals are recorded to be used by a significant number of respondents to cure a certain condition, Fic levels are always higher, whereas low Fic values indicate that informants disagree about which animal to utilise. (Heinrich *et.al.,* 1998; Canales *et.al.,* 2005). The Fic can be calculated using the formula as follows:

$$F_{ic} = (N_{ur} - N_t) / (N_{ur} - 1)$$

where F_{ic} = informants' consensus factor, N_{ur} = number of use citation counted in each category, and N_t = the total number of species utilised.

3.8 Fidelity Level (FL)

The Fidelity level is important for determining which species are chosen by key informants for treating specific diseases. Animals that are commonly employed by locals for a certain function have greater FL values than those that are less commonly used. The percentage of informants who claim to have used a certain animal species for the same principal purpose is shown by the fidelity level. This is used to determine how important a species is for a certain purpose. All of the diseases that were reported are categorised into main classifications before the FL values are calculated (Teklehaymanot and Giday, 2007).

FL value was estimated using the formula

$$FL = I_p/I_u \times 100$$

where I_p is the proportion of respondents who said they used animals to treat a certain major illness and I_u is the number of individuals who said the same animal helped them with whatever disease (Friedman *et al.,* 1986). It is considered that animals that are utilised for the same ailment category on a regular basis are more probably to be physiologically active. (Trotter and Logan, 1986).

4. RESULTS

In Kerala, some tribals were more or less isolated from the modern world and continue to use different wild and domesticated animals and plants for food, medicines, rituals, game, religious purposes, and so on. They hunted many creatures out of need, not to upset the ecosystem's equilibrium, but to give required nutritional content to their dietary system for life's sustenance. Many species, including birds, have proven to be a valuable source of food for tribals in various parts of Idukki, depending on their availability.

The tribals are rarely choosy in their animal diet, except for certain creatures associated with religious belief, folklore, and mythology, and this varies greatly from one group to the next. Wild boar, chital, sambar deer, tortoise, frog, crab, fishes, insects, molluscs, and other common animals, on the other hand, were in high demand among tribals for food because they were easily available.

In addition to this various animal body parts are frequently employed by tribals for a range of household uses. Some of the examples for this include antlers being used to make handles of knives, animal skins for making their festival musical instruments, ornaments from various animal products, and so on.

Our tribal groups employ a wide range of remedies originating from both invertebrate and vertebrate species. When it comes to the usage of animals as medicines, tribals have traditions that are based on particular species that are available in their surroundings. This indirectly demonstrates the genuineness of tribals use of such medicines, which has grown through time in their healthcare systems. Against this backdrop, gathering information on the animal species used by tribal groups and their methods is critical for developing a strategy and action plan for the conservation and sustainable use of animal resources.

This report aims to fill scientific gaps in these areas by documenting various ethnozoological remedies and end uses, as well as scientific evaluation, thereby it

can act as a foundation stone in conserving wildlife resources and ensuring sustainable utilization of animal resources in the Western Ghats and South India in general.

Tribals believe that consuming human urine on an empty stomach is good in curing some kinds of infections, maintaining a good immune system, preventing loss of eyesight, maintaining an energy level throughout the day, etc.

Entire organisms and their body products like flesh, fat, tongue, bone, as well as their products like egg, honey, and even the metabolic products like excreta (dung), are used in traditional medicine. More than thirty-two diseases, such as rheumatism, asthma, piles, arthritis, erectile dysfunction, bronchitis, etc. are cured with the help of animal drugs.

4.1 Demography of Informants

The demography of informants was collected through direct interviews. The total number of informants thus obtained are classified into various categories based on demographic features such as gender, age class, tribes to which they belong, and education.

Table 1. Percentage wise gender distribution of the informants

Gender	Number of informants	Percentage
Male	62	79.49
Female	16	20.51

Table 2. Percentage wise age class distribution of the informants

Age class	Number of informants	Percentage
Young aged (20 to 35 years)	10	12.82
Middle aged (35 to 50 years)	23	29.49
Old aged (50 and above)	45	57.69

Table 3. Percentage wise educational qualification of the informants

Educational qualification	Number of informants	Percentage
Uneducated (literate)	11	14.10
Attended school	40	51.28
Finished middle school	18	23.08
Finished high school	9	11.54

Table 5. Number of informants surveyed in different tribal groups

Tribe	Number of informants	Percentage
Mannan	7	8.97
Muthuvan	25	32.05
Urali	15	19.23
Malaarayar	12	15.38
Malapulayan	8	10.26
Malapandaram	11	14.11

Despite the existence of sound traditional therapeutic knowledge, the majority of people rely on treatments provided by professionally certified medical practitioners. In addition to this, traditional healers are referring their patients to hospitals and other institutions. Furthermore, every village is either visited by a doctor on a regular basis or has a government health centre at a convenient location. The people are also well-informed in this regard.

4.2 Ethnozoological observations

A total of 25 animals are recorded through this study among the six major tribes of Idukki. Among the 25 animal species, identified as important sources of tribal medicine, three are invertebrates, such as Citellates, and Insects, while twenty-two are vertebrates, such as Actinopterygii, Amphibians, Reptiles, Aves, and Mammals, among others. Where most of the contribution is by mammals.

4.3 Ailment categories

All of the reported illnesses were classified into 11 categories created in accordance to the traditional healers' knowledge in the research region. Some disorders are categorized into one based on the target organ of action. They include hair care (HC), psychology ailments (PA), eye ailments (EA), poisonous bites (PB), neurological disorder (ND), dermatological infections/diseases (DID), gastro-intestinal ailments (GIA), genito-urinary ailments (GUA), respiratory systems diseases (RSD), skeleto-muscular system disorders (SMSD) and general health (GH).

Table 6. Class wise arrangement of animals reported during the research

SL. No.	Class of animals	Number of species reported	Percentage
1	Citellates	1	4
2	Insects	2	8
3	Actinopterygii	1	4
4	Amphibians	1	4
5	Reptiles	5	20
6	Aves	6	24
7	Mammals	9	36

Table 8. Number of animals reported in each ailment category

SL. No.	Ailment category	Number of animals	Percentage
1	Haircare (HC)	2	6.25
2	Psychology ailments (PA)	1	3.13
3	Eye ailments (EA)	1	3.13
4	Poisonous bites (PB)	2	6.25
5	Dermatological infections/diseases (DID)	2	6.25
6	Gastro-intestinal ailments (GIA)	2	6.25
7	Genito-urinary ailments (GUA)	3	9.38
8	Respiratory systems diseases (RSD)	8	25.00
9	Skeleto-muscular system disorders (SMSD)	3	9.38
10	General health (GH)	8	25.00

4.4 Method of application

The two main methods of application of traditional medicine among the tribal groups of Idukki are oral and topical. The oral intake includes those which are edible and are consumed directly or by converting them into forms such as cooked, boiled, decoction, paste, mixtures, and soup. While topical medicines are those medicines which are applied to specific target area on or inside the body which only

acts on applied areas. Topical administration means the application of medicines to target locations either directly or in the form of oils and mixtures.

4.5 Medicinal animals

The use of animals for therapeutic reasons has been proven to be a significant alternative to medicines offered in pharmacies in the area investigated. A total of 25 species belonging to 7 classes have been identified as possessing therapeutic properties.

Table 9. Method of application in animals reported during the study

Method of application	Number of animals	Percentage
Oral intake	21	65.6
Topical administration	11	34.4

Table 10. Usage of different animals for therapeutic reasons

SL. No.	Common name	Classification	Disease treated/ Purpose	Part(s) used	Medicine preparation
Citellates					
1	Leech	Kingdom: Animalia Phylum: Annelida Class: Clitellata Order: Hirudinida Family: Hirudinidae Genus: Hirudo Species: *H. medicinalis*	Swellings	Whole animal	Leech made to bite target location and suck blood
Insects					
2	Red weaver ant	Kingdom: Animalia Phylum: Arthropoda Class: Insecta Order: Hymenoptera Family: Formicidae Genus: Oecophylla Species: *O. smaragdina*	Eyesight	Whole animal	Paste
3	Honey bee	Kingdom: Animalia Phylum: Arthropoda Class: Insecta Order: Hymenoptera Family: Apidae Genus: Apis	Stomach pain	Honey	Honey with curd
			Cough	Honey	Honey mixed with ginger extract
			Skin burn	Honey	Direct
Actinopterygii					
4	Catfish	Kingdom: Animalia Phylum: Chordata Class: Actinopterygii Order: Siluriformes Family: Claridae	Asthma	Flesh	Cooked
Amphibians					
5	Indian green frog	Kingdom: Animalia Phylum: Chordata Class: Amphibia Order: Anura Family: Dicroglossidae Genus: Euphlyctis Species:*E. hexadactylus*	Stimulant for the male sex organ	Meat	Decoction

Reptiles					
6	Indian black turtle	Kingdom: Animalia Phylum: Chordata Class: Reptilia Order: Testudines Family: Geoemydidae Genus: Melanochelys Species: *trijuga*	Piles	Carapace	Used as vessel
7	Indian rock python	Kingdom: Animalia Phylum: Chordata Class: Reptilia Order: Squamata Genus: Python Species: *P. molurus*	Arthritis	Body fat	Arthritis
			Wound	Body fat	Fat is converted to oil
8	Monitor lizard	Kingdom: Animalia Phylum: Chordata Class: Reptilia Order: Squamata Family: Varanidae Genus: Varanus Species: *V. bengalensis*	For energetic body	Fresh tongue	Raw
9	Common house gecko	Kingdom: Animalia Phylum: Chordata Class: Reptilia Order: Squamata Family: Gekkonidae Genus: Hemidactylus Species: *H. frenatus*	Erectile dysfunction	Whole body	Decoction
10	Asian chameleon	Kingdom: Animalia Phylum: Chordata Class: Reptilia Order: Squamata Family: Chamaeleonidae Genus: Chamaeleo Species: *C. zeylanicus*	Arthritis	Meat	Oil
Aves					
11	Common quail	Kingdom: Animalia Phylum: Chordata Class: Aves Order: Galliformes Family: Phasianidae Genus: Coturnix Species: *C. coturnix*	Common cough	Egg	Egg is boiled

12	Rock dove	Kingdom: Animalia Phylum: Chordata Class: Aves Order: Coloumbiformes Family: Coloumbidae Genus: Columba Species: *C. livia*	Anemia	Meat	Soup
13	Little Egret	Kingdom: Animalia Phylum: Chordata Class: Aves Order: Pelecaniformes Family: Ardeidae Genus: Egretta Species: *E. garzetta*	Immunity	Meat	Cooked
14	Indian Peafowl	Kingdom: Animalia Phylum: Chordata Class: Aves Order: Galliformes Family: Phasianidae Genus: Pavo Species: *P. cristatus*	Flexibility	Full body	Made oil from this
15	Green Imperial Pigeon	Kingdom: Animalia Phylum: Chordata Class: Aves Order: Columbiformes Family: Columbidae Genus: Dacula Species: *D. aenea*	Epilepsy	Meat	Soup
16	Duck	Kingdom: Animalia Phylum: Chordata Class: Aves Order: Anseriformes Family: Anatidae Genus: Anas	Erectile dysfunction	Eggs	Boiled
Mammals					
17	Common palm civet	Kingdom: Animalia Phylum: Chordata Class: Mammalia Order: Carnivora Family: Viverridae Genus: Paradoxurus Species: *P. hermaphroditus*	Unhealthy body	Flesh	Cooked
			Asthma	Flesh	Cooked
			Snakebite	Urine and urinary bladder	Urine is heated and the urinary bladder is put into it
			Poisoning	Body fat	Its fat is extracted from its body

18	Indian crested porcupine	Kingdom: Animalia Phylum: Chordata Class: Mammalia Order: Rodentia Family: Hystricidae Genus: Hystrix Species: *H. indica*	Chronic cough	Flesh	The decoction is made from it
19	Asian elephant	Kingdom: Animalia Phylum: Chordata Class: Mammalia Order: Proboscidea Family: Elephantidae Genus: Elephas Species: *E. maximus indicus*	Hair growth	Dung	The dung is dehydrated and pulverised before being cooked in coconut oil
			Fear	Tail hair	Made into ring
20	Sloth bear	Kingdom: Animalia Phylum: Chordata Class: Mammalia Order: Carnivora Family: Ursidae Genus: Melursus Species: *M. ursinus*	Hair growth	Body fat	Its fat is extracted from its body
21	Goat	Kingdom: Animalia Phylum: Chordata Class: Mammalia Order: Artiodactyla Family: Bovidae	Malnutrition	Bones	Soup of bone is made
22	Nilgiri langur	Kingdom: Animalia Phylum: Chordata Class: Mammalia Order: Primates Family: Cercopithecidae Genus: Semnopithecus Species: *S. johnii*	Asthma	Meat	Soup
23	House rat	Kingdom: Animalia Phylum: Chordata Class: Mammalia Order: Rodentia Family: Murids Genus: Rattus Species: *R. rattus*	Wounds	Whole animal	Oil
24	Bats	Kingdom: Animalia Phylum: Chordata	Asthma	Meat	Raw

		Class: Mammalia Order: Chiroptera			
25	Indian hare	Kingdom: Animalia Phylum: Chordata Class: Mammalia Order: Lagomorpha Family: Leporidae Genus: Lepus Species: *L. nigricollis*	Asthma	Meat	Soup

4.6 Mode of preparation

According to informants, the method of preparation of the medicine has a significant impact on its action. The method of preparing traditional medicine among the tribes of Idukki can be characterised as direct, cooked, boiled, decoction, paste, mixtures, soup, and oils, according to this study. This classification is significant because it demonstrates how animal medicine is prepared prior to being used.

Table 11. Mode of preparation of medicines adopted in different animals

Sl No.	**Mode of preparation**	**Number of animals**
1	Direct	8
2	Cooked	4
3	Boiled	3
4	Decoction	3
5	Paste	1
6	Mixtures	3
7	Soup	5
8	Oils	5

4.7 Data analysis

4.7.1 Informant consensus factor (ICF)

Informant consensus factor (F_{ic}) was utilised to check the agreement in the use of animals in the examination of general therapeutic use. The consensus of informants is important in identifying the plants that are commonly used, assisting in plant selection for phytochemical and pharmacological research.

4.7.2 Fidelity level (FL)

The fidelity level is used to determine the species that is favoured by informants for treating a specific disease. The FL values of animals that are frequently used in therapeutics by the locals are higher than those that are less widely used. The percentage of informants that claim to utilise a specific animal species for the same principal purpose is what is expressed in fidelity level. This is used to determine how important a species is for a specific purpose.

Table 12. Informant consensus factor for different ailment categories

Sl No.	Ailment category	Number of animals reported	Number of informants reported	Informant consensus factor (ICF)
1	Haircare (HC)	2	19	0.94
2	Psychology ailments (PA)	1	4	1
3	Eye ailments (EA)	1	10	1
4	Poisonous bites (PB)	2	9	0.88
5	Dermatological infections/diseases (DID)	2	36	0.97
6	Gastro-intestinal ailments (GIA)	2	42	0.97
7	Genito-urinary ailments (GUA)	3	37	0.94
8	Respiratory systems diseases (RSD)	8	112	0.94
9	Skeleto-muscular system disorders (SMSD)	3	33	0.94
10	General health (GH)	8	89	0.92

Table 13. Fidelity level of animals reported during the study

Sl No.	Animal	Ailment	Number of informants	Fidelity level (FL)
1	Leech	Dermatological infections/diseases (DID)	12	100
2	Red weaver ant	Eye ailments (EA)	10	100
3	Honeybee	Gastro-intestinal ailments (GIA)	38	39.18
		Respiratory systems diseases (RSD)	35	36.08
		Dermatological infections/diseases (DID)	24	24.74
4	Catfish	Respiratory systems diseases (RSD)	8	100
5	Indian green frog	Genito-urinary ailments (GUA)	13	100
6	Indian black turtle	Gastro-intestinal ailments (GIA)	4	100
7	Indian rock python	Skeleto-muscular system disorders (SMSD)	5	45.45
		General health (GH)	6	54.55
8	Monitor lizard	General health (GH)	13	100
9	Common house gecko	Genito-urinary ailments (GUA)	12	100
10	Asian chameleon	Skeleto-muscular system disorders (SMSD)	14	100
11	Common quail	Respiratory systems diseases (RSD)	19	100
12	Rock dove	General health (GH)	11	100
13	Little egret	General health (GH)	12	100

14	Indian peafowl	Skeleto-muscular system disorders (SMSD)	14	100
15	Green imperial pigeon	General health (GH)	8	100
16	Duck	Genito-urinary ailments (GUA)	12	100
17	Common Common palm civet	General health (GH)	8	33.33
		Respiratory systems diseases (RSD)	7	29.17
		Poisonous bites (PB)	4	16.67
		Poisonous bites (PB)	5	20.83
18	Indian crested porcupine	Respiratory systems diseases (RSD)	13	100
19	Asian elephant	Haircare (HC)	7	63.64
		Psychology ailments (PA)	4	36.36
20	Sloth bear	Haircare (HC)	12	100
21	Goat	General health (GH)	20	100
22	Nilgiri langur	Respiratory systems diseases (RSD)	11	100
23	House rat	General health (GH)	11	100
24	Bats	Respiratory systems diseases (RSD)	7	100
25	Indian hare	Respiratory systems diseases (RSD)	12	100

5. DISCUSSION

Ethnozoology is a branch of zoology that explores the interactions between early human societies and the natural resources that surround them. Ethnozoological studies of tribal people in Kerala's Idukki area has yielded several discoveries.

Tribals live in close proximity to nature and have built a unique and specialised understanding of the indigenous flora and animals, as well as their medicinal uses. There has been no organised attempt to chronicle traditional usage of animals for food, medicine, and other uses in Idukki, the district with Kerala's second biggest tribal population. This is the first report of traditional ethnozoological animal use knowledge of Mannan, Muthuvan, Urali, Malaarayar, Malapulayan, and Malapandaram tribal people in Idukki District, we believe.

This study highlights the need of considering the conservation of particular animal species in order to preserve traditional medical knowledge. This research highlights the relevance of local faunal diversity in providing ethnomedicine, according to Alves and Rosa, they also found that the sort of zootherapeutic resources employed in any particular place is directly influenced by faunal composition, accessibility, and availability (Borah and Prasad, 2017).

The findings demonstrate that tribal tribes in Idukki's traditional knowledge of animal-derived remedies plays a crucial role in their basic health care. The information gathered in this study on tribals' ethnozoological usage in Idukki necessitates a full pharmacological investigation involving a few lab experiments and analyses. This might also aid in raising awareness about the importance of conserving, preserving, and enriching the gene bank of commercially significant species before they become extinct. Documenting people's cultural knowledge on faunal-derived medicines will contribute in the development of policies for responsible bio-resource management and conservation, and also open the door to new medication development.

5.1 Demographic characteristics of informants

During the direct interviews, demographic characteristics of respondents were obtained. When compared to the other categories, the number of informants over the age of 50 was much higher. Only 12.85 percent of practitioners were under the age of 35 years old. The male–female ratio was not evenly distributed.

Nearly 14.10 percent of the practitioners were illiterate but literate, whereas 51.28 percent had gone to school. 23.08 percent of students have completed middle school, and 11.54 percent have completed high school. In terms of informant demographics, the predominance of middle-aged informants has been reported not just in our investigations but also by other researchers (Albuquerque *et al*., 2010). The significant male–female ratio showed that women's understanding of traditional medicine was quite poor.

The similar finding has been confirmed in prior studies in India with practitioners of indegenous medicine (Prabhu *et al*., 2014). When it comes to traditional medicine, women have less expertise than males in our research region. The overall picture suggests that the majority of the informants are untrained or undereducated, and that some practitioners also refer patients to biomedical specialists for a variety of ailments. People also appear to be aware of the contemporary medical services that are accessible to them. Vijayakumar *et al.,* in 2015, noticed a similar pattern

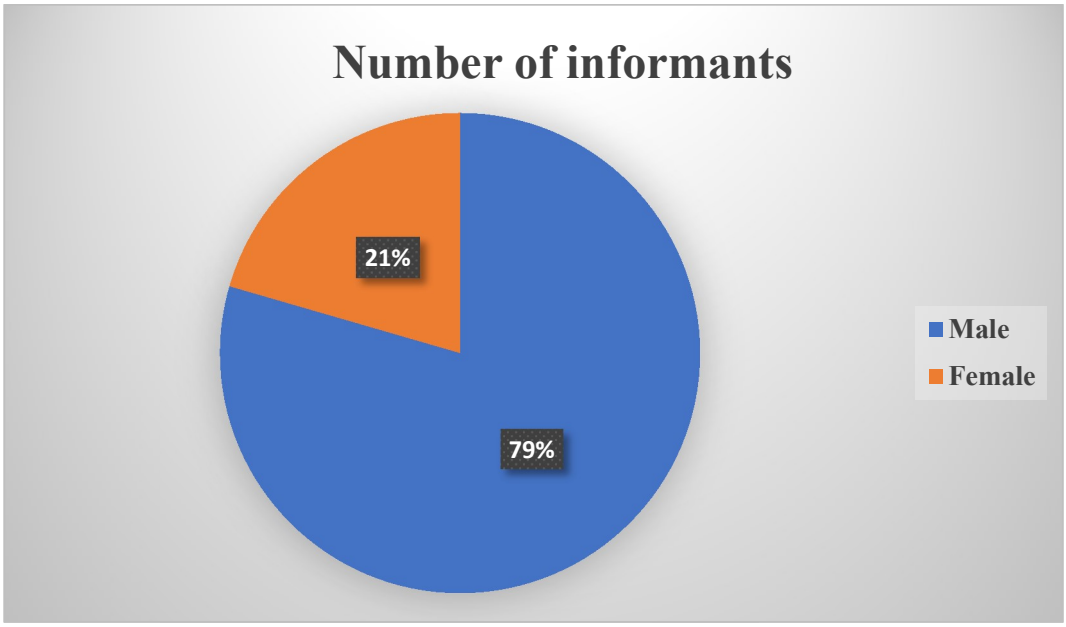

Fig 1. Gender wise distribution of informants surveyed in the study

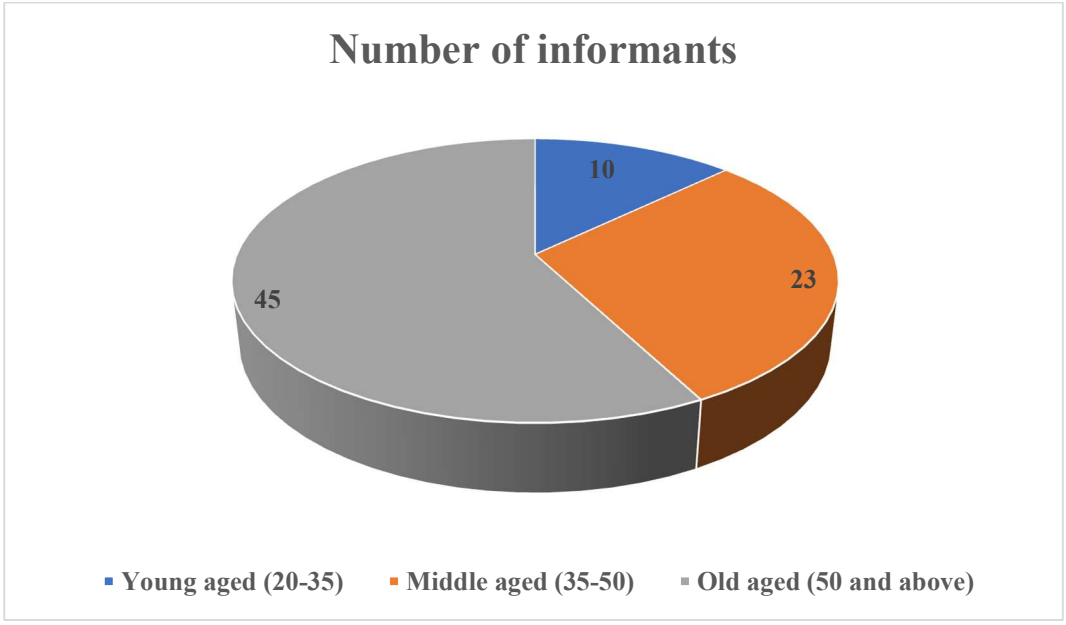

Fig 2. Age wise distribution of informants surveyed in the study

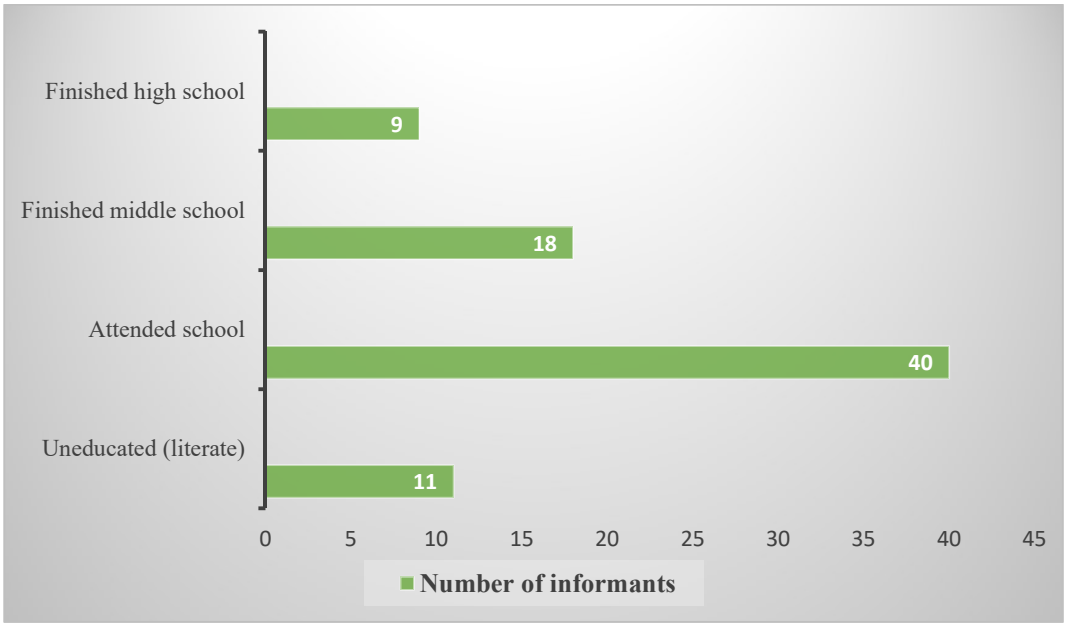

Fig 3. Educational qualification of the informants surveyed in the study

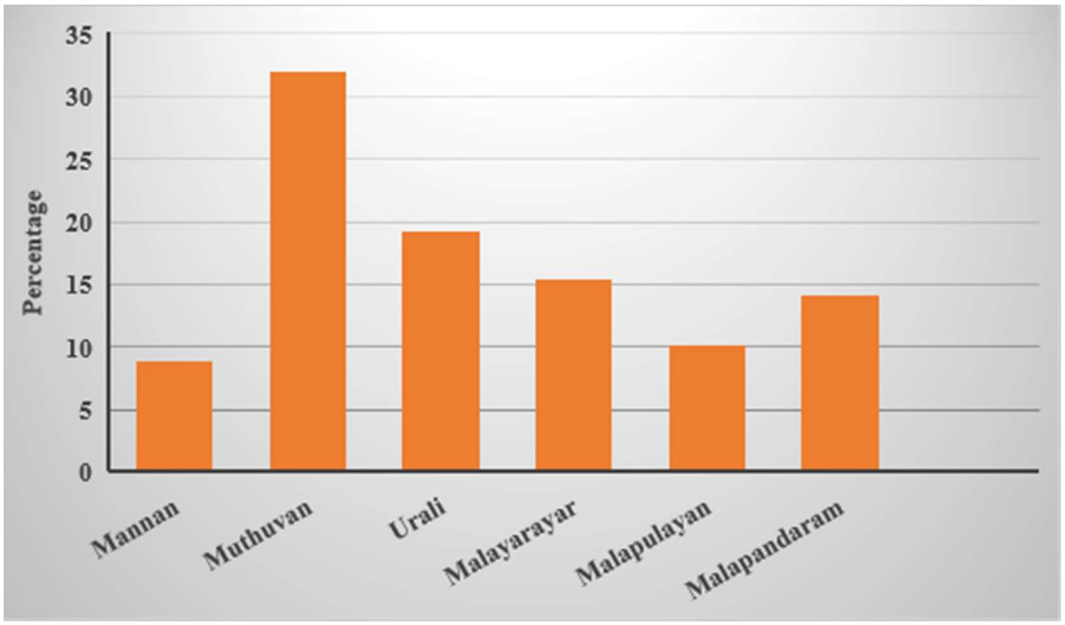

Fig 4. Percentage wise distribution of tribals surveyed in the study

Traditional tribal medical knowledge is vanishing. There are several reasons for the decline of traditional knowledge among primitive tribal communities in Idukki, including Mannan, Muthuvan, Urali, Malaarayar, Malapulayan, and Malapandaram. According to the findings, there was a favourable association between the informant's age and the number of species recognised to have therapeutic benefit. This suggests that the elder generation has more traditional knowledge that is not being passed down to the younger generation. According to the report, lower income has prompted people to consider careers in other fields where they may make more money for their children and grandchildren. As a result, the majority of families and the younger generation have relocated to pursue higher education and jobs in other areas. The structural family system was finally lost as a result of this. Information is not being passed down to the next generation as a result of migration and the loss of the structural family system, and older people do not want to share their knowledge with others in the area, except their own relatives, which is also one of the major reasons for its depletion in the study area. Traditional remedies are also unpopular among the younger generations, owing to the difficulty of finding them in nature, preparing them, and utilising them. Traditional knowledge was more prevalent among less educated respondents than in highly educated respondents, according to an assessment of knowledge related to schooling. This means that, as a result of socioeconomic changes, the knowledge of educated people has decreased. Traditional wisdom is also being depleted due to its seldom use in people's daily lives. The availability of contemporary medical facilities that provide faster results than traditional medicines, as well as their ease of access, has led to a decrease in the use of traditional medicines in daily life. They take these creatures from the forest for medicine, which has now become illegal, and this has resulted in a loss of traditional knowledge. An ethnobotanical research in the cold-arid area of the Nanda Devi Biosphere Reserve in the Western Himalaya found similar results (Kumar *et al*., 2015).

However, like in other parts of Kerala, the rapid decline of the senior population is projected to result in a higher loss of oral traditional knowledge (Balakrishnan, 1997; Radhakrishnan and Pandurangan, 2000; Padmanabhan, 2007;

Padmanabhan and Sujana, 2008). We are acutely aware of the need of preserving indegenous knowledge of animal uses that are orally transmitted in a long-term manner.

5.2 Ethnozoological analysis

In all, 448 ethnozoologically significant creatures have been documented by Indian researchers. Among these, Vijayakumar *et al.* (2015) ethnozoological study from the Silent Valley has identified 57 animals with medicinal importance (Vijayakumar *et al.,* 2015).

A total of 23 families, 25 genera, and 25 species of animals were identified in this study, resulting in 32 usages (Table 2). The 25 species included both vertebrates (3 species) and invertebrates (3 species). Mammalian species represented about 36 percent of all listed organisms, followed by aves (24 percent), insects (8 percent), and reptiles (20 percent), actinopterygii (4 percent), malacostraca (4 percent), amphibians (4 percent), and citellata (4 percent). (4 percent). The most often utilised class was mammals.

In general, and in line with other research from throughout the world, including those from Latin America (Alves *et al.* 2008, 2010; Martinez 2013), Africa (Adeola 1992; Mbaya and Malgwi 2010; Whiting *et al.* 2011; Izah and Seiyaboh 2018), and China (Maciocia 1994; Commission 2015), mammalian and avian components of local traditional remedies received the greatest scores, whereas amphibians received the lowest (Sharma and Khan 1995; Mahawar and Jaroli 2006; Betlu 2013). Other studies concentrating on North-East India (Kakati and Doulo 2002; Solanki and Chutia 2004; Jamir and Lal 2005; Kakati *et al*. 2006; Chakravorty *et al*. 2011) found similar results, however, there were significant differences. In accordance with Alves *et al.* (2017), pisces had an important therapeutic function in South America, but not so for tribals in North-East India (Das *et al*. 2017), while in Africa, reptiles, along with birds and mammals, were used more frequently as traditional medicines than fish. (Vats and Thomas 2015; Williams *et al*. 2016). Birds took the top spot among the Wancho tribe, earning 37 percent, followed by mammals (26.3 percent), insects (21.1 percent), annelids (10.5

percent), and fish (5.6 percent). Birds were also the most commonly used therapeutically in the Chhindwara district of Madhya Pradesh, which are immediately succeeded by mammals (Neelima and Jain, 2015), but for the dwellers of Tamil Nadu's Kolli Hills, mammals and insects were considerably more significant than birds (Raja *et al.* 2018), and accordance with list published by Borah and Prasad (2017), the native dwellers nearby to the Gibbon Wildlife Sanctuary in Assam utilised largely insects and animals.

Honey is also used to cure cough by the Kurumbar, Mudugar, and Irular tribal communities of the Western Ghats' Attapadi hills (Padmanabhan and Sujana, 2008), and the same insect bite is used to treat paralysis and senselessness by certain tribal communities in South India (Dixit *et al*., 2010). Porcupine flesh is used by tribals in Idukki to treat coughs, and by the Chakhesang ethnic group of Nagaland to treat fevers (Kakati and Doulo, 2002). Similarly, the utilisation of fresh Monitor lizard tongue as an energy booster was previously recorded among the Paniyars, Kurichiars, and Uraly in Kerala's Wayanad region, and its use in a cooked form was discovered in another research (Mary, 2019). The flesh of the Monitor lizard is also said to be a source of energy (Solanki *et al.,* 2010). The weaver ant, Oecophylla smaragdina, or Oravi, is a good source of nutrition and bioresource among the Ao tribe of Nagaland (Pongener, 2019).

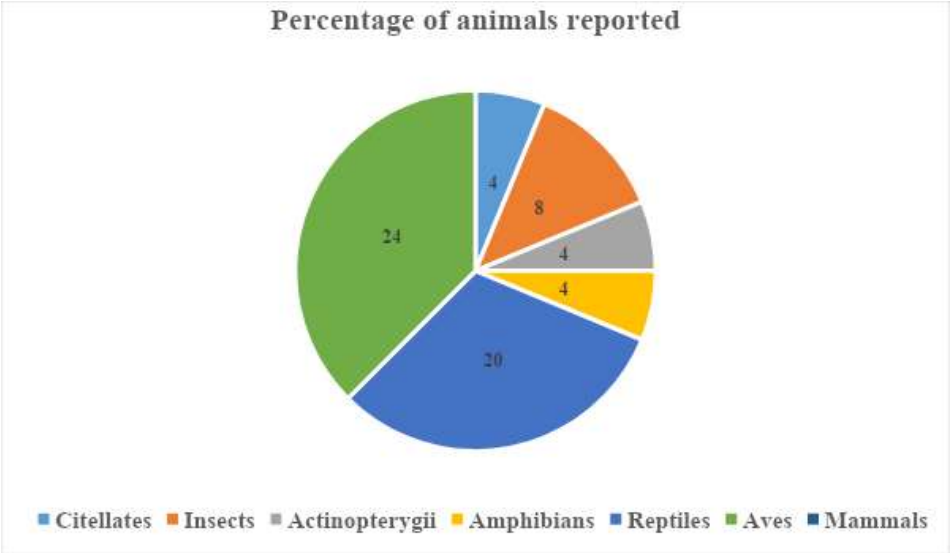

Fig 5. Percentage of animals having therapeutic usage reported in each class

In the Khasi culture, catfish has been used to treat a disease that is comparable to leukoderma in neonates (Mihsill and Keshan, 2017). Tortoise shell was used to cure Trypanosomiasis among tribal people in Kollihills, Namakkal district, Tamil Nadu, in the same way that indigenous people of Idukki used it to treat piles. (Raja *et al.,* 2018). Indegenous knowledge bearers in Arunachal and Mizoram utilise the fat from Indian rock pythons to cure wounds (Chinlampianga *et al.,* 2013).

In Assam's Karbi tribes, the tokay gecko is used to cure male impotency in a similar fashion to the Idukki Gecko. Traditional healers in Theni use Asian chameleon oil on the skin to alleviate paralysis. Among the indigenous people of the Theni district, Indian Peafowl is said to heal bone fractures and thrombosis, Rheumatalgia, Somatalgia, Pectoralgia, and Common palm civet is said to cure many maladies (Chellappandian *et al*., 2014).

The Garasiya people of India utilise the Asian elephant tooth for medicines, hence it is also regarded an ethnozoological resource. (Kioko *et al.,* 2015). Values and attitudes of the Maasai people and elephants.) A research in Mizoram and Arunachal has previously found that sloth bears may be used to cure malaria (Chinlampianga *et al*., 2013).

Goats are also highlighted as an ethnozoological resource because their milk is used by traditional healers in the Theni area to treat jaundice. Nilgiri langur blood Traditional healers in the Theni area mixed it with coconut oil and applied it to the head to cure Trichogenou (Chellappandian *et al.,* 2014). House rat meat is also said to be consumed by Warangal residents to aid in the creation of sperm (Benarjee *et al*., 2010). In the Maharastra area of Nandurbar, the smoke of a fallen Indian Hare is utilised for piling (Patil, 2003).

This finding suggests that the zootherapeutics used are determined by the accessibility and availability of animals in the area. Vijayakumar *et al.* (2015) discovered similar results in an ethnozoological investigation in Silent Valley. According to Vats and Thomas (2015), 42 faunal species are used in traditional medicine used by the Sukuma tribe in the Busega area in northwestern Tanzania for around 30 various therapeutic reasons. In the Wayanad District of Kerala, approximately 6 species utilised for ethnozoological reasons were revealed to be much like the list of species in use for ethnozoological goals by tribals, according to his study. This necessitates a comprehensive ethnozoological research of Kerala's whole district, incorporating as many indigenous people as feasible.

5.3 Ailment categories

All reported ailments were categorised into ten categories based on information obtained from informants in the study area: hair care (HC), psychology ailments (PA), poisonous bites (PB), eye ailments (EA), dermatological infections/diseases (DID), gastrointestinal ailments (GIA), genito-urinary ailments (GUA), respiratory systems diseases (RSD), skeleto-muscular system disorders (SMSD), and general health (GH). Many diseases were grouped together into one disease category based on the human systems that were affected.

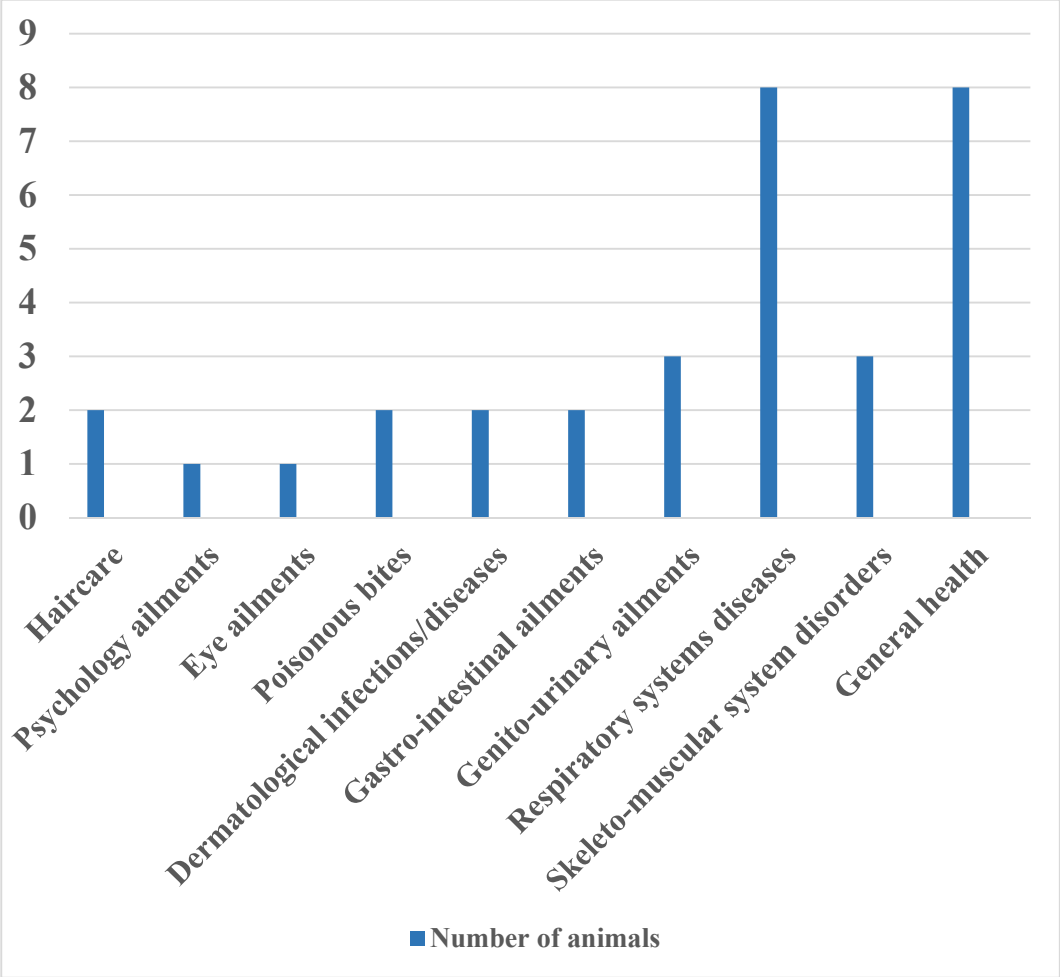

Fig 7. Number of animals reported in different ailment categories

According to the findings, respiratory system illnesses (RSD) and general health (GH) are at the top of the list with 25% each, while psychological disorders (PA) and eye disorders (EA) are at the bottom with 3.13 percent each. The following categories are equally well-represented in Idukki's traditional medicine. Hair care (HC), poisonous bites (PB), dermatological infections/diseases (DID), and gastrointestinal illnesses (GIA) each account for 6.25 percent of the total, while genito-urinary ailments (GUA) and skeleto-muscular system disorders (SMSD) account for 9.38 percent.

5.4 Method of application

Oral and topical traditional medicine are the two most common routes of administration among Idukki's tribal communities. However, other researches indicate another technique of administration, namely nasal. (Dhakal *et al*., 2020; Vijayakumar *et al.,* 2015; Kumari and Kumar, 2009)

Oral intake comprises edibles that are ingested directly or after being transformed into cooked, boiled, decoction, paste, mixes, and soup forms. A topical medication, on the other hand, is one which is administered to a particular part of the body or even to a specific part of the body that requires treatment. The direct application of drugs to particular regions, including use of of oils and mixtures, is referred to as topical administration.

The majority of the medications were taken orally, which is consistent with findings from prior research (Jaroli *et al*., 2010; Benitez, 2011; Verma *et al*., 2014; Vijayakumar *et al.,* 2015; Teronpi *etal.,* 2012; Chinlampianga *et al*., 2013).

5.5 Medicinal animals

According to IUCN Red list category, among the 25 animals identified 1 belong to Endangered (EN), 2 comes under Vulnerable (VU), 2 belong to Near threatened (NT) and 14 animals belong to Least concern (LC).

Table 13. IUCN categories of different animals reported in the study

Sl No.	IUCN Red list category	Animals
1	Endangered (EN)	Asian elephant
2	Vulnerable (VU)	Sloth bear, Nilgiri langur
3	Near threatened (NT)	Indian rock python, Monitor lizard
4	Least concern (LC)	Catfish, Indian green frog, Indian black turtle, Common house gecko, Asian chameleon, Common quail, Rock dove, Little egret, Indian peafowl, Common Common palm civet, Indian crested porcupine, House rat, Indian hare, White bellied woodpecker

In total, data on 25 distinct medicinal animal species was gathered to treat ten different human illnesses. Some of the animals might be used for many purposes. Whole animals, or parts of them, or goods taken fat, faeces, urine, bones, meat, tongue, honey, and eggs are among the products harvested from them and used for a variety of medical purposes, according to the research. Honey was the most popular of these items. Aside from that, it was discovered that the majority of the animals employed by all six tribals for ethnozoological medicinal purposes belonged to the Mammalia class.

Wild animals are frequently used for non-edible purposes such as decorations, clothes, tools, and religious responsibilities, in addition to food, medicine, and the selling of portions or the full animal.

5.6 Mode of preparation

The manner of preparation of the drug, according to informants, has a considerable influence on its activity. According to this study, the way of creating traditional medicine among the tribes of Idukki may be classified as direct, cooked, boiling, decoction, paste, mixes, soup, and oils. This categorization is important because it shows how animal medication is prepared before it is utilised.

The findings show 17 different ways to prepare animal therapeutic ingredients. The majority of the medicinal animals described by key informants for treatment of the disease are consumed directly, with 25 percent falling into this category. Soups and oils are in second place, accounting for 15.63 percent of the total. Cooking accounts for 12.50 percent of total consumption. Among the preparations, 9.38 percent is ingested as boiling, decoction, and combination. Paste, on the other hand, has the lowest percentage of 3.13 percent. The raw consumption of therapeutic animal species for the healing of diseases is a frequent practise among indigenous societies across the world (Benitez, 2011; Kim and Song, 2014).

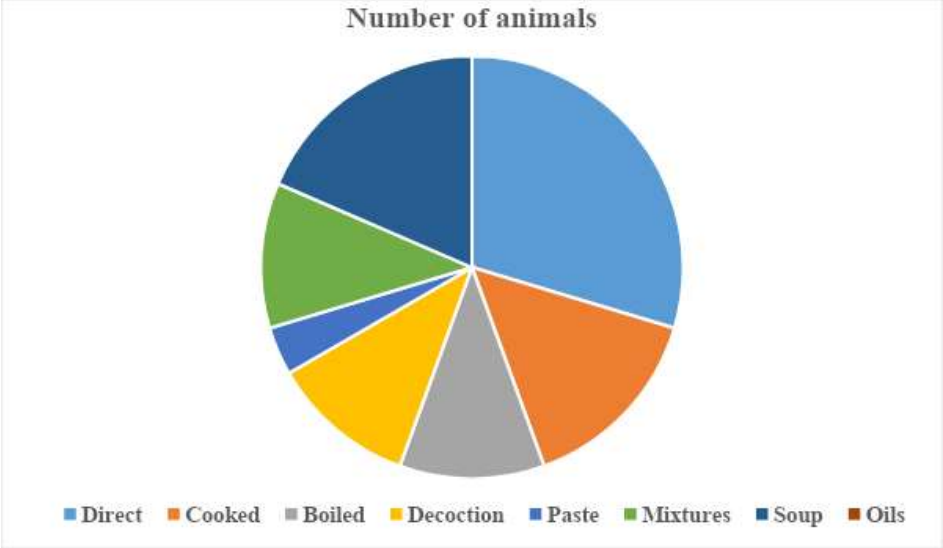

Fig 8. Different modes of preparation of medicines using animals reported in the study

5.7 Data analysis

5.7.1 Informant consensus factor (ICF)

Psychology (PA) and Eye Ailments (EA) were the two categories having the most agreement across informants (each ICF value, 1.00). Dermatological infections/diseases (DID) and gastrointestinal illnesses (GIA) (0.97) are next in line, followed by various medical problems. Poisonous bites (PB) had the lowest level of agreement (each ICF: 0.88). In Uganda (Asiimwe *et al*., 2014), gastro intestinal disorders were the most common, however in Waheed *et al* (2013) .dermatological ailments, cardiovascular ailments, inflammation ailments, fever ailments, and dental ailments were the most common. These differences are due to each country's geographical location and regional hygienic conditions.

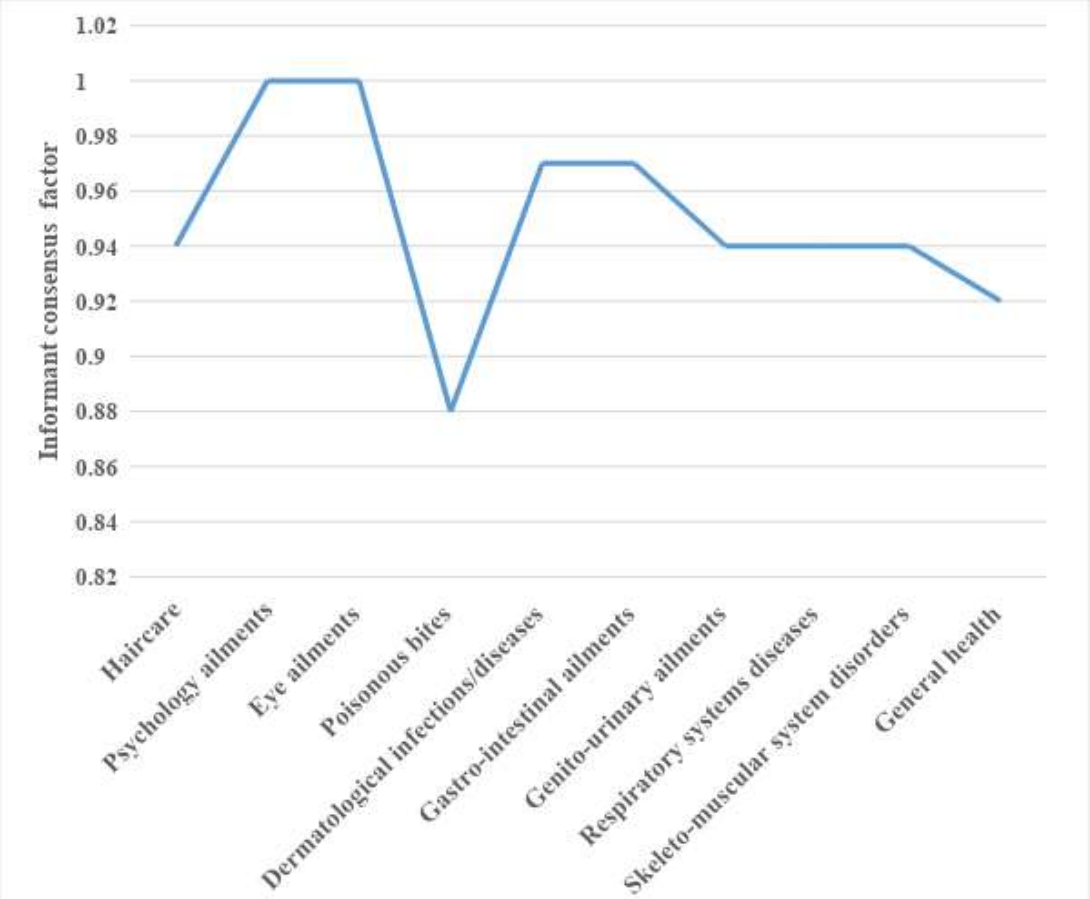

Fig 9. Informant consensus factor of different ailment categories reported in this study

5.7.2 Fidelity level (FL)

The fidelity level is critical in establishing which taxa are preferred by residents for treating various ailments. In this research, FL scores ranged from 16.67 percent to 100 percent. A FL of 100 percent for a given fauna implies that each and every use report for that animal specified the same treatment approach (Kim and Song, 2014). The current investigation discovered 21 animal species with a FL of 100 percent. According to the findings of this study, 16 percent of animal species have been found to treat more than one condition. This trend runs counter to what is usual in Kerala (Padmanabhan, 2007) and other conventional medical systems throughout the world (EL-Kamali, 2000; Vazquez *et al*., 2006; Mahawar and Jaroli, 2008; Alves, 2009). Most animal treatments, according to the answers, have no negative side effects provided the dosage and administration are correct.

6. SUMMARY

There is evidence that humans have been using animals for food, clothing, medicine, and other purposes since prehistoric times. Ethnobotany and traditional medicine have gotten a lot of attention. Animals and their products (like plants) have therapeutic characteristics that can be utilised for the benefit of humans. Many ethnic communities are distributed throughout India, and for health care, these communities are still fully relying on the country's conventional medical system. The purpose of this research was to perform an ethnozoological data gathering among indigenous peoples in the Idukki district.

India is rich in faunal and floral biodiversity, and Idukki is one of them. The study was designed with the goals of 1) analysing and documenting indigenous people's ethnozoological knowledge in Kerala's Idukki area. 2) document the creation and use of medications derived from animals and animal products, and 3) quantitative indices are used to determine the highly desired ones.

Ethnozoology, in this sense can help in assessing the effects of human populations on native animal species and developing long-term management plans, making them crucial conservation initiatives. Furthermore, public awareness of the local wildlife might help academic research projects and can save money when compared to traditional approaches. The current article provides a brief overview of ethnozoology, emphasising its significance, historical and current tendencies, etc.

The highlights of the results are summarised below:

- The significant male–female ratio showed that women's understanding of traditional medicine was quite poor
- Elder generation has more traditional knowledge that is not being passed down to the younger generation
- A total of 23 families, 25 genera, and 25 species of animals were identified in this study, resulting in 32 zootherapeutic usages
- Mammals are the most used class of animals

- This was categorised to various ailment categories and among them respiratory system illnesses (RSD) and general health (GH) are at the top
- Among the oral and topical applications, oral was seen to be more.
- Among the 25 animals identified 1 belong to Endangered (EN), 2 comes under Vulnerable (VU), 3 belong to Near threatened (NT), 16 animals belong to Least concern (LC) and 2 species are Not evaluated (NE)
- Among the 17 different modes of preparation of medicine the majority described by key informants for treatment of the disease are consumed directly
- 16 percent of animal species have been found to treat more than one condition which counters what is usual in Kerala
- Psychology (PA) and Eye Ailments (EA) were the two categories having the most agreement across informants (each ICF value, 1.00)

Future Recommendations:

- Traditional knowledge should be considered while developing conservation strategies.
- Immediate steps are to be taken to document traditional knowledge of different indigenous people in different places.
- Awareness are to be made that traditional knowledge are as important as modern education.
- Scientific validation of the medicines need to be done.

7. REFERENCES

Adeola, M.O. 1992. Importance of wild animals and their parts in the culture, religious festivals, and traditional medicine of Nigeria. *Environ. Cons.* 19(2): 125-134.

Albuquerque, U. P., Monteiro, J. M., Ramos, M. A., and Amorim, E. L. C. 2007. Medicinal and magic plants from a public market in northeastern Brazil. *J. Ethnopharmacology.* 110: 76–91.

Allaby, M., 2010. Plants: *Food, Medicine, and the Green Earth*. Infobase Publishing, New York, 232p.

Almeida, C.F.C.B.R. and Albuquerque, U.P. 2002. Use and conservation of medicinal plants and animals in the State of Pernambuco (Northeast Brazil): A case study. *Interciencia.* 27: 276-285.

Alvard, M.S., Robinson, J.G., Redford, K.H., Kaplan, H. 1997. The sustainability of subsistence hunting in the neotropics. *Conserv. Biol*. 11: 977-982.

Alves, R.R.N. 2009. Fauna used in popular medicine in Northeast Brazil. *J. Ethnob. Ethnomed.* 5:1-30.

Alves, R.R.N. 2012. Relationships between fauna and people and the role of ethnozoology in animal conservation. *Ethnob. Conserv.* 1: 1-69.

Alves, R.R.N. and Pereira, F.G.A. 2007. Commercialization and use of snakes in North and North eastern Brazil: implications for conservation and management. *Biodiv. Conserv*. 16: 969–985.

Alves, R.R.N. and Souto, W.M.S. 2010. Ethnozoology: concepts, considerations history and importance. In: Alves, R.R.N., Souto, W.M.S., Mourao, J.S. (Eds.), *Ethnozoology in Brazil: Importance, Status and Actual Perspectives.* NUPEEA, Recife, PE, Brazil, pp. 19-40.

Alves, R.R.N. and Souto, W.M.S. 2015. Ethnozoology: A brief introduction. *Ethnobio. Conserv*. 4:110.

Alves, R.R.N., Leite, R.C., Souto, W.M.S., Bezerra, D.M.M., Ribeiro, L.A 2013. Ethno-ornithology and conservation of wild birds in the semi-arid Caatinga of northeastern Brazil. *J. Ethnob. Ethnomed*. 9(14): 1-12

Alves, R.R.N., Mendonça, L.E.T., Confessor, M.V.A., Vieira, W.L.S., and Lopez, L.C.S. 2009. Hunting strategies used in the semi-arid region of north eastern Brazil. *J. Ethnobiol. Ethnomed*. 5:1-50.

Alves, R.R.N., Nishida, A.K., and Hernandez, M.I.M. 2005. Environmental perception of gatherers of the crab 'caranguejo-uçá' (*Ucides cordatus*, Decapoda, Brachyura) affecting their collection attitudes. *J. Ethnobiol. Ethnomed*. 1:10.

Alves, R.R.N., Nogueira, E., Araujo, H., and Brooks, S. 2010. Bird-keeping in the Caatinga, NE Brazil. *Human Ecol.* 38:147-156.

Alves, R.R.N., Oliveira, T.P.R., and Medeiros, M.F.T. 2017. Trends in medicinal uses of edible wild vertebrates in Brazil. *Evidence-Based Complem. Altern Med.* 5: 87-98.

Alves, R.R.N., Rosa, I.L., Albuquerque, U.P., and Cunningham, A.B. 2013. Medicine from the wild: an overview of the use and trade of animal products in traditional medicines. In: Alves, R, R, N. and Rosa, I.L. (eds.), *Ani. Trad. Folk Med*. Springer, Berlin, pp. 25-42.

Alves, R.R.N., Vieira, W.L.S., and Santana, G.G. 2008. Reptiles used in traditional folk medicine: conservation implications. *Biodiv. Conserv.* 17: 2037–2049.

Anadón, J.D., Giménez, A., and Ballestar, R. 2010. Linking local ecological knowledge and habitat modelling to predict absolute species abundance on large scales. *Biodiv. Conserv*. 19:1443-1454.

Arena, P., Molares, S., Contreras, A.A., Doumecq, M.B., and Gabrielli, F. 2010. Ethnobotanical, micrographic and pharmacological features of plant-based weight-loss products sold in naturist stores in Mexico City: The need for better quality control. *Acta Botanica Brasilica*. 27(3):560-579.

Asiimwe, S., Namutebi, A., Borg-Karlson, A.K., Mugisha, M.K., Kakudidi, E.K., and Hannington, O.O. 2014. Documentation and consensus of indigenous knowledge on medicinal plants used by the local communities of western Uganda. *J.Nat. Prod. Plant Res*. 4(1): 34-42.

Baker, F.C. 1941. A study of ethnozoology of the prehistoric Indians of Illinois. *Trans. Amer. Phil. Soc.* 32:51-77.

Banerjee, P., Sahoo, K.N., Biswas, T.K., Basu, S.K., Chatterjee, J., Hui, A.K., Chakraborty, N., and Debnath, P.K. 2003. Bees make medicine for mankind. *Ind. J. Trad. Knowl.* 2 (1): 22-26.

Begossi, A. 2006. Temporal stability in fishing spots: conservation and co-management in Brazilian artisanal coastal fisheries. *Ecol. Soc.* 11:5

Benarjee, G., Srikanth, K., Ramu, G., and Ramulu, K.N. 2010. Ethnozoological study in a tropical wildlife sanctuary of Eturunagaram in the Warangal district, Andhra Pradesh. *Ind. J.Trad. Knowl.* 9(4):701-704.

Benitez, G. 2011. Animals used for medicinal and magico-religious purposes in western Granada Province, Andalusia (Spain). *J. Ethnopharm*. 137(3): 1113-1123.

Berlin, B., Breedlove, D.E., and Raven, P.H. 1973. General principles of classification and nomenclature in folk biology. *Am. Anthr*. 75: 214-242.

Betlu, S. and Lalduhawma, A. 2013. Indigenous knowledge of zootherapeutic use among the Biate tribe of Dima Hasao District, Assam, North-eastern India. *J. Ethnob. Ethnomed*. 9(1): 1-16.

Borah, M. P. and Prasad, S. B. 2016. Ethnozoological remedial uses by the indigenous inhabitants in adjoining areas of Pobitora Wildlife Sanctuary, Assam, India. *Int. J. Pharm. Pharm. Sci*. 8(4): 90–96.

Borah, M. P. and Prasad, S. B. 2017. Ethnozoological study of animals-based medicine used by traditional healers and indigenous inhabitants in the adjoining areas of Gibbon Wildlife Sanctuary, Assam. *Ind. J. Ethnob. Ethnomed*. 5: 13-39.

Bright, J.O. and Bright, W. 1965. Semantic Structures in North western California and the Sapir-Whorf Hypothesis. *Am. Anthr.* 67:249-258.

Canales, M., Hernández, T., Caballero, J., De Vivar, A.R., Avila, G., Duran, A., and Lira, R. 2005. Informant consensus factor and antibacterial activity of the medicinal plants used by the people of San Rafael Coxcatlán, Puebla, México. *J. Ethnoph*. 97(3): 429-439.

Castetter, E.F. 1944. The domain of ethnobiology. *Am. Nat.*78:1 58-170.

Chakravorty, J., Rochow, M.V. B., and Ghosh, S. 2011. Vertebrates used for medicinal purposes by members of the Nyishi and Galo tribes in Arunachal Pradesh (North-East India). J. Ethnob. Ethnomed. 7: 13.

Chamberlin, R.V. 1908. Animal names and anatomical terms of the Goshute Indians. *Proceed. Acad. Nat. Sci. Philadelphia.* 60:74-103.

Chellappandian, M., Pandikumar, P., Mutheeswaran, S., Paulraj, M.G., Prabakaran, S., Duraipandiyan, V., Ignacimuthu, S., and Al-Dhabi, N.A. 2014. Documentation and quantitative analysis of local ethnozoological knowledge among traditional healers of Theni district, Tamil Nadu, India. *J.Ethnopharm*. 154(1): 116-130.

Chinlampianga, M., Singh, R. J., and Shukla, A. C. 2013. Ethnozoological diversity of Northeast India: Empirical learning with traditional knowledge holders of Mizoram and Arunachal Pradesh. *Ind. J. Trad. Knowl*.12: 18–30.

CITES [Convention on International Trade in Endangered Species of Wild Fauna and Flora] 2002. Annual Report of the Secretariat. Available: https://cites.org/sites/default/files/document/2002.pdf [5 September 2021].

Clément, D. 1998. The historical foundations of ethnobiology (1860-1899). *J. Ethnob.* 18:161-161.

Commission, C. P. 2015. *Pharmacopeia of the Peoples Republic of China.* Chemical Industry Press, Beijing, 86p.

Das, K. S., Choudhury, S., and Nonglait, K. C. 2017. Zootherapy among the ethnic groups of North eastern region of India—A critical review. *J. Critical Rev*. 4(2): 1–9.

Dhakal, P., Chettri, B., Lepcha, S., and Acharya, B.K. 2020. Rich yet undocumented ethnozoological practices of socio-culturally diverse indigenous communities of Sikkim Himalaya, India. *J. Ethnopharm.* 249: 112-386.

Diamond, J.M.1966. Zoological Classification System of a Primitive People. *Sci.* 151:1102-1104.

Dias, T.L.P., Neto L.N.A., Alves, R.R.N. 2011. Molluscs in the marine curio and souvenir trade in NE Brazil: species composition and implications for their conservation and management. *Biodiv.Conserv.* 20: 2393-2405.

Digard, J.P. 1992. Ethnozoology in our lives. *L'Homme*. 32: 253-270.

Dixit, A.K., Kadavul, K., Rajalakshmi, S., and Shekhawat, M.S. 2010. Ethno-medico-biological studies of South India. *Ind. J.Trad. Knowl.* 9(1):116-118.

Dodd, J.C.K. 1993. Strategies for snake conservation. *Ecology and Behavior*. McGraw-Hill, Inc., New York, pp. 363-393

Edgar, T.1909. Castes and Tribes of South India, Vol.4, Madras: Government press, 88p.

El-Kamali, H.H. 2000. Folk medicinal use of some animal products in Cen-

Ellen, R. 2004. From ethno-science to science, or' What the indigenous knowledge debate tells us about how scientists define their project'. *J. Cogn. Cult*. 43:409-450.

Emery, K.F. 2007. Assessing the impact of ancient Maya animal use. *J. Nat. Conserv*. 15:184-195.

Fita,S. D. and Neto, C.E.M. 2007. As interações entre os seres humanos eos animais: a contribuição da etnozoologia. *Biotemas.* 20: 99-110.

Fleck, D.W., Voss, R.S., Patton, J.L.1999. Biological basis of saki (Pithecia) folk species recognized by the Matses Indians of Amazonian Peru. *Int. J. Primat.* 20:1005- 1027.

Foster, M.S. and James, S.R. 2002. Dogs, Deer, or Guanacos: Zoomorphic figurines from Pueblo Grande, Central Arizona. *J. Field Archae*. 29:165-176.

Franke, J. and Telecky, T.M. 2001. *Reptiles as Pets: An Examination of the Trade in Live Reptiles in the United States.* Humane Society of the United States, Washington (DC), 319p.

Friedman, J., Yaniv, Z., Dafni, A., and Palewith, D. 1986. A preliminary classification of the healing potential of medicinal plants, based on a rational analysis of an ethnopharmacological field survey among Bedouins in the Negev desert, Israel. *J. Ethnopharm*.16: 275– 287.

GOI [Government of India] 2001. Population Census Data Summary 2001[on-line]. Available: https://censusindia.gov.in/2011-common/census_data_2001.html. [28 September2021].

Gupta, L., Siroli, C. S., Mistry, N., and Dixit, A. M. 2003. Use of animals and animal products in traditional health care systems in District Kachch, Gujarat. Ind. J.Trad. Knowl. 3(2): 346–356.

Hamblin, N.L. 1985. The role of marine resources in the Maya economy: A case study from Cozumel, Mexico. Prehistoric lowland Maya environment and subsistence economy. In: *The Peabody Museum of American Archaeology and Ethnology*, Cambridge, Harvard university, USA. pp. 159-173.

Heinrich, M., Ankli, A., Frei, B., Weimann, C., and Sticher, O.1998. Medicinal plants in Mexico: Healers' consensus and cultural importance. Social Sci. Med. 47(11):1859-1871.

Henderson, J. and Harrington, J.P. 1914. *Ethnozoology of the Tewa Indians*. Bulletin 56, Smithsonian Institution, Bureau of American Ethnology, 268p.

Holley, D. 2009. *The History of Modern Zoology*. [http://suite101.com/article/the-history-of-modern-zoology-a135787]. Accessed on October 2021.

Hornaday, W.T. 1889. The extermination of the American bison, with a sketch of its discovery and life history. *Annual Report of the Board of Regents of the Smithsonian Institution for the year ending June 30, 1887,* pp. 367–548.

Inskip, C. and Zimmermann, A. 2009. Human-felid conflict: A review of patterns and priorities worldwide. *Oryx*. 43:18-34.

ITDP [Institute for Transportation and Development Policy] 1999. Gender Issues in Transportation: A Short Introduction. Available: https://www.itdp.org/publication/gender-issues-in-transportation-a-short-introduction/. [12 September 2021].

Izah, S. C. and Seiyaboh, E. I. 2018. Challenges of wildlife with therapeutic properties in Nigeria; A conservation perspective. *Int. J. Avian Wildlife Biol*. 3(4): 252–257.

Jain, A., Katewa, S.S., Galav, P.K., and Nag, A. 2007. Unrecorded ethnomedicinal uses of Biodiversity from Tadgarh-Raoli wildlife sanctuary, Rajasthan, India. *Int. J. Avian Wildlife Biol*. 29(3): 337-344.

Jain, A., Katewa, S.S., Sharma, S.K., Galav, P., and Jain, V. 2011. Snakelore and indigenous snakebite remedies practiced by some tribals of Rajasthan. *Ind. J. Trad. Knowl*. 10(2): 258-268

Jamir, N. S. and Lal, P. 2005. Ethnoscientific practices among Naga tribes. *Ind.J. Trad. Knowl*.4(1): 100–104.

Jaroli, D.Á., Mahawar, M.M., and Vyas, N. 2010. An ethnozoological study in the adjoining areas of Mount Abu wildlife sanctuary, India. *J.Ethnobiol. Ethnomed*. 6(1): 1-8.

Johannes, R.E. 1993. Integrating traditional ecological knowledge and management with environmental impact assessment. In: Inglis, J.T (Ed.) *Traditional Ecological Knowledge: Concepts and Cases.* International Program on Traditional Ecological Knowledge and International Development Research Centre, Ottawa, Canada, pp. 33–39.

Jorgenson, J.P. 1998. The Impact of Hunting on Wildlife in the Maya Forest of Mexico. Timber, Tourists and Temples: Conservation and Development in the Maya forests of Belize, Guatemala and Mexico. Island Press, Washington D.C., pp. 179-194.

Kakati, L. N. and Doulo, V. 2002. Indigenous knowledge system of zootherapeutic use by Chakhesang tribe of Nagaland, India. *J.Hum. Ecol.*13(6): 419–423.

Kakati, L. N., Bendang, A., and Doulo, V. 2006. Indigenous knowledge of zootherapeutic use of vertebrate origin by the Ao tribe of Nagaland. *J.Hum. Ecol*.19(3): 163–167.

Kalita, D., Dutta, M., and Islam, N.F. 2005. Few plants and animals based folk medicines from Dibrugarh District, Assam.

Kim, H. and Song, M.J. 2014. Analysis of traditional knowledge for wild edible mushrooms consumed by residents living in Jirisan National Park (Korea). *J. Ethnopharm*. 153(1): 90-97.

Kimmerer, R.W. 2002. Weaving traditional ecological knowledge into biological education: a call to action. *BioSci.* 52: 432-438.

Kioko, J., Kiffner, C., Ndibalema, V., Hartnett, E., and Seefeld, C. 2015. Maasai people and elephants: values and perceptions. *Open Conserv. Biol. J.* 29: 28-39.

Kumar, S. 2015. Ethnobotanical uses of some medicinal plants of District Mandi, Himachal Pradesh (India). *J Biol. Chem. Chron*. 2: 34-37.

Kumari, B. and Kumar, S. 2009. An insight into the ethnozoology of Panch Pargana area of Jharkand, India. *J.Threat. Taxa* 58: 441-443.

Kyselý, R. 2008. Frogs as a part of the Eneolithic diet. Archaeozoological records from the Czech Republic (Kutná Hora-Denemark site, Rivnác Culture). *J.Archaeolog. Sci*. 35:143-157.

Lopes, P.F., Silvano, R.A.M., and Begossi, A. 2010. Extractive and Sustainable Development Reserves in Brazil: resilient alternatives to fisheries?. *J. Environ. Plann. Manag*. 56: 421-443.

Maciocia, G. 1994. *The Practice of Chinese Medicine*. Churchill and Livingstone, London, pp. 851-903.

Madhava, M. 1996. *The Encyclopaedia of Dravidian Tribes* (Vol.2), DLA publications, Trivandrum, 1159p.

Maffi, L., Kangas, S.T., and Andrianarivo, J. 1999. Language and diversity. In: Posey, D.A. (Ed.), *Cultural and Spiritual Values of Biodiversity*. Intermediate Technology Publications Ltd. UNEP, London, pp.89-99.

Mahawar, M. M. and Jaroli, D. P. 2006. Animals and their products utilized as medicines by the inhabitants surrounding the Ranthambhore National Park, India. J. Ethnobiol. Ethnomed. 2: 46.

Mahawar, M. M., and Jaroli, D. P. 2007. Traditional knowledge on zootherapeutic uses by the Saharia tribe of Rajasthan, India. *J. Ethnobiol. Ethnomed*. 3: 25.

Mahawar, M.M. and Jaroli, D.P. 2008. Traditional zootherapeutic studies in India: a review. *J. Ethnobiol. Ethnomed*. 4(1): 1-12.;

Malkin, B. 1958. Cora ethnozoology, herpetological knowledge; A bioecological and cross-cultural approach. *Anthropol. Quart*. 31:73-90.

Manoj, M. 2000. Idukki Charithravum Charithratheethavum (Historical and Cultural Studies about Idukki), Kazhcha Books, Kattappana, 55p.

Marques, J.G.W. 1991. New record of malformation in the true crab *Ucides cordatus* (Linnaeus, 1763) (Crustacea, Decapoda, Ucididae), at Brazilian coast. *Univers. Estad. de Campinas*. 78:107-128.

Marques, J.G.W. 1995. The Significance of the Category "Insect" for Folk Biological Classification Systems. *J. Ecolog. Anthrop*. 4(1): 56-84.

Marques, J.G.W. and Guerreiro, W. 2007. Répteis em uma Feira Nordestina (Feira de Santana, Bahia). Contextualização Progressivae Análise Conexivo-Tipológica. Sitientibus Série. *Ciências Biológicas* 7: 289-295.

Martinez, G. J. 2013. Use of fauna in the traditional medicine of native Toba (qom) from the Argentine Gran Chaco region: An ethnozoological conservationist approach. *Ethnobiol. Conserv*. 2:1–43.

Mason, O.T. 1899. Aboriginal American Zootechny. *Zootechny.* 1:45-81.

Mbaya, Y. P. and Malgwi, H. 2010. Species list and status of mammals and birds in Sambisa game reserve, Borno state, Nigeria. *J. Res. For. Wildlife Environ*. 2(1): 135–140.

McNeely, J.A. 2001. *Religions, Traditions and Biodiversity*. COMPAS Magazine, 102. pp. 20-22.

Merriam, C.H. 1905. The Indian Population of California. *Am. Anthropol.* 7: 594-606.

Mihsill, K.R. and Keshan, B.E.L.A. 2017. Ethno-zoological practices by Khasis, an indigenous tribe of Meghalaya, India. *Nehu J.* 15(1): 89-96.

Moller, H., Berkes, F., Lyver, P.O., Kislalioglu, M. 2004. Combining science and traditional ecological knowledge: monitoring populations for co-management. *Ecol. Soc*. 9: 2.

Moreira, I.C. 2002. O escravo do naturalista - O papel do conhecimento nativo nas viagens científicas do século 19. *Ciência Hoje*. 31:40 - 48.

Nascimento, S.A. 1993. Biologia do caranguejo-uçá Ucides cordatus. Sergipe, pp. 55-98.

Neelima, B. and Jain, S. 2015. Study of traditional man-animal relationships in Chhindwara district of Madhya Pradesh, India. *J.Glob. Biosci*. 4: 1456–1463.

Negi, C.S. and Palyal, V.S. 2007. Traditional uses of animal and animal products in medicine and rituals by the Shoka Tribes of District Pithoragarh, Uttaranchal, India. *Stud. Ethno-Med.* 1(1): 47-54.

Neto, L.N.A., Brooks, S.E., and Alves, R.R.N. 2009. From Eshu to Obatala: animals used in sacrificial rituals at Candomble "terreiros" in Brazil. *J. Ethnobiol. Ethnomed.* 5:1-23.

Nishida, A.K., Nordi, N., Alves, R.R.N. 2006. Mollusc Gathering in Northeast Brazil: An Ethnoecological Approach. *Hum. Ecol.* 34:133-145.

Nishida, A.K., Nordi, N., Alves, R.R.N. 2006. Molluscs production associated to lunar-tide cycle: A case study in Paraíba State under ethnoecology viewpoint. *J. Ethnobiol. Ethnomed.* 2(28): 1-6.

Oudhia, P. 1995. Traditional knowledge about medicinal insects, mites and spiders in Chhattisgarh, India. *Insect Environ*. 4: 57-58.

Oudhia, P. 2003. Medicinal herbs of Chhattisgarh. India having less known traditional uses, VII. Thura. *J. Ind. Trad. Med.* 55: 76-83.

Overal, W.L .1990. Introduction to ethnozoology: what it is or could be. In: Posey, D.A. and Overal, W.L. (Eds.), *Ethnobiology: Implications and Applications*, MPEG, Belém, Brasil, pp. 127-129.

Padmanabhan, P. 2007. *Ethnozoological Studies on the Tribals of Palakkad and Malappuram Districts of Kerala*. Division of Forest Ecology and Biodiversity Conservation Kerala, South India, pp. 5–146.

Padmanabhan, P. and Sujana, K.A. 2008. Animal products in traditional medicine from Attappady hills of Western Ghats. *Ind. J. Trad. Knowl.* 89: 326-329.

Patil, S.H. 2003. Ethno-medico-zoological studies on Nandurbar district of Maharashtra. *Ind. J. Trad. Knowl.*2(3):297-299.

Pongener, A., Ao, B., Yenisetti, S.C., and Lal, P. 2019. Ethnozoology and entomophagy of Ao tribe in the district of Mokokchung, Nagaland. *Ind. J. Trad. Knowl*. 18(3): 508-515.

Prabhu, S., Vijayakumar, S., MorvinYabesh, J.E., Ravichandran, K., and Sakthivel, B. 2014. Documentation and quantitative analysis of the local knowledge on medicinal plants in Kalrayan hills of Villupuram district, Tamil Nadu, India. *J. Ethnopharm.* 157: 7–20.

Prins, H.H.T., Grootenhuis, J.G., and Dolan, T.T. 2000. Wildlife Conservation by Sustainable Use. Kluwer Academic Publishers, Amsterdam, 89p.

Radhakrishnan, K., Pandurangan, A.G., and Pushpangadan, P. 2000. Tribal artefacts of Kerala. *Ethnobot.* 12: 67-71.

Raja, L., Matheswaran, P., Anbalagan, M., Sureshkumar, V., Ganesan, D., and Gani, S. B. 2018. Ethnozoological study of animal-based products practices among the tribal inhabitants in Kolli Hills Namakkal District, Tamil Nadu, India. *World J. Pharm. Pharmac.Sci.*7(12): 85–797.

Rajmohan, D., Niranjana, K.M., Yamuna, R., and Logankumar, K. 2017. An ethnozoological assessment of traditionally used animal-based therapies in Attappady of Palakkad district, Kerala, India. *Kongunadu Res.J.* 4(3): 86-89.

Ranjith Singh, A.J.A. and Padmalatha, C. 2004. Ethno-entomological practices in Tirunelveli district, Tamil Nadu. *Ind. J. Trad. Knowl.* 3(4): 442-446.

Ribeiro, D. 1998. *O Processo Civilizatório: Etapas Da Evolução Sociocultural*. Editora Companhia das Letras, 176p.

Sax, B. 2002. *The Mythological Zoo: An Encyclopedia of Animals in World Myth, Legend and Literature*. ABC-CLIO, Inc., Santa Barbara, 87p.

Selvaraj, D. and Biju, S. 1999. The Betta Kurumbar of Tamil Nadu, Kadu Kurumbar of Karnataka and Urali Kuruman of Kerala: Further sociolinguistic survey. *Ind. J. Trad. Knowl.* 23: 45-56.

Sharma, S.K. 2002. A study on ethnozoology of Southern Rajasthan. *Ethnobot*. 5: 239-253.

Sharma, V. P., and Khan, A. U. 1995. Drugs of mammals origin used by aborigines of Garo Hills of Meghalaya State, India. *Bionat.*15(1): 1–55.

Shashi, S.S. 1994. *Encyclopaedia of Indian tribes, Vol. 8*. Anmol Publications, New Delhi, 321p.

Sillitoe, P. 2006. Ethnobiology and applied anthropology: rapprochement of the academic with the practical. *J. Royal Anthropol.Inst*. 12:119-142.

Silvano, R.A.M. and Valbo-Jørgensen, J. 2008. Beyond fishermen's tales: contributions of fishers' local ecological knowledge to fish ecology and fisheries management. *Environ. Devel. Sustain*. 10: 657-675.

Silvano, R.A.M., MacCord, P.F.L., Lima, R.V., and Begossi, A. 2006. When does this fish spawn? Fishermen's local knowledge of migration and reproduction of Brazilian coastal fishes. *Environ. Biol. Fishes.* 76: 371-386.

Singh, K.S. 1994. The scheduled tribes, Vol. 3, New Delhi: Anthropological Survey of India, Oxford University Press, pp.63-71.

Singh, K.S. 1994. *The Scheduled Tribes, Vol. 3.* Anthropological Survey of India, New Delhi, 781p.

Smith, B. K. 1976. *Ethnographical Collections from the Northwest Passage*. AMS Press, New York, pp. 287-315.

Solanki, G. S. and Chutia, P. 2004. Ethnozoological and socio-cultural aspects of Monpas of Arunachal Pradesh. *J. Hum. Ecol.*15(4): 251–254.

Solanki, G. S. and Chutia, P. 2009. Studies on ethno-medicinal aspects and zoo-therapy in tribal communities in Arunachal Pradesh, India. *Int. J. Ecol. Environ. Sci.* 5(1): 67–76.

Solanki, G.S., Singh, O.P., and Chutia, P. 2010. Ethnozoology of the Nyishi tribe and its impact on biodiversity in Arunachal Pradesh, India. *J. Hum. Ecol*.10(5): 157–232.

Solavan, A., Paulmurugan, R., Wilsanand, V., and Sing, R. 2004. Traditional therapeutic uses of animals among tribal population of Tamil Nadu. *Ind. J. Trad. Knowl*. 3: 206–207.

Stearns, R.E.C. 1889. Ethno-conchology: a study of primitive money. *Ann. Rep. US Nat. Museum*. 89: 297-334.

Sturtevant, W.C. 1964. Studies in Ethnoscience. *Am. Anthrop*. 66: 99-131

Teklehaymanot, T. and Giday, M. 2007. Ethnobotanical study of medicinal plants used by people in Zegie Peninsula, Northwestern Ethiopia. *J. Ethnobiol. Ethnomed*. 3: 1-11.

Teronpi, V., Singh, H.T., Tamuli, A.K., and Teron, R. 2012. Ethnozoology of the Karbis of Assam, India: Use of ichthyofauna in traditional health-care practices. *Anc. Sci. Life*. 32(2): 99.

Tidemann, S. and Gosler, A. 2010. Ethno-ornithology: Birds, Indigenous People, Culture and Society. Earthscan/James & James, UK. pp.89-101.

tral Sudan. *J Ethnopharmacol.* 72(12): 279-282.

Unnikrishnan, P. M. 1998. Animals in Ayurveda. *Amruth*. 1(3): 1–23.

Vats, R. and Thomas, S. 2015. A study on use of animals as traditional medicine by Sukuma tribe of Busega District in North-western Tanzania. *J. Ethnobiol. Ethnomed*. 11: 38.

Vazquez, E.P., Mendez, M.R., Guiascon, R.O.G., and Pinera, N.E.J., 2006. Use medicinal de la fauna silvestre en los Altos de Chiapas, Mexico. *Interciencia* .31: 491–499.

Verma, A. K., Prasad, S. B., Rongpi, T., and Arjun, J. 2014. Traditional healing with animals (zootherapy) by the major ethnic group of Karbi Anglong district of Assam, India. *Int. J. Pharm. Pharmac.Sci.* 6: 1–8.

Vijayakumar, S., Yabesh, J.M., Prabhu, S., Ayyanar, M., and Damodaran, R. 2015. Ethnozoological study of animals used by traditional healers in Silent Valley of Kerala, India. *J. Ethnopharm*.162: 296-305.

Vinu, M. and Sadanand, M, Y. 2019. Traditional knowledge of therapeutic uses of animal resource among indigenous tribal communities in Wayanad district, Kerala state, India. *Int. J. Adv. Res.* 56: 310-325.

Waheed, M., Azizullah, A., Muhammad, A., Akash, T., Kalim Ullah, K., Saqib, W., and Ashfaq, A. 2013. Ethnobotanical assessment of plant resources of Banda Daud Shah, District Karak, *Pak. J. Ethnobiol. Ethnomed*. 9: 77.

Whiting, M. J., Williams, V. L., and Hibbitts, T. J. 2011. Animals traded for traditional medicine at the Faraday market in South Africa: Species diversity and conservation implications. *J. Zool*. 284: 84–96.

Williams, V., Moshoeu, T. J., and Alexander, G. J. 2016. Reptiles sold as traditional medicine in Xipamanine and Xiquelene markets (Maputo, Mozambique). *South African J.Sci*. 112: 1–9.

Williams, V.L., Cunningham, A.B., Bruyns, R.K., and Kemp, A.C. 2013. Birds of a Feather: Quantitative Assessments of the Diversity and Levels of Threat to Birds Used in African Traditional Medicine. In: Alves, R.R.N. and Rosa, I.L. (Eds.), Animals in Traditional Folk Medicine: Implications for conservation. Springer, pp. 383-420.

Zuercher, G.L., Gipson, P.S., and Stewart, G.C. 2003. *Identification of Carnivore Faeces by Local People and Molecular Analyses.* Wildlife Society Bulletin, 31:961-970.

TRADITIONAL THERAPEUTIC USES OF ANIMALS AND ANIMAL PRODUCTS AMONG INDIGENOUS PEOPLE OF IDUKKI DISTRICT, KERALA, INDIA

by

SHIJITH S NAIR

(2019-17-012)

ABSTRACT

Submitted in partial fulfilment of the

requirements for the degree of

MASTER OF SCIENCE IN FORESTRY

Faculty of Forestry

Kerala Agricultural University

DEPARTMENT OF WILDLIFE SCIENCES

COLLEGE OF FORESTRY

VELLANIKKARA, THRISSUR, 680 656

2021

ABSTRACT

Humans have known about ethnobiological uses since ancient times and rely on fauna and flora for medicines, food, clothing, and other necessities of life. For their basic health-care needs, the world population is looking for an alternative medication generated from natural resources, and this natural alternative, which consists of various bioactive chemicals, may be more effective with less toxicity than manufactured pharmaceuticals. The Western Ghats are home to a diverse range of fauna and flora, with plant-based medicines accounting for the majority of natural medicines discovered thus far. Animal medicines, on the other hand, have a restricted number of references. Rural communities, who have acquired millennium old traditional wisdom from their predecessors and handed it down through generations, are crucial in disease management. Poverty and a scarcity of medical facilities are to blame, they rely mainly on traditional knowledge, hence This knowledge is only available in rural regions. Before it is depleted as a result of rising urbanisation, modernization, and industry, traditional plant and animal recipes must be recorded. It is critical to document particular human societies' plant and animal usage that are passed down through the generations in undiscovered areas. Furthermore, with the growing threat of microorganism resistance to existing allopathic medications, novel natural chemical combinations with synergistic or additive effects are desperately needed. As a result, the project was designed with the goals of 1) analysing and documenting indigenous people's ethnozoological knowledge in Kerala's Idukki area. 2) additionally, document the creation and use of medications derived from animals and animal products, and 3) quantitative indices are used to determine the highly desired ones. This might be the first investigation in the specific location to describe traditionally used medicinal fauna and its recipes. The findings of the study might help preserve traditional knowledge and identify new taxa as a potential source of adjunct to conventional medicine.

The outcomes of the reseaech followed imply that local populations in Idukki have a good understanding of how to make ethnomedicine out of faunal diversity based on what's available. This research preserves ethnobiological data while also laying the groundwork for pharmacological, phytochemical, and synergistic research. People employ animal products/parts either alone or in combination with other things to treat a variety of human diseases. The findings also reveal that ethnomedicine is an important part of the primary health care system in the research area, but that it is mostly centred on flora rather than fauna. The animal recipes offer new perspectives on drug research that, through synergistic mechanisms, may pave the way for the development of new and effective therapies. Traditional knowledge is rapidly fading; hence scholars are being encouraged to perform further study in this region so that it may be preserved and documented.