

From Myths to Reality: Understanding the Interplay of Folklore and Herpetofauna Conservation in Punjab, Pakistan

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SUMMARY

Efforts to conserve herpetofauna, such as amphibians and reptiles, are significantly influenced by the beliefs and folklore around them. These opinions and narratives may differ depending on a person's gender, age, or degree of education. Sadly, compared to other vertebrates, herpetofauna frequently receive less respect and may be subject to unfavorable perceptions and myths derived from folklore. Our research intends to offer light on how these beliefs and folklore affect how people engage with these animals and, in turn, how likely it is that they will survive. We performed a questionnaire study among 815 people in Punjab, Pakistan, to test the theory that false beliefs and unfavorable values contribute to how these animals are treated by people. The potential connections between these impressions, unfavorable values, persecution, and anti-conservation sentiments were examined using a structural equation model. Our model's findings strongly imply that negative values and folklore are significant predictors of abuse of amphibians and reptiles and anti-conservation sentiments. Additionally, we discovered that while these values fluctuate among various demographic groupings, they are widely held among the populace. This work uses PCA to help us understand how certain beliefs and values can have a significant impact on how people view herpetofauna and pose a serious conservation issue.

Keywords: Herpetofauna, Folklore, Questionnaire, Pakistan

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INTRODUCTION

There are now 10,885 described species of reptiles, and this figure is rising as more are found every year (Frank and Ramus, 1995; Janovcová et al., 2019a). However, compared to birds and mammals, reptiles frequently receive less attention, leaving several knowledge gaps about these animals. Many species' basic characteristics, such as population levels, life cycles, and real distributions, are unknown. These knowledge gaps are problematic, particularly when it comes to conserving endangered species, as we are unable to tell whether or how a certain species is threatened in the absence of this crucial knowledge (Bonnet et al., 2002; Clark and May, 2002; Uetz et al., 2018).

Ethnozoology, a field that has flourished since the 19th century, has typically focused on the wide range of human relationships with regional wildlife (Bashir et al.,

2021; Hamid et al., 2021; Adil et al., 2022; Faiz et al., 2022). A growing body of evidence suggests that ethnozoology, which examines how people view animals, is essential to the sustainable management of natural resources and may therefore play a critical role in the conservation of endangered species, including reptiles, whose protection is made more difficult by the human aversion they frequently elicit (Bertrand, 1997; Alves et al., 2009; Alves et al., 2012; Fernandes-Ferreira et al., 2013; Mendonça et al., 2014; Alves et al., 2015). According to our knowledge, no one has previously investigated how people see reptiles as a group in Asia, a group that would comprise members of several taxonomic clades (such as crocodiles, turtles, tortoises, lizards, and snakes) and so reflect their extensive biological variety. However, concentrating on a single group of animals might produce intriguing findings about our attitudes toward them and reveal the criteria used to evaluate these species (Batt, 2009; Alves et al., 2012; Ceriaco and Ethnomedicine, 2012; Frynta et al., 2013; Alves et al., 2014).

Only a small number of reptiles, including snakes and crocodiles, are seriously dangerous to people. Due to their size and predatory nature, crocodiles are potentially fatal. However, some snakes, especially big constrictors like pythons, can get big enough or have venom that can be deadly to an adult human. The greatest significant threat from snakes comes from the family of vipers, which are distinguished by their highly venomous bites (Murphy and Henderson, 1997; Öhman et al., 2001; Öhman and Mineka, 2001; Caldicott et al., 2005; Headland and Greene, 2011; Janovcová et al., 2019b). The ability to recognize and react to snakes' threat was formerly essential for early humans. A large amount of research suggests that even in the current era, when the likelihood of coming into contact with snakes has considerably diminished, these animals still captivate our attention and cause heightened responses in humans, driven by certain neurological pathways (Bjerke et al., 1998; Flykt, 2006; Isbell, 2006; LoBue and DeLoache, 2008; Shibasaki and Kawai, 2009; Soares et al., 2009; Öhman et al., 2012; Soares, 2012; Van Le et al., 2013; Soares et al., 2014; Van Strien et al., 2014; Kawai and Koda, 2016; Baynes-Rock, 2017).

Animals can be fascinating from an aesthetic perspective and have the power to make people feel good. However, the interchangeability of words like "beauty," "aesthetic value," or "attractiveness" in literature frequently leads to misunderstanding (Brady and Prior, 2020). It's important to clearly describe what we mean when we judge animals from a human perspective. For instance, a pet's appearance may not always translate into a favorable assessment. An animal that appeals to people could actually be strange, odd, or even mysterious. Therefore, similarity, pleasantness, and attractiveness tend to converge when people have a positive attitude toward animals, leading to positive experiences that are motivated by these creatures (Frynta et al., 2011; Kühn and Gallinat, 2012). The appeal of animals as objects of beauty is an aesthetic value that transcends gender, ethnicity, and cultural boundaries (Bitgood and Patterson, 1987; Geldart et al., 1999; Woods, 2000; Richards, 2001; Jacobsen et al., 2006; Frynta et al., 2010; Landová et al., 2018). Basic aim of the study is to know the human attitude and impacts on the herptile species.

MATERIALS AND METHODS

STUDY AREA

Punjab is a province in northeastern Pakistan (Figure 1). Geographically, Punjab is known by its rich alluvial plains. Punjab is Pakistan's agricultural hub thanks to its fertile soil and effective irrigation systems. The province's agricultural production, which includes cotton, sugarcane, wheat, and rice, significantly contributes to the nation's economy and food security. Punjab has a significant sociodemographic impact as a result of its size. It is the province with the highest population in Pakistan and is home to many different ethnic and cultural groups. With influences from multiple dynasties, including the Mauryan, Gupta, Mughal, and Sikh empires as well as historic civilizations like the Indus Valley Civilization, Punjab's historical significance is clearly clear (Shah and Amjad, 2011).

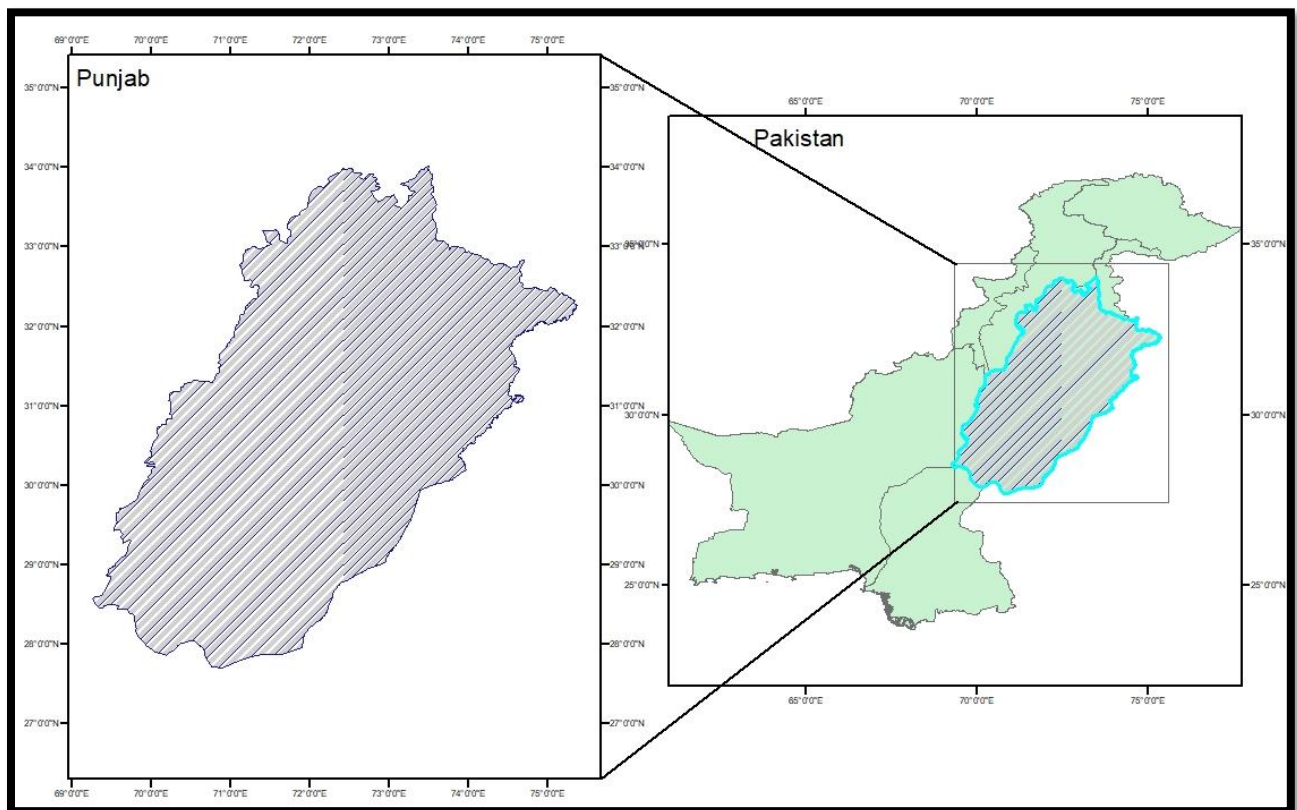


Figure 1: Map of Punjab.

PROCEDURE

We select participants at random from crowds and explained the purpose of our study and the methodology we would use. We only gathered information from people who voluntarily signed up, and we made a commitment to keep that information private. To ensure that everyone was treated fairly, we made sure that all of the interviews and questions were conducted in the same manner. A short booklet containing images of animals connected to the study was also given to them. All of the surveys were completed during the day, between the hours of 7:00 AM and 12:00 PM and 5:00 PM and 7:00 PM. After gathering the data, we put together a brief brochure to go into

more detail about the creatures we were researching and their significance to the ecology. This was done to dispel any doubts or misunderstandings that anyone could have had. It took roughly 25 minutes to complete the information gathering and knowledge sharing process.

QUESTIONNAIRE PREPARATION

We gathered data on people's views and general concepts in order to comprehend how people in Punjab feel about reptiles and amphibians. We conducted this research by reading books and records regarding these animals as well as speaking with a variety of people, including university experts in ecology, biology, and sociology. Each respondent given "0", "1" and "2" marks from disagree, agree and strongly agree respectively for each question. It was composed of following items,

- This Species is beautiful
- I avoid this species
- I fear this species
- I like the voices of this species
- This species is useful to human beings
- This species is harmful to human beings
- This species is harmful to poultry and pet
- This species is harmful to fishes
- This species attacks human beings
- This species ignores human beings
- The way the species moves gives me the creeps
- These species gives me nightmares
- When I find one of these species, I usually kill it or ask someone to kill it
- If there was a population of these species in my property I would take measures to eliminate it
- I think that these species should be exterminated.

STATISTICAL ANALYSES

In order to simplify and comprehend a big amount of data, we used a method called "Principal Component Analysis" (PCA), which divides the data into independent elements that may be more easily researched and analyzed.

RESULTS AND DISCUSSION

As shown in Figure 2, we interviewed 815 individuals in total, who ranged in age from 18 to 70. Notably, 348 respondents, or a majority, were between the ages of 18 and 35, which is a rather young age range. These participants had various levels of education, including those with primary, matriculated, intermediate, graduate, master's, and even doctoral degrees. It's interesting to note that 279 respondents were from rural communities and relied heavily on agriculture for their livelihoods. The older informants' notable depth of traditional knowledge was evident in comparison to their younger counterparts, which is remarkable. This is probably due to their extensive contacts with numerous animal species.

We learned some fascinating things about how individuals feel about certain reptiles from our research. It turns out that most people really like turtles and has a

soft spot in their hearts for them. But when it comes to lizards and snakes, it's a different story; these animals don't receive as much affection. Here's where it gets interesting; most of the respondents acknowledged to avoiding snakes and lizards, feeling afraid of them, and even experiencing the creeps. Many people think that these reptiles' sounds aren't exactly pleasant to hear and have no real utility. But there's a catch when it comes to snakes. They are regarded by many as the scariest, posing a threat and even annoyance individuals in their dreams. It's interesting to observe how differently we all perceive these amazing creatures (Table 1). The majority of responders' sentiment was fairly remarkable. They thought all snake species were extremely dangerous and would frequently kill them right away if they were seen. Given their perceived degree of harm, many believed that snakes ought to be immediately removed from their property and even from the entire world (Table 2). This powerful reaction highlights the widespread phobia and anxiety felt toward these animals, emphasizing the need for a more complex understanding of their place in our environment and the value of education in easing this phobia.

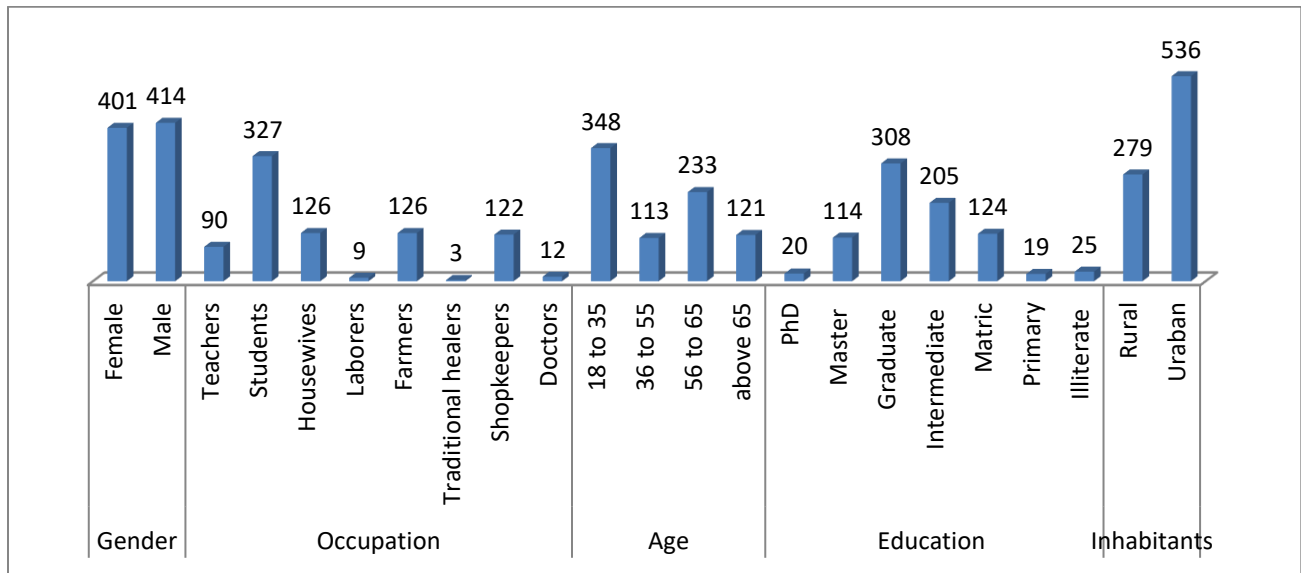


Figure 2: Profile the respondents.

The first two axes of the Principal Component Analysis (PCA) explained a total of 40.539% of the variation in people's attitudes about herpetofauna. Component 1 contributed 27.62% and Component 2 13.477%, respectively, to this variation. Component 1 was influenced by various variables, including "I like this species" (negatively correlated: -0.020413), "This species is beautiful" (negatively correlated: -0.03928), "I avoid this species" (positively correlated: 0.17815), "I fear this species" (positively correlated: 0.37779), "I like the voices of this species" (positively correlated: 0.035131), "This species is useful to human beings" (positively correlated: 0.10479), "This species is harmful to human beings" (positively correlated: 0.46731), "This species is harmful to poultry & pets" (positively correlated: 0.38621), "This species is harmful to fishes" (positively correlated: 0.26412), "This species attacks human beings" (positively correlated: 0.4066), "This species ignores human beings" (positively correlated: 0.098356), "The way the species moves gives me the creeps"

(positively correlated: 0.3133), and "These species gives me nightmares" (positively correlated: 0.31767). These variables collectively contribute to the diverse spectrum of human attitudes and perceptions towards herpetofauna. In Component 2, we observed correlations with various variables: "I like this species" (positive correlation: $r = 0.42403$), "This species is beautiful" (positive correlation: $r = 0.44774$), "I avoid this species" (negative correlation: $r = -0.21129$), "I fear this species" (negative correlation: $r = -0.28635$), "I like the voices of this species" (positive correlation: $r = 0.26691$), and "This species is useful to human beings" (positive correlation: $r = 0.33853$). Importantly, each principal component did not show significant correlations with the previously explained components ($r = -0.10939$). Additional variables like "This species is harmful to poultry & pets" (positive correlation: $r = 0.20626$), "This species is harmful to fishes" (positive correlation: $r = 0.31664$), "This species attacks human beings" (positive correlation: $r = 0.4066$), "This species ignores human beings" (positive correlation: $r = 0.11128$), "The way the species moves gives me the creeps" (negative correlation: $r = -0.26005$), and "These species gives me nightmares" (negative correlation: $r = -0.13754$) also displayed varying degrees of correlation. Significant correlations between several variables and other PCA components were not evident, indicating that human interactions dominated the process of forming the herpetofauna community (Figure 3 and 4).

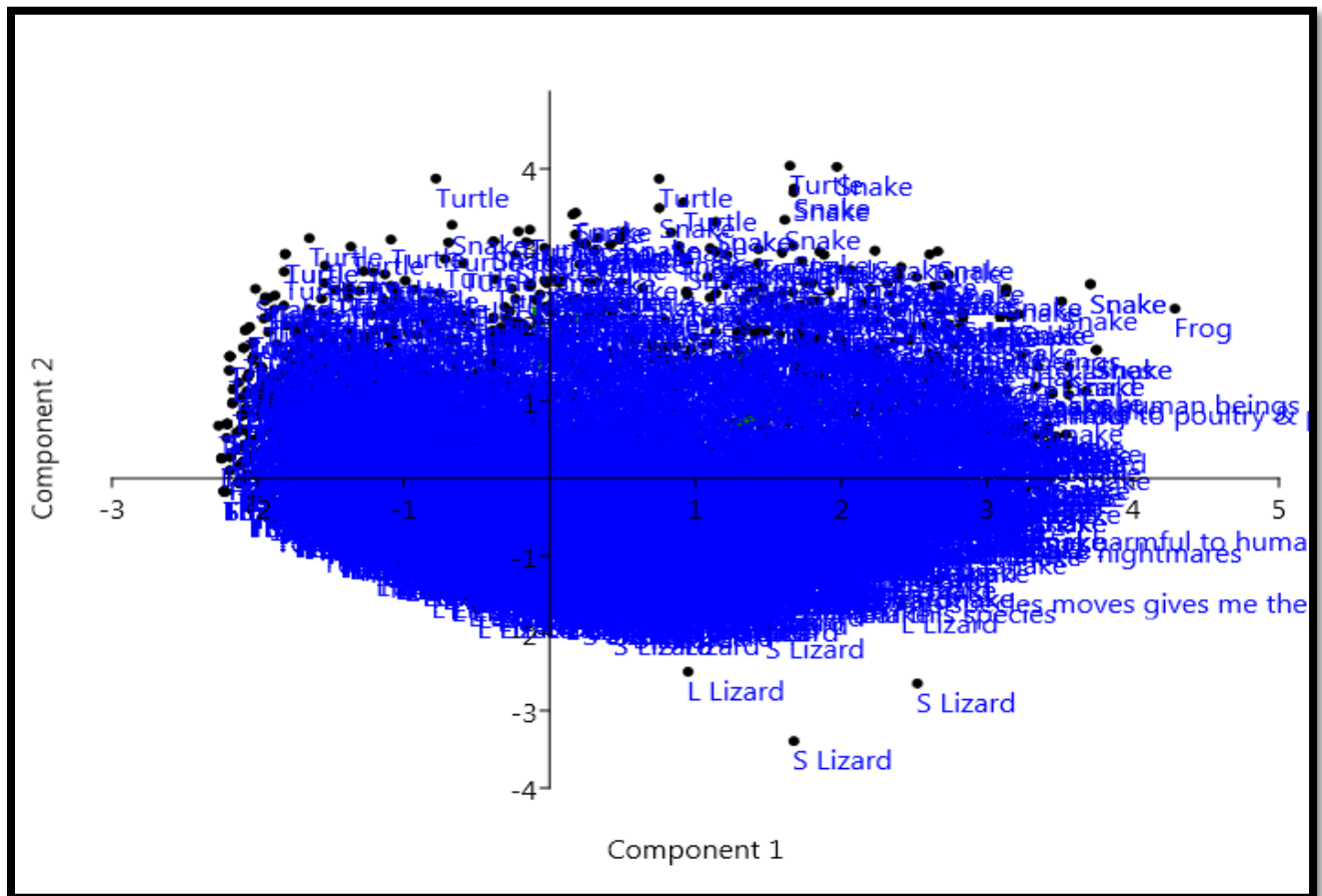


Figure 3: PCA for human behavior towards herpetile species.

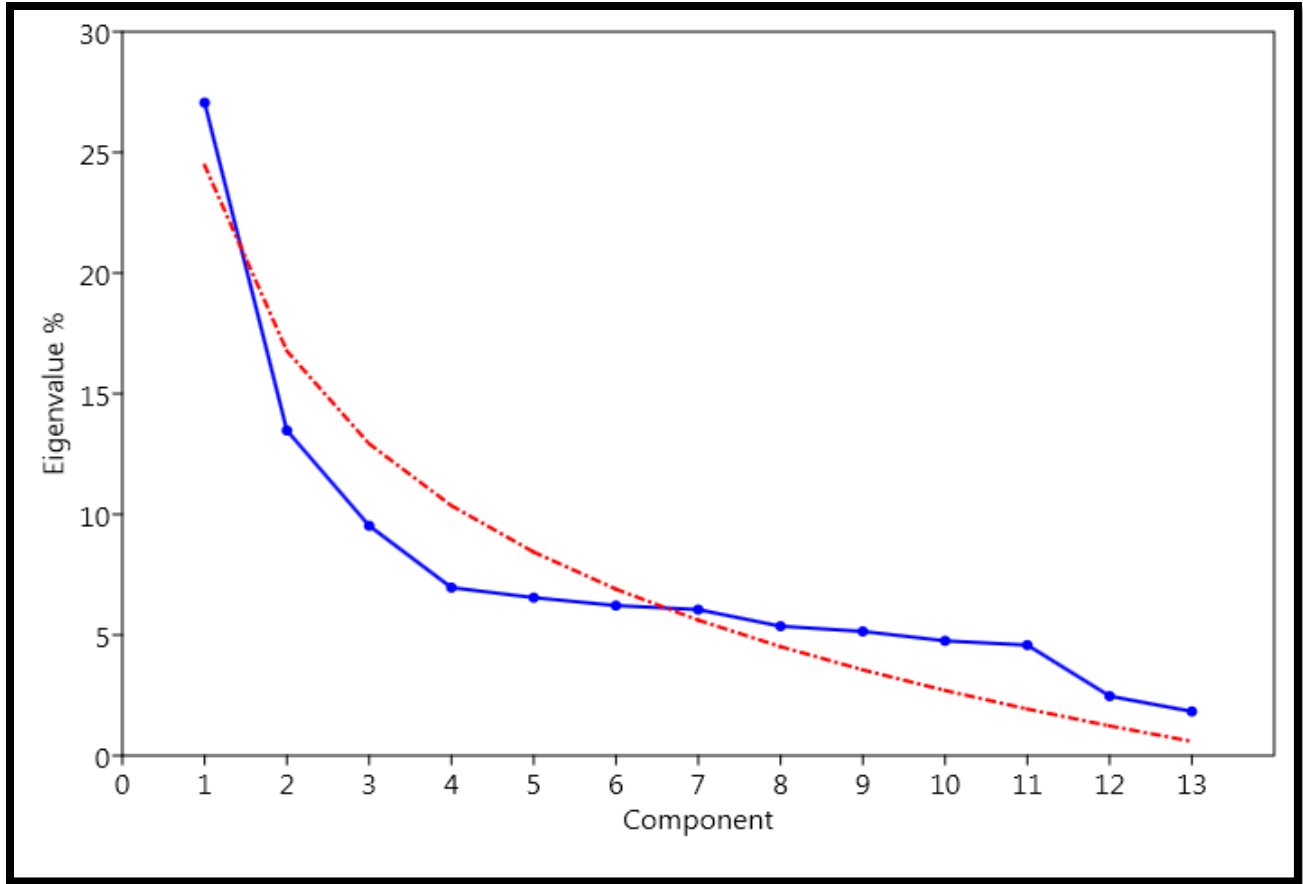


Figure 4: Eigenvalue compared with components of human behavior towards herptile species.

In the PCA analysis, the top two axes significantly explained 83.968% of the variation in respondents' attitudes toward herpetofauna conservation. Component 1 was responsible for 62.89% of the variation, whereas Component 2 was responsible for 21.078%. The variables "When I find one of these species, I usually kill it or ask someone to kill it" (positive correlation: $r = 0.71337$), "If there was a population of these species on my property, I would take measures to eliminate it" (positive correlation: $r = 0.58078$), and "I think that these species should be exterminated" (positive correlation: $r = 0.39217$) were all linked to Component 1. For example, Component 2's variables "When I find one of these species, I usually kill it or ask someone to kill it" (positive correlation: $r = 0.45738$), "If there was a population of these species on my property, I would take measures to eliminate it" (negative correlation: $r = -0.80985$), and "I think that these species should be exterminated" (positive correlation: $r = 0.36736$) all had positive correlations with each other. Importantly, none of the major components displayed a meaningful association with the elements that had previously been discussed. The patterns of the avian communities that Component 2 retrieved were also unrelated to those that Component 1 could explain. Further evidence that human impact was the main factor affecting the herpetofauna community was provided by the fact that the majority of habitat variables did not exhibit significant connections with other PCA components (Figure 5 and 6).

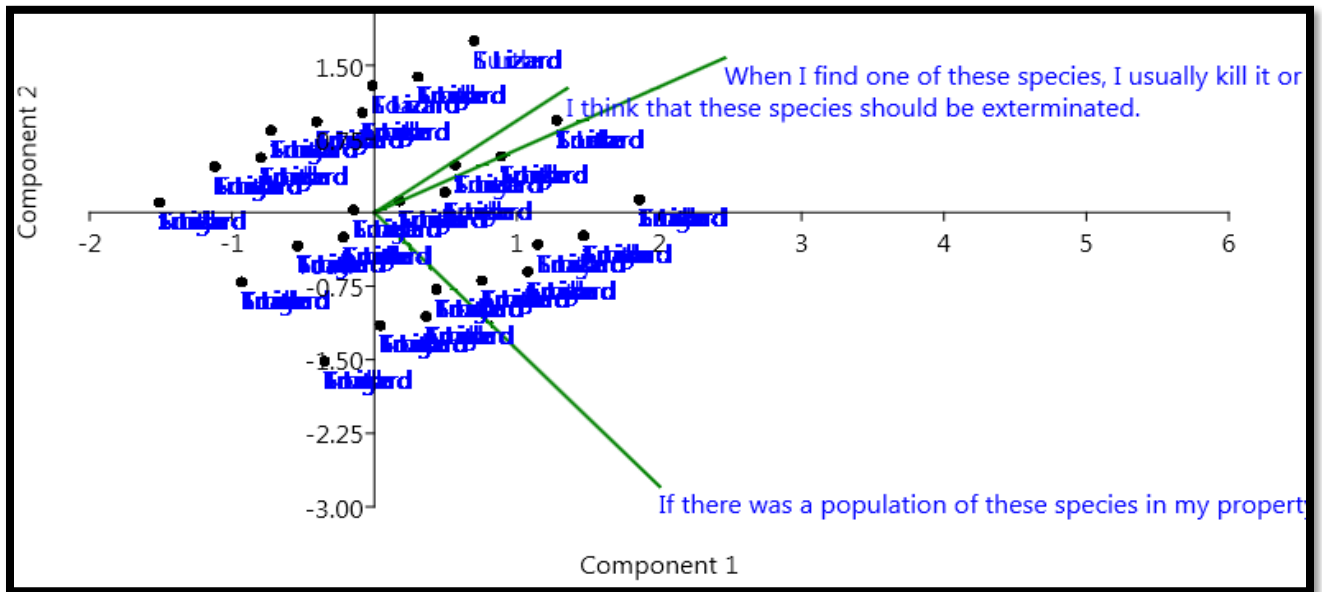


Figure 5: PCA for human behavior for conservation of herptile species.

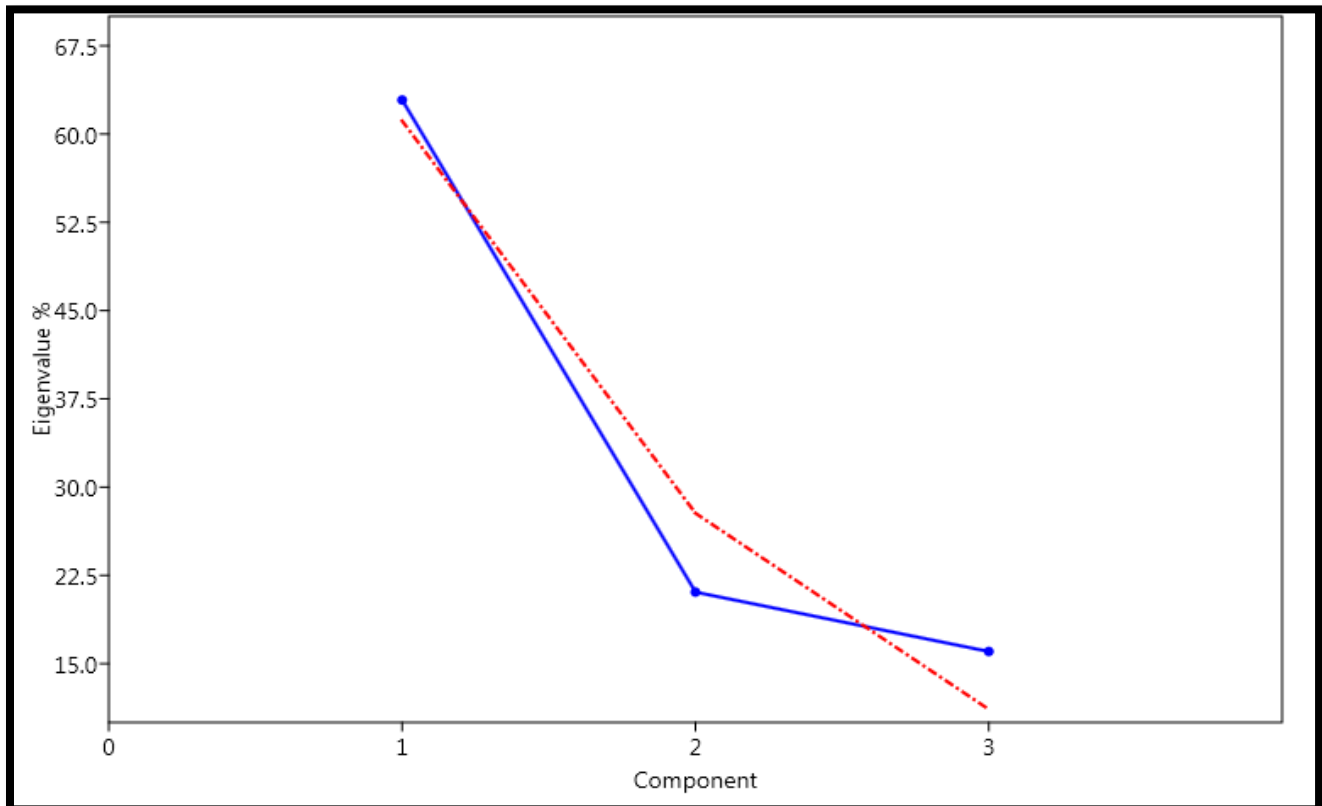


Figure 6: Eigenvalue compared with components of human behavior PCA for human behavior for conservation of herptile species.

Our study contributes to our understanding of how individuals feel about reptiles. While some of our findings are in line with those of prior studies, we also

discovered that certain people experience extremely strong sensations of aversion and terror for snakes. This demonstrates the need for us to learn more about why people experience fear and how we might lessen their fear. Education could play a significant role in the answer by enhancing people's comprehension of these species and perhaps even making them like them little more. People around the world view and interact with amphibians like frogs (Prokop et al., 2016) and toad (Tarrant et al., 2016) and reptiles like snakes and lizards (Janovcová et al., 2019a; Islam et al., 2023) in varied ways (Ceríaco, 2012; Islam et al., 2023). The cultures and beliefs of each location can have an impact on these variations in attitude and conduct. People treat snakes with high reverence in some cultures where they are revered or seen as powerful beings. You might come across temples or rituals honoring snakes in such locations. However, snakes are seen as venomous and deadly creatures in many other places, which cause dread (Öhman and Mineka, 2003) and even tries to kill them when found.

Depending on where someone lives, how old they are, and how much education they have, different individuals have different myths and beliefs about reptiles and amphibians. These myths and legends about reptiles, such as snakes and lizards, change considerably depending on where you live, how old you are, and how much you've learned (Collins et al., 2021; Adil et al., 2022; Hassan et al., 2023). Older people typically have less of these tales and notions about these beings, largely because they have more life experience and wisdom. As we had anticipated, however, many people also hold negative views of these animals. Reptiles like snakes and lizards are more likely to do this than amphibians. Therefore, there are a lot of people that have negative opinions towards these species (Ceríaco, 2012). Conservation activities are also impacted by these cultural differences. Amphibians and reptiles are protected by robust conservation initiatives in some nations, but these animals may not receive the same level of care or attention in other nations. As a result, cultural values, customs, and superstitions can have a big impact on how people feel about amphibians and reptiles globally. It can assist to promote greater coexistence and conservation efforts for these significant creatures if you are aware of these cultural distinctions.

CONCLUSIONS

Significant challenges to the survival of reptiles and amphibians include habitat destruction, pollution, climate change, and competition from exotic species. However, human interaction with these animals poses another significant and very serious concern. They are occasionally harmed, captured, or even killed, which is a grave worry. The fact that these animals are depicted in myths and legends as being dangerous and venomous is one factor contributing to this destructive behavior. These tales have the potential to create misconceptions and false assumptions about these creatures. Future research will focus on how these false ideas can lead to unfavorable attitudes and whether correct knowledge can help to alter these views. This study will enable us to develop more effective strategies for protecting these species. Furthermore, despite the fact that these animals are protected by law, they are still being captured and killed. As a result, we need to investigate alternate conservation strategies because the existing legislative restrictions are insufficient.

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Table 1: Myths and folklore about herpetofauna in Punjab, Pakistan.

Species	I like this species	This Species is beautiful	I avoid this species	I fear this species	I like the voices of this species	This species is useful to human beings	This species is harmful to human beings	This species is harmful to poultry and pet	This species is harmful to fishes	This species attacks human beings	This species ignores human beings	The way the species moves gives me the creeps	These species gives me nightmares
Frog	0.0821	0.0035	0.8809	0.5139	0.1100	0.4665	0.4387	0.4243	0.5295	0.3052	0.8023	0.6462	0.3260
Toad	0.0335	0.0393	0.9549	0.5723	0.0000	0.4583	0.4439	0.4345	0.4798	0.3526	0.7445	0.5757	0.3121
Snake	0.0699	0.8312	1.0370	1.1457	0.0045	0.4520	1.2925	1.2338	1.0706	1.3688	0.6717	0.9665	1.2613
Small Lizard	0.0000	0.0000	1.1884	1.4150	0.0035	0.4867	1.7329	0.6046	0.4647	0.6058	0.7407	1.2983	0.7801
Large lizard	0.0000	0.0000	1.1884	1.4150	0.0035	0.4855	0.8867	0.8231	0.5468	0.7523	0.7847	1.2971	0.7801
Turtle	0.8647	0.8566	0.6243	0.4763	0.4479	0.5445	0.5168	0.4416	0.5919	0.3931	0.7665	0.5324	0.0000

Table 2: Human negative thoughts about herptile species in Punjab, Pakistan.

Species	When I find one of these species, I usually kill it or ask someone to kill it.	If there was a population of these species in my property I would take measures to eliminate it.	I think that these species should be exterminated.
Frog	0.3017	0.6810	0.8137
Toad	0.3353	0.6451	0.8137
Snake	1.8936	1.8960	1.8185
Small Lizard	0.8347	0.9006	1.0347
Large lizard	0.8902	0.8983	1.0347
Turtle	0.3098	0.9954	0.3942