

## HUMAN



## WILDLIFE

## DE-CONFLICTING A CITY IN NATURE: NAVIGATING THE APPROACHES TOWARDS UNDERSTANDING HUMAN-WILDLIFE RELATIONSHIPS IN SINGAPORE

### 1. INTRODUCTION

Increasing conflicts between Singaporean residents and wildlife, particularly macaques, otters, and wild boars, necessitate an in-depth investigation into **human-wildlife interactions**. Despite Singapore's "City in Nature" image and its green spaces facilitating encounters, there is a gap in understanding the **multidimensional factors** influencing human impressions towards these animals. As the study of **human-wildlife coexistence** remains limited and existing methods are inadequate, evaluating future prospects for harmonious coexistence is vital for Singapore's development trajectory and nature preservation.

### 2. OBJECTIVES

- Assess distribution and factors behind impressions formed towards macaques, otters, and wild boars as a result of human-wildlife encounters in Singapore
- Evaluate existing assessment methodology and suggest improvements to address the challenges posed

### 3. HUMAN-NATURE CONNECTEDNESS (HNC) THEORY

One's emotions, thoughts, and intentions affect their capacity to value nature, whether intrinsically (biocentric) or for self-preservation (anthropocentric). Their behaviors can be modeled from intolerance to stewardship, and from conflict to coexistence, providing a preliminary indication of one's relationship with wildlife. However, such **linear dichotomy** belies the underlying complexities. HNC is **physically context-specific**, influenced by the urban tropical environment of Singapore that features unforeseen wildlife interactions even in controlled settings. **Sociocultural contexts** also shape intolerances impacting behavior toward wildlife. Assessments of coexistence thus require a **holistic approach** to complement linear assessments by considering diverse dimensions like individual values, tolerance, and acceptance, illuminating potential pathways for harmonious interactions within Singapore's urban tropical landscape.

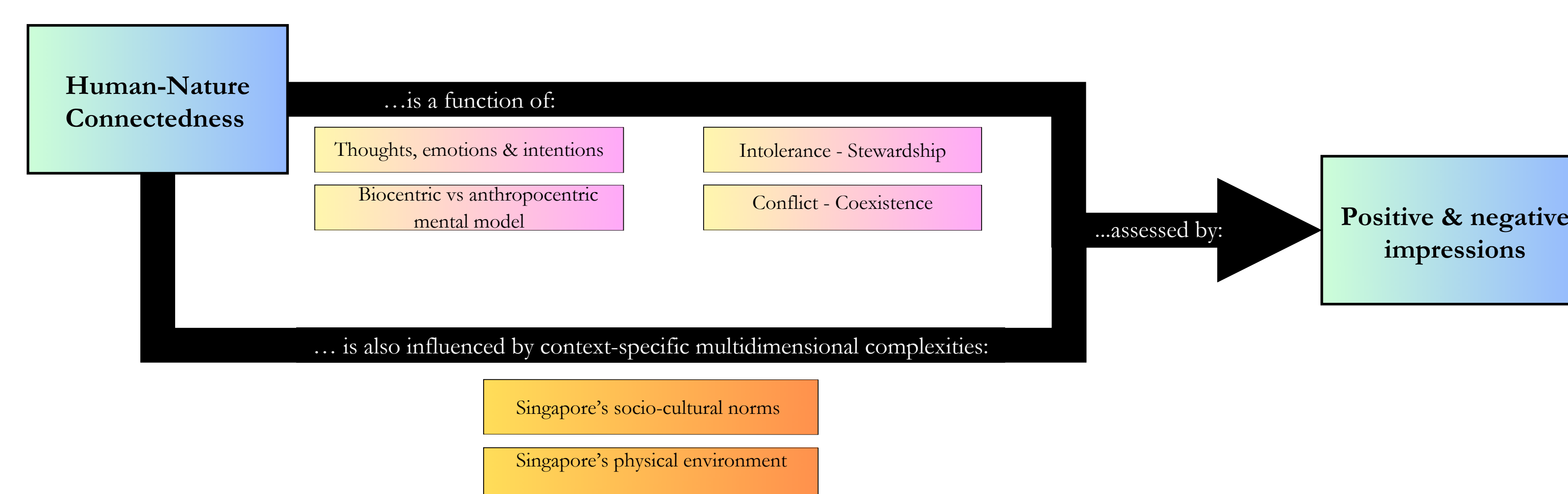


Figure 1. Conceptual framework visualising the links between human-nature connectedness theory and assessing impressions towards wild animals

### 4(A). SINGAPORE BASELINE ASSESSMENT FOR IMPRESSIONS OF WILD ANIMALS: FREQUENCY AND DISTRIBUTION

Fig. 2: 58% of the respondents sighted macaque(s), 57% sighted otter(s), and only 42% sighted wild boar(s).

Fig. 3: Respondents only sighted macaques and wild boars once or rarely while otters were sighted between once to a monthly basis. 33% of respondents rated their impression of macaques slightly negative while 37% rated similarly for wild boars. Majority of responses rated all animals neutrally, with 44%, 37%, and 39% for macaques, otters, and wild boars respectively. **Otters have the most 'slightly positive' impressions**, with 35% rating it as such.

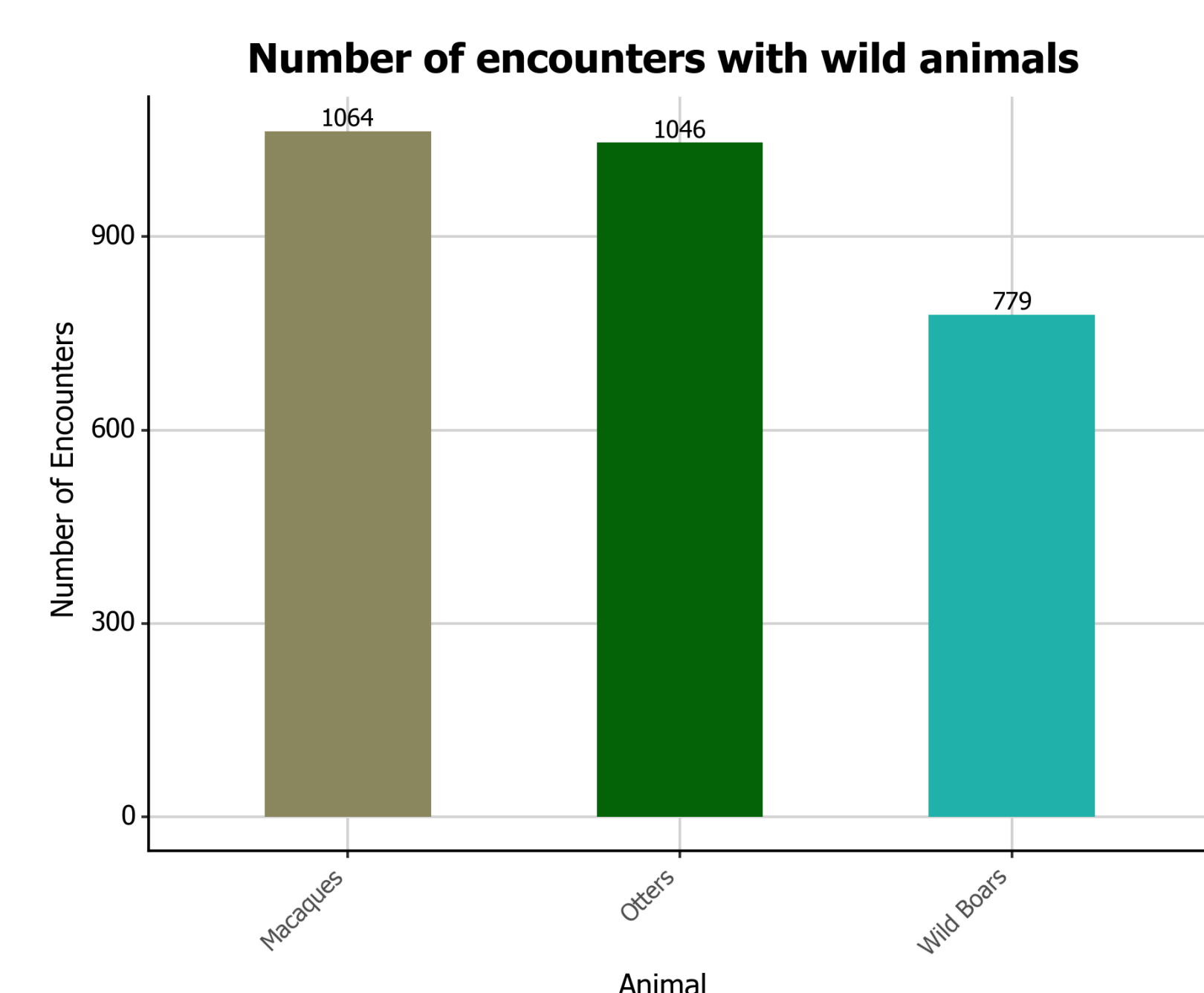


Figure 2. Barplot of residents who encountered each wild animal, of 1839 completed surveys

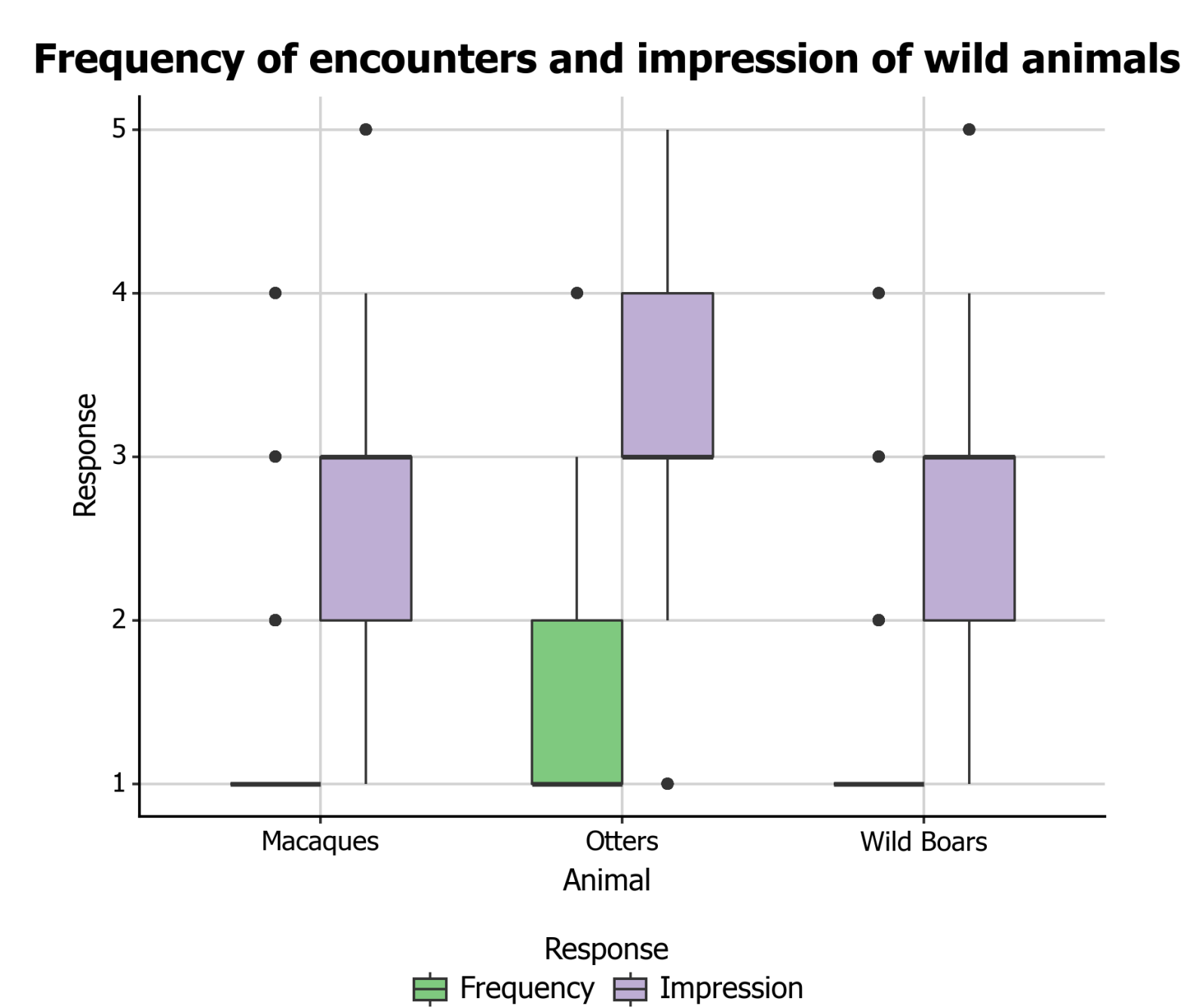
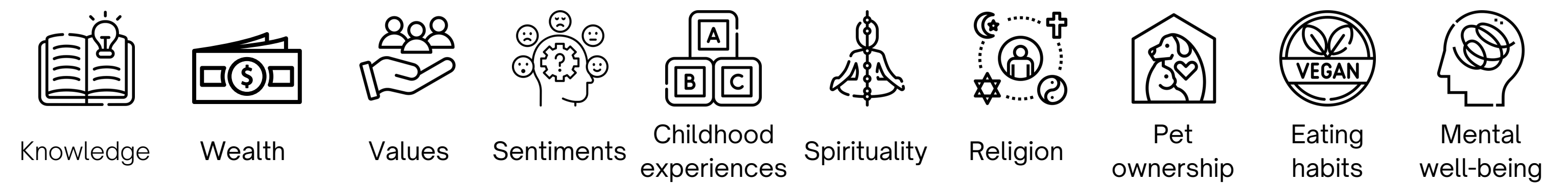


Figure 3. Boxplot of the spread of responses for the frequency of residents' encounters and their impressions of each wild animal.

### 4(B). SINGAPORE BASELINE ASSESSMENT FOR IMPRESSIONS OF WILD ANIMALS: FACTORS

Secondary data survey questions were grouped into 10 broader themes to analyse their effect on an individual's impression of each animal:



Regression modeling found **no significant effect of knowledge** on the impressions of any animals, suggesting strategies to educate are not effectively assimilating and altering behavior. Similarly, wealth is insignificant. **Values, sentiments, childhood experiences, and spirituality were significant** for all animals, factors that are deeply rooted in one's identity and mental models. Correlation coefficient values were  $< 0.2$  indicating unclear correlation owing to **multicollinearity**.

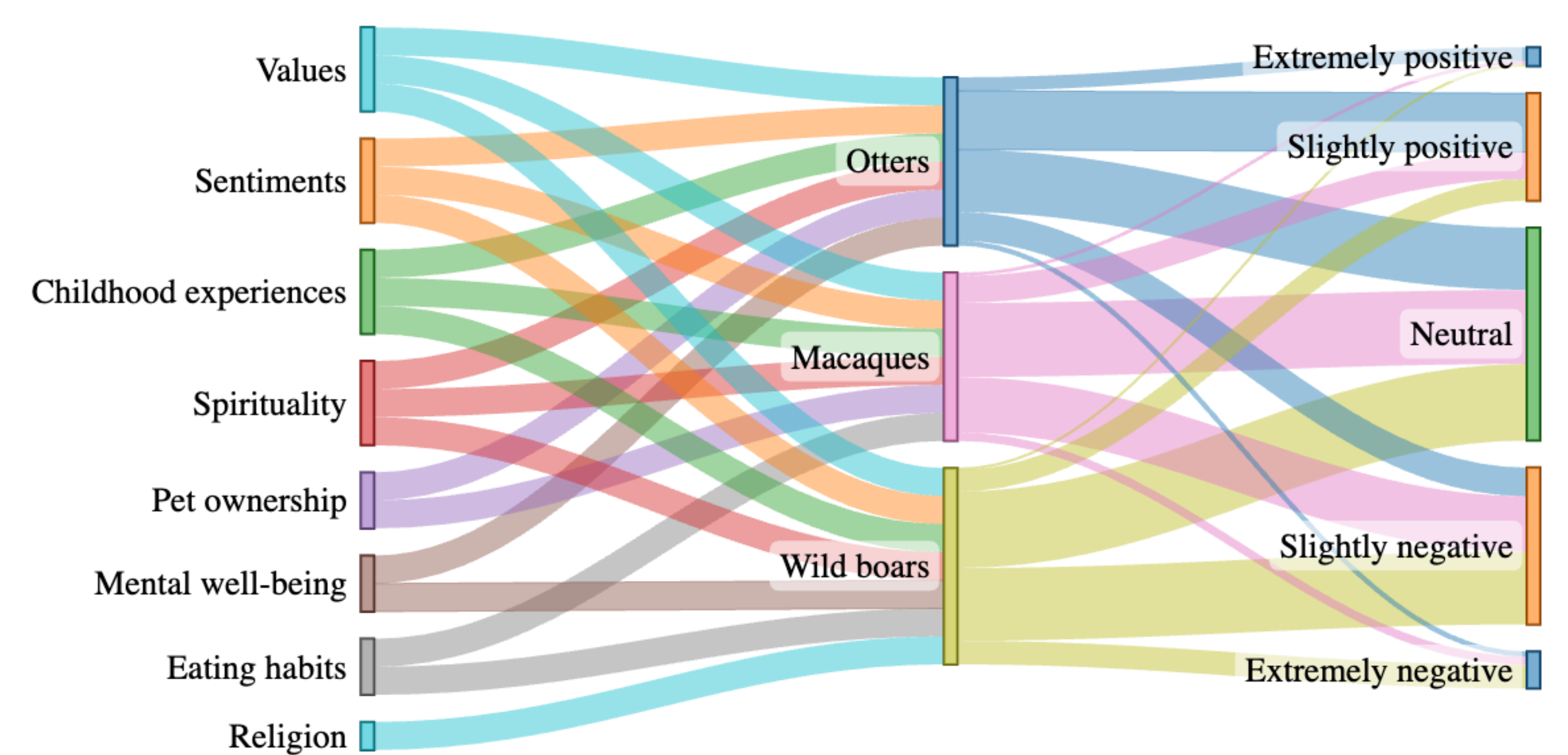


Figure 4. A Sankey diagram to visualise the factors which have a significant effect on impressions of wild animals.

### 5. THE SYSTEMS THINKING APPROACH TO HUMAN-WILDLIFE INTERACTIONS

Figure 5 visually emphasizes the **multidimensional complexity**. For example, a person's childhood nature experiences can lead to bonding through feeding animals, initiating a **chain of behaviors and interconnected variables**. The diagram underscores how childhood experiences, knowledge, and values are interlinked, influencing each other's outcomes. **Mapping** serves an educational tool, allowing wildlife managers to visualise **intricate cause-and-effect relationships**, and grasp action consequences within the complex environmental system.

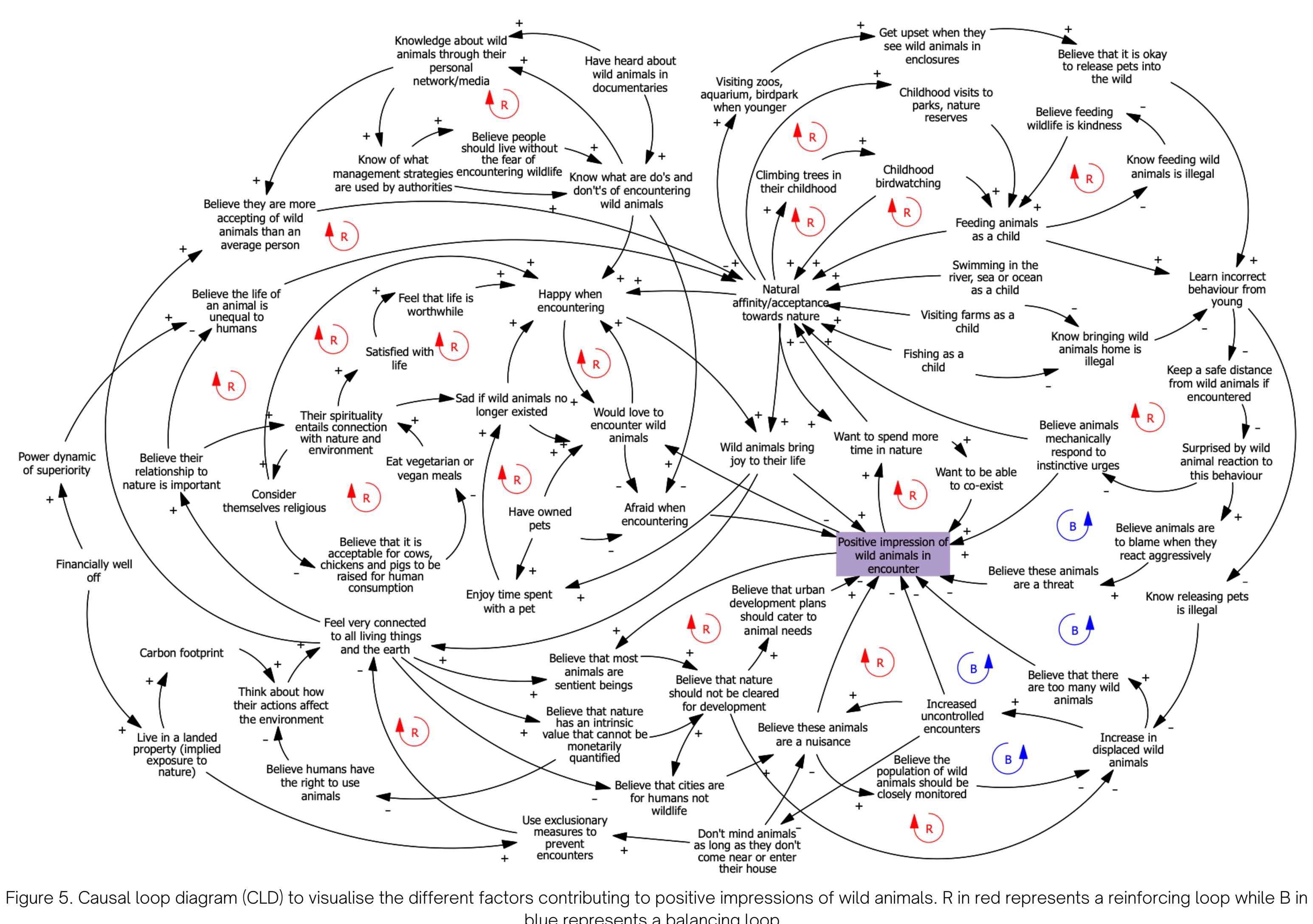


Figure 5. Causal loop diagram (CLD) to visualise the different factors contributing to positive impressions of wild animals. R in red represents a reinforcing loop while B in blue represents a balancing loop.

### 6. IMPLICATIONS FOR FUTURE INQUIRY

Conducting **longitudinal studies** will allow for more dynamic modeling to capture rapid behavioral system changes. Building on the CLD, temporal data allows the modeling of impressions with interlinked considerations and can better guide policymakers in assessing the absolute impact of their management strategies, as there are **reinforcing and balancing behaviors** that may have confounding implications on an otherwise direct relationship.

#### KEY REFERENCES

- Bruskotter, J. T., Singh, A., Fulton, D. C., & Stagle, K. (2015). Assessing tolerance for wildlife: clarifying relations between concepts and measures. *Human Dimensions of Wildlife*, 20(3), 255-270.
- Frank, B., Glikman, J. A., & Marchini, S. (2019). *Human-wildlife interactions: turning conflict into coexistence* (Vol. 23). Cambridge University Press.

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