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Hippopotamus (*Hippopotamus amphibius*) Aggressive Behaviors in the Retima Hippo Pool, Orangi River, Tanzania

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Comparison of Hippopotamus (*Hippopotamus amphibius*) Aggressive Behaviors in the Retima Hippo Pool, Orangi River, Tanzania

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Introduction

- The hippopotamus (*Hippopotamus amphibius*), or hippo (Figure 1), is a mega-herbivore and ecosystem engineer, meaning that it is an organism which modifies an environment and its resources (Subalesky, A., et al.).
- Hippos forage on land at night and spend the daytime in shallow pools to thermoregulate, to keep sensitive skin moist, and to minimize exposure to light (Tumbuka, C.).
- Hippos function under a dominance hierarchy and live in populations that are distributed based on access to living space (Furstenburg, D.; Olivier, R. & Laurie, A.).
- This study focused on observing aggressive behaviors of hippopotamuses while in pools of water.
- We hypothesized that hippos, while in the Retima Hippo Pool, would be more aggressive in the mornings compared to the evenings due to competition for space in the water as they first arrive to the pool. (Tumbuka, C.).
- Based on this hypothesis, we predicted that if hippos compete more actively for area within the pool during the mornings than evenings, then there will be more aggressive behaviors observed during the morning.

Methods

- Observational data was collected on 29 May 2022 at Retima Hippo Pool, Orangi River, Serengeti National Park, Tanzania (1.42572° S, 35.35911° E).
- Data collection took place during a morning session (06:25 - 07:40) and an evening session (17:20 - 18:35), and the count of observed behaviors was compared.
- Five transects were randomly selected and behaviors were observed along sight lines.
- Behaviors were collected every 5 minutes for 75 minutes (a total of 16 observation periods per session) and were classified based on pre-determined descriptors and terminology (Table 1).
- Data from open mouth, turning away, becoming prone, and leave vicinity behaviors was pooled together and classified under "Submissive" (Table 1).
- Data was analyzed using a chi-square goodness of fit test.

Figure 1. Hippopotamuses exhibiting jaw-to-jaw behavior in the Retima Hippo Pool, Orangi River, Serengeti National Park, Tanzania. Image: P. Kopel.

Table 1. Observed behaviors during the morning (06:25-07:40) and evening (17:20-18:35) in the Retima Hippo Pool, Orangi River, Serengeti National Park, Tanzania (n = 150).

Behavior	***Morning***	***Evening***
Chasing	5	0
Jaw to Jaw	15	30
Gaping	10	25
Rearing/Pushing	8	15
Tusking/Slashing/Biting	5	14
Submissive	11	12
Total	54	96

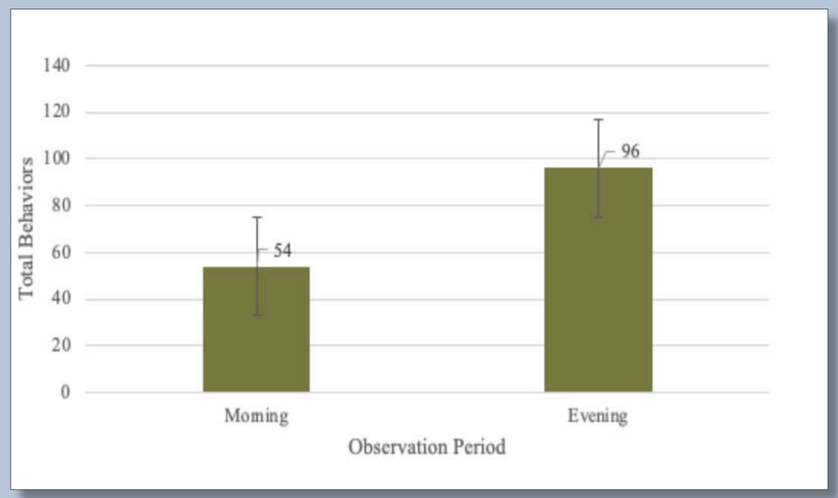

Figure 2. Total observed behaviors of hippopotamuses in the morning versus evening at the Retima Hippo Pool, Orangi River, Serengeti National Park, Tanzania. Error bars represent standard error (n = 150).

Results

- Table 1 indicates a statistically significant difference in the occurrence of aggressive behaviors in hippos comparing the morning and evening ($\chi^2 = 11.760$, $p = 0.0006$, $df = 1$).
- Total number of behaviors observed: 150 (Figure 2).
- Count of hippos present in the morning: 70.
- Count of hippos present in the evening: 50.

Discussion/Conclusion

- Our hypothesis, that hippos would be more aggressive in the morning than the evening due to competition for space in the pool as they first arrived, was not supported ($\chi^2 = 11.760$, $p = 0.0006$, $df = 1$).
- Our hypothesis was based on results of a study done by Tumbuka, C. This study found that threats and biting in adults were most frequent during the morning and mid-morning hours (08:00 - 11:00), when in water.
- Upon comparing our results to this study, we found there to be disagreement. Our experimental data supported that aggressive behaviors were employed more frequently during the evening (96 observed behaviors) than in the morning (54 observed behaviors) (Figure 2).
- In both the morning and evening, gaping and jaw to jaw were the dominant behaviors displayed. These behaviors, however, occurred more frequently in the evening: gaping was observed 2.5 times and jaw to jaw observed 2 times more often in the evening than the morning. (Table 1).
- The amount of water moving, and the depth of the pool, can fluctuate based on seasons. Data was collected at the end of the rainy season, of which yielded little precipitation. The pool contained a low water level relative to common seasonal conditions. This could be a reason for the low hippo density in the pool and the aggressive behaviors.
- Further research could investigate the relationship between the speed of moving water in the pools and aggression.

Literature Cited

- Available upon request