



UNIVERSITI PUTRA MALAYSIA

**GIBBON BEHAVIOURAL ECOLOGY ON FRINGES OF TAMAN NEGARA
KUALA TAHAN, PAHANG**

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**GIBBON BEHAVIOURAL ECOLOGY ON FRINGES OF TAMAN NEGARA
KUALA TAHAN, PAHANG**

NOR AZREN BINTI ABDUL RAHMAN

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CERTIFICATIONS

It is hereby certified that I have read this project paper entitled “ Gibbon Behavioural Ecology On Fringes Of Taman Negara Kuala Tahan, Pahang” by Nor Azren binti Abdul Rahman and in my opinion it is satisfactory in terms of scope, quality, and presentation as partial fulfilment of the requirement for the course VPD 4999 – Project.

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DEDICATIONS

This study is wholeheartedly dedicated to my beloved parents, who have been my source of inspiration and strength. Thank you for continuously provide me with emotional and financial support

And to Almighty God, Allah, thank you for the guidance, strength, protection and healthy life.

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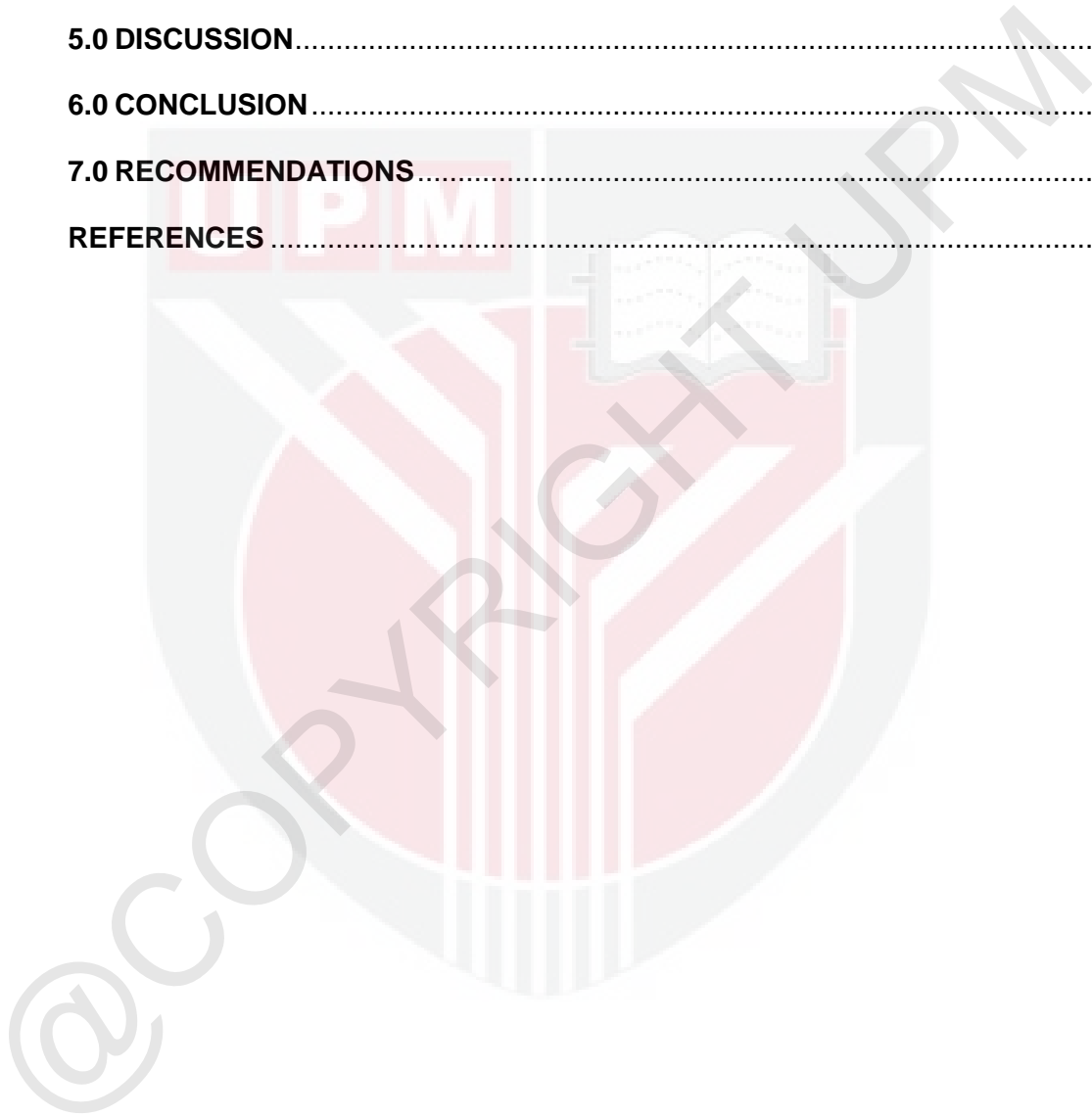
I would also like to thank everyone that involves directly or indirectly.

To DVM2023, lets make it to graduation day together.

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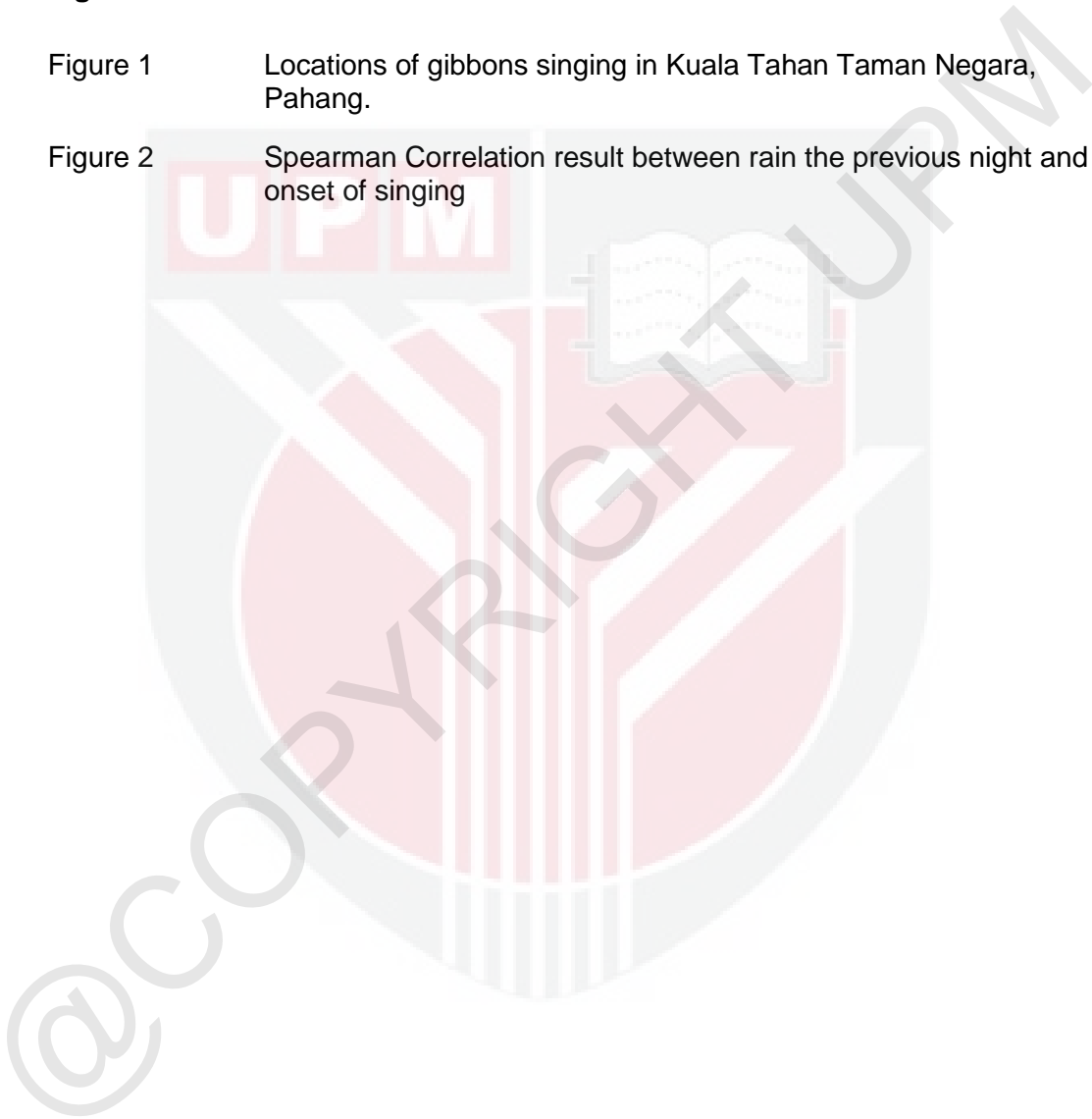
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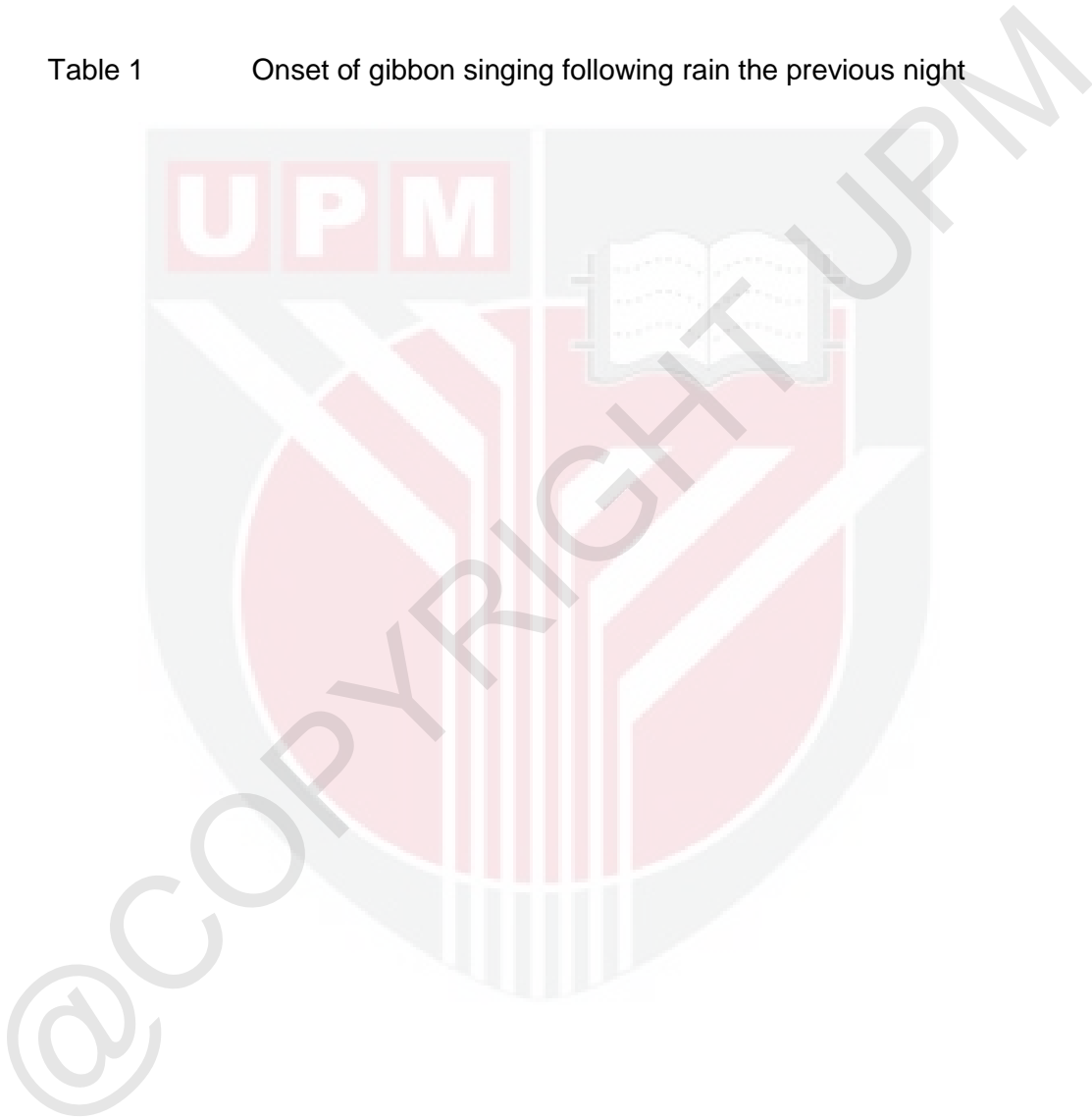
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ABSTRAK

Abstrak daripada kertas projek yang dikemukakan kepada Fakulti Perubatan Veterinar untuk memenuhi sebahagian daripada keperluan VPD 4999 – Projek Ilmiah Tahun Akhir.

TINGKAH LAKU EKOLOGI UNGKA DI PINGGIRAN TAMAN NEGARA KUALA TAHAN, PAHANG

Oleh

NOR AZREN BINTI ABDUL RAHMAN

2022

Penyelia: Dr. Tengku Rinalfi Putra Tengku Azizan

Tingkah laku menyanyi ditunjukkan oleh banyak haiwan semasa interaksi intraspesifik, seperti semasa penandaan wilayah, bermain dan mengarah binate lain. Ungka terkenal dengan lagu-lagu mereka yang kuat dan pelbagai pada awal pagi bermula dari matahari terbit. Panggilan ini bertahan rata rata dalam tempoh 11 minit dan dapat didengar hingga satu kilometer sahaja kerana habitatnya adalah kanopi tinggi. Kajian menunjukkan awal pagi memberikan keadaan terbaik untuk penghantaran bunyi tetapi cuaca dapat mempengaruhi bagaimana perjalanan suara melalui persekitaran. Tujuan kajian ini adalah untuk mengkaji hubungan antara kesan cuaca pada awal pagi terhadap tingkah laku nyanyian ungu. Dalam kajian ini, kami menilai tingkah laku nyanyian ungu secara kualitatif berkaitan dengan perubahan cuaca. Tingkah laku menyanyi oleh ungu liar dipelajari pada awal pagi bermula dari jam 7 pagi hingga 11 pagi di Taman Negara Kuala Tahan, Pahang. Tempoh nyanyian didokumentasikan dan keadaan cuaca, suhu dan kelembapan pada waktu pagi

dan malam sebelumnya direkodkan. Selama lima hari kajian, ungka liar memulakan nyanyian mereka sekitar jam 9 pagi. Sekiranya terdapat hujan pada malam sebelumnya atau awal pagi, gibbon mula menyanyi pada waktu kemudian sekitar jam 11 pagi atau ketika matahari kelihatan. Hasil tersebut menunjukkan bahawa terdapat hubungan antara cuaca dan corak tingkah laku menyanyi ungka. Hasilnya sejajar dengan kajian sebelumnya dilakukan oleh Dena J.Clink di Sabah yang menunjukkan bahawa perubahan dalam keadaan semalaman dan cuaca dapat mempengaruhi tingkah laku panggilan pagi dan waktu ungka mula menyanyi.

Kata kunci: Ungka, Tingkah laku, nyanyian , hujan, panggilan

ABSTRACT

An abstract of the project paper presented to the Faculty of Veterinary Medicine in partial fulfilment of the course VPD4999 - Final Year Project.

GIBBON BEHAVIOURAL ECOLOGY ON FRINGES OF TAMAN NEGARA KUALA**TAHAN, PAHANG****By****NOR AZREN BINTI ABDUL RAHMAN****2022****Supervisor: Dr. Tengku Rinalfi Putra Tengku Azizan**

Singing behavior is shown by many animals during intraspecific interactions, such as during territorial marking, playing and directing others. Gibbons are known for their loud and elaborate songs in the early morning starting from sunrise. These calls average 11 minutes and can be heard up to one kilometre only as their habitat is high canopy. Studies show early mornings provide the best conditions for sound transmission but weather can have a large influence on how sound travels through the environment. The purpose of this study is to determine the effect of weather in early mornings on the singing behavior of the gibbons. In this study, we qualitatively assess gibbon singing behavior in relation to weather changes. The singing behavior in wild gibbons was studied in the early morning starting from 7am

until 11am at Taman Negara Kuala Tahan, Pahang. The duration of the singing was documented and the condition of the weather, temperature and humidity in the morning and the night before were recorded. Over the five periods of investigation, wild gibbons started their singing around 9am. If there was rain the previous night or early morning, gibbons started singing at a later time around 11am or when the sun was visible. Those results indicated that there is an association between weather and gibbons' singing behavior pattern. The results are in line with previous studies from Dena J.Clink in Sabah that show that changes in overnight conditions and weather can influence early morning calling behavior and time it starts calling.

Keywords: gibbon; behavior; singing; rainfall; vocalisation

1.0 INTRODUCTION

1.1 Background

Gibbons come in between monkey and anthropoid. Gibbons comes from family of Hylobatidae. The various species of gibbons can be divided into four genera: Hylobates, Hoolock, Nomascus and Symphalangus. Gibbons fall into the ape category but are considered lesser apes with same humanlike build and no tail. Gibbons differ from great apes in having larger arms, thicker hair and a neck pouch that amplifies sound (Britannica, 2021). Gibbons communicate through vocalising or oftenly referred as singing for gibbons.

Animals in a variety of settings, including tropical forests and deserts, engage in early-morning calling and this include gibbons (Clink, D.J., 2020). The function of most early morning vocalisations is thought to be either for territorial communication or mate attraction (Henwood & Fabric, 1979). All of the potential uses for singing involve some kind of group or intergroup communication. The male-female duet may serve as a spacing device for communication within the same species, telling other groups of each other's locations (Cheyne. S.M., 2008).

The selection pressure that resulted in variance in animal calling and singing timing is still not fully understood, but variation in call timing is most likely due to environmental factors such as temperature, weather, humidity, rainfall and topography (Clink, D.J., 2020). Precipitation of the rain may influence singing behaviour due to the masking effects of the sound during raining, or it could be linked to an overall decrease in animal activity during rainy periods (Link et al, 2011). Previous studies have shown that gibbon singing behaviour can be affected by rain (Chivers. D.J., 1974). However, not much

research has been done in Peninsular Malaysia regarding how rainfall can affect gibbon singing.

1.2 Objective

This also brings the objectives of the study which is to observe if rainfall influenced gibbon singing behaviour.

1.3 Hypothesis

Null Hypothesis: There is no association between rainfall and gibbons singing behaviour

Alternative hypothesis: There is association between rainfall and gibbons singing behaviour

2.0 LITERATURE REVIEW

2.1 Gibbons behaviour and communication

Gibbons are arboreal and they use their long arms to brachiate through the canopy. They live in tiny, monogamous groups and are active during the day, defending territory in the treetops. They eat mostly fruit, various amounts of leaves, and occasionally insects (Brittanica, 2021). Gibbons are a high canopy species with an altitudinal range limited to 1200 metres and rarely found in the understory of forest (Gron,2010).

Because gibbons are high canopy species animals, they communicate by vocalising which often referred as song. Vocalization is a useful method of communication for groups members close by, distant neighbours, and even other species (Martinez et al., 2022). The songs of gibbons are a rare exception to the generally lacklustre vocal range of non-human primates. These apes combine a variety of call notes into complex songs that serve to repel away conspecific invaders, promote pair ties, and draw mates (Clarke, 2006). Long-distance song may be used to signal physical strength and/or paired status to adult offspring of other far-off pairs who disperse to nearby areas (Brockelman et al., 1998). This threat needs to be more intense when there is a high population density, where all accessible territory is occupied, and where few adults are single. In those areas, singing is very important and should happen often. With distant communication between groups, it helps individuals to know the presence of mates or rivals (Terleph, T., Saralamba, C., & Reichard, U. H., 2022).

Gibbon vocals are strong, have a melodious tone, and travel far. In the majority of gibbon species, mated pairs sing in synchronised duets (Dallman & Geissman, 2021) except for silvery gibbon and Kloss's gibbon (Dallman & Geissmann, 2009). Duets are

performed by mated pairs that are concentrated on the female's great call and her mate's coda answer, which is referred to as the duet's great call sequence (Terleph, T., Saralamba, C., & Reichard, U. H., 2022). The "great call," is the most recognisable vocalisation. Both sexes use it to claim their territory (Britannica, 2021). These song bouts average 11 minutes and can be heard up to one kilometre away (Raemaekers & Raemaekers, 1985).

2.2 Early morning vocalisation

Animals in diverse habitats ranging from tropical forests to deserts engage in early morning calling activity and this include gibbons. Most early morning vocalisations are assumed to be used for mate attraction or territory communication. It has been shown that before dawn is an ideal time to call (Whitten, A. J., 1982) and it has been suggested also that animals call in the morning because the conditions are ideal for sound transmission, yet there is a significant amount of inter- and intra-specific diversity in call time within the early morning calling activity (Clink, D.J., 2020). Understanding the selective pressures that lead to variation in timing of animal calling remains an open question, but variation in call timing is most likely the result of a combination of species and individual - specific intrinsic, social and environmental factors (Staicer, 1996). Normally, gibbons tend to call in early morning hours (Mitani, J. C., 1984) or before sunrise (Tenaza, 1976).

2.3 Rainfall delayed gibbon calling

Rainfall is known to have an impact on the frequency of singing, with less singing occurring during the rainy season (Cheyne, S.M., 2008). There is also evidence that animals alter or lessen their calling behaviour in response to environmental changes.

For example, European robins were experimentally subjected to warm or cold overnight temperatures and those subjects that were exposed to cold temperature were found to initiate less vocal behaviours (Godfrey & Bryant, 2000).

Rainfall has been found as one of the primary factors negatively influencing gibbon calling across species, and the majority of acoustic survey methodologies advise doing gibbon surveys only after dry, rainless nights (Brockelman & Srikosamatara, 1993). Studies also have shown that rain inhibits gibbon singing behaviour (Whitten, 1982). If gibbons spend the night and the morning wet which makes them cold, they will be expected to prioritise finding food over singing to replenish their energy levels. Susan Cheyne also mentioned in her study in 2008 that gibbons took much longer to begin singing in the mornings when it rained.

Gibbons also experience heat loss throughout the night, which will be more pronounced after rain (Tenaza, 1976). It's also possible that higher levels of rainfall are associated with cooler air temperatures, which raises energy needs and forces gibbons to spend more time foraging and less time calling during rainfall (Cheyne. S.M., 2008). On top of that, sound transmission during heavy rainfall also would be reduced (Lengagne & Slater, 2002).

3.0 METHODOLOGY

3.1 Study Site

This study was done in Taman Negara Kuala Tahan, Pahang, Malaysia (4.3831N, 102.4033E), operated by Department of Wildlife and National Parks (DWNP), whereas the facilities and services are managed by local communities and private sectors.



Figure 1: Locations of gibbons singing in Kuala Tahan Taman Negara, Pahang.

3.2 Data Collection

Data were collected on *Hylobates Lar* that live in Taman Negara for 5 days (27 September until 1 October) ranging from 0730h until 1100h. Singing onset time was recorded until the time of last call to know the duration of the singing. Humidity that morning and presence of rainfall the previous night were measured and recorded.

Rainfall the previous night was classified as 0 - dry and 1 = light rain (< 2.5 mm (0.098 in) per hour).

3.3 Statistical Analysis

Statistical test were performed using Minitab v.13. Data between variables was examined by Spearman's rank correlation. Rainfall the previous night and onset of singing were analysed.

4.0 RESULTS

4.1 RAINFALL AND SINGING ONSET MEASUREMENT

Date	Rainfall the previous night 0=No rain 1=Light rain	Onset of singing
27 September 2022	1	1030h
28 September 2022	0	0925h
29 September 2022	0	0905h
30 September 2022	0	0845h
1 October 2022	1	1025h

Table 1 : Onset of gibbon singing following rain the previous night

Weather (rainfall or not) the previous night was recorded and temperature that morning was taken. Presence of singing is the response variable and rainfall the previous night is the predictor. On 5 days of data collection, there was light rainfall on two nights which was on 27 September and 1 October. On mornings when there was rain the previous night, gibbons started to sing much later between 1000h to 1030h instead of between 0845h and 0930h. Meanwhile on 28 September, 29 September and 30 September where there was no rain the previous night, gibbons start singing earlier around 0845h until 0925h.

4.2 STATISTICAL ANALYSIS RESULT

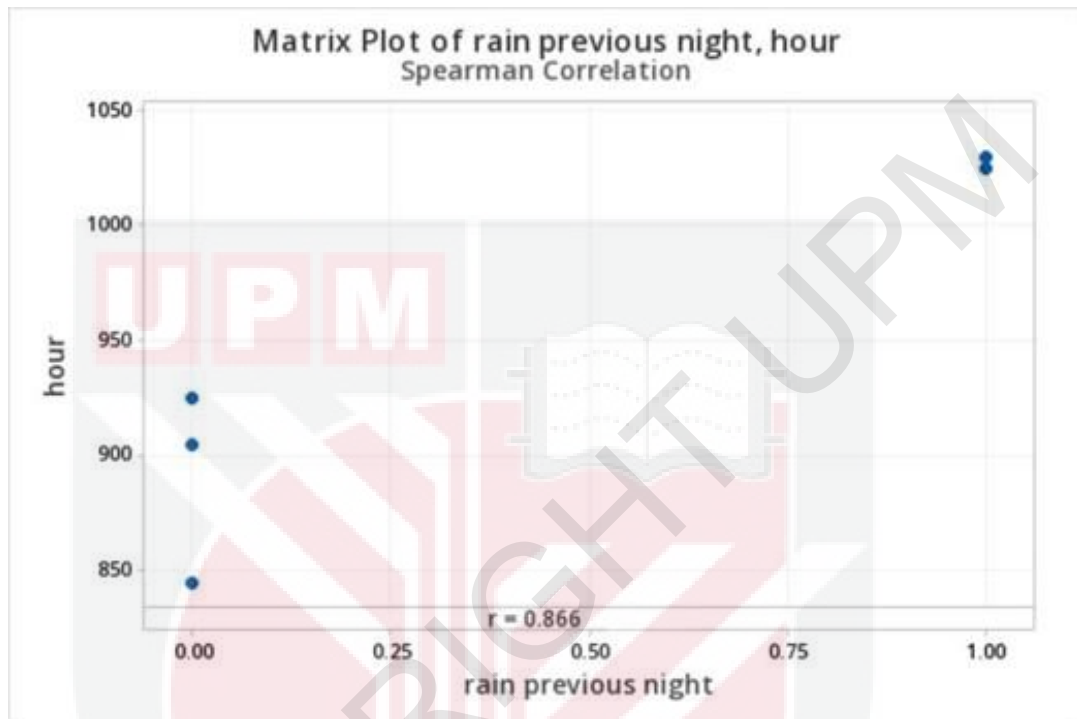


Figure 1 : Spearman Correlation result between rain the previous night and onset of singing

Result for spearman correlation was $r=0.866$ indicating that there is a strong relationship between rainfall the previous night and onset of singing.

5.0 DISCUSSION

The main goal of this study was to investigate if rainfall has an influence on singing behaviour of gibbons in Taman Negara Kuala Tahan, Pahang, Malaysia. All gibbons in this study were wild and had no direct contact with humans. Prior research on nocturnal or cathemeral primates, such as gibbons has been done and it has been shown that these animals are adaptable in their behaviour and can change it according to the daytime hours if the previous night's conditions were not favourable. Gibbons often sing from their sleeping tree and usually do not move far in the early morning during the singing bouts (Cheyne. S.M, 2008).

Our study found that the presence of rain the previous night led to an approximately 1 hour later onset of singing. Previous study done in Sabah also show that presence of rain on previous night can lead to fewer and later time of gibbon calling (Clink. D.J, 2020). Cold overnight conditions can reduce energetic stores in animals including gibbons making it one of the main factors determining onset of singing of gibbons the next morning (Barnet & Briskie, 2007). This is because reduce in energetic store will reduce vocalisation because vocalising uses a lot of energy and gibbons try to conserve energy during rainfall and cold temperature. Ambient temperature is probably one of the most crucial environmental factors when determining the rate at which energetic stores are consumed overnight and hence available the following morning. Level of excess energy in the morning have also being linked to the quality of early morning vocalisation (McNamara et al., 1987).

We were able to get hourly rain data but somehow a limitation to the study is that we were not able to get hourly temperature, cloud cover, humidity and air quality of the area

where the singing was able to be recorded. More accurate information on those data would be helpful. For example, bad air quality due to smoke hazard can actually reduce the gibbon singing behaviour due to poor health condition (Cheyne, S. M., 2008).

Onset of singing behaviour can also differ according to individual or population. Some of them are more dominant at population level making them call more or earlier than others which can be due to food availability or population density in the area itself (Clink, D.J., 2020). These two factors can make them feel less threatened to mark their territory and find food. Food availability in the area is also very important as when animals have increased food sources, they would exploit it by increasing energetic reserves at the end of the day which then will lead to increase in song output the following morning (Barnett, C. A., & Briskie, J. V. (2007).

Morning vocalisations are a basic aspect of activity for vocal primates like gibbons, and quantifying variation in calling behaviour has significant ecological and conservational consequences (Fournet et al, 2018). PAM has been used infrequently in studies of primate behaviour, despite its frequent use in research on marine mammals. Most studies using autonomous acoustic monitoring of primates have concentrated more on the occurrence or presence/absence of calling animals than on the potential of PAM to advance our understanding of primate behaviour (Heinicke, S.et al., 2015). PAM programmes for gibbons in damaged habitats can benefit from long-term baseline data on how calling behaviour fluctuates over time and place and in relation to environmental variables. This is especially true for monitoring gibbons in protected and inaccessible locations (Clink, D.J., 2020). In our studies, we were not able to use autonomous recording devices so we recorded the singing manually using personal observation and video recording. However, Brockelman and Srikosamatara mentioned in their study in

1993 that gibbon calls can be heard by human observers up to about 1 km depending on topography but using autonomous recording devices, the recording distance is lesser than that. Clink, D.J. also mentioned in their study done in Sabah, 2020 where their early field tests showed that the greatest gibbon recording distance on their recorders and in the habitat was 350–400 m, however calls were only sometimes picked up at greater distances and were of extremely poor quality. Recording sound from autonomous recording still need to be analysed manually to identify the events and sound but the time involved was still much lesser than what would have been required to record data manually from personal observation from listening post (Terleph, T., Saralamba, C., & Reichard, U. H., 2022).

6.0 CONCLUSION

From the results, we can conclude that there is association between rainfall the previous night and onset of gibbons singing the next morning. Out of 5 days observation, two days when it was rain the previous night, gibbons start singing at a later time that morning meanwhile on the other three days where there was no rain recorded on the night, gibbons start singing from around 0845h the next morning. This result is in line with previous studies done in Sabah that show changes in overnight conditions can influence gibbons' early morning calling behaviour.

7.0 RECOMMENDATIONS

To improve the accuracy of the results for future studies, it is recommended to do this kind of study for a longer duration preferably for months that include both dry and rainy seasons. This is to avoid bias during the study conducting time because gibbons live in Southeast Asia where the season can be rainy all day long or dry throughout the day. Besides that, it is also recommended to use both personal observation and passive acoustic monitoring along with camera trap for more accurate result of the singing of the gibbon population. Other studies also show that passive acoustic monitoring is superior with only needing 10 to 15 days during late dry and early wet seasons respectively. Passive acoustic monitoring was also more efficient with large detection area. Using these techniques, we can improve the way wildlife study has been done by identifying wildlife hotspot and prioritise patrols and also help to monitor wildlife response to environment disturbance.

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