

Conservation Effort of Amphibia at Taman Negara Johor Endau Rompin

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Abstract: Taman Negara Johor Endau Rompin (TNJER) is the largest piece of protected area in the southern part of Peninsula Malaysia. The Endau part of the park, covering the size of 48,905 ha, is in the state of Johor. This study sampled a specific area of TNJER along three streams (Sungai Daah, Sungai Kawal and Sungai Semawak). Anurans were sampled along each stream using Visual Encounter Survey (VES). Twenty species were collected from this small plot of 2 ha. Using species cumulative curve, the 20 species apparently reached the asymptote. Further analyses, involving nine estimators showed that chances of finding new species ranges from 20 (MMeans) to 27 (Jack 2). Based on the species cumulative curve, MMeans estimator was found to be more realistic. From a separate study to produce a checklist of anurans for TNJER based on several expeditions, carried out from several parts of TNJER and collections made from 1985 to 2015, 52 species were recorded. Samples collected from this study then forms 18% of the total fauna of anuran in Peninsula Malaysia. From this study in a relatively small area, 20 species were sampled accounting for 38% of the recorded anuran fauna in the park. Analysed the same way, the 52 species collected over 30 years did not reach an asymptote, indicating more species are to be discovered from TNJER. From the conservation point of view and on a larger area scale, considering the whole of TNJER, the species cumulative curve showed that the 52 species recorded is far from reaching the asymptote indicating that TNJER would have higher anuran diversity. Comparatively, on the same area scale, Singapore with a land size of 71,910ha recorded 30 species of anuran. Finding from this study is evident that TNJER is rich with anuran. This diversity should be maintained as TNJER is the major remaining last southernmost bastion for biodiversity conservation in Malaysia. To conserve anuran may need efforts to popularize the group such as using them as products of nature tourism as well as organizing frog camps for younger children.

Keywords: Anuran; Diversity; Taman Negara Johor Endau Rompin; Conservation

1. Introduction

Taman Negara Johor Endau Rompin (TNJER) is the largest piece of the protected area and one of the last remaining tropical forests in the southern part of Peninsula Malaysia and mainland Asia. Covering the size of 48,905ha, the Endau part of this park, is in the state of Johor and currently under the jurisdiction of Johor National Park Corporation (JNPC). TNJER is the most important refuge for wildlife in southern Peninsula Malaysia as it provides different types of microhabitats to maintain the whole range of biodiversity including the existence and survival of anurans

(frogs and toads). Anurans have been dominating this planet for roughly about 350 million years ago. Currently about 6,766 species of anurans have been described worldwide [1]. Every year, new species are being discovered, and the total number of species continues to grow. As for Peninsula Malaysia, a total 107 amphibian species have been recorded based on [2]. This is a seven years old record and the number of amphibian species might have increased. Similarly, in TNJER, which recorded a total of 52 anuran species [3] is a compilation of 30 years research and collections, and as such could be far more productive.

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2. Methodology

This study focusses on three different streams namely; Sungai (Sg.) Da'ah, Sg. Semawak, and Sg. Kawal in Fig. 1.



Fig. 1 Study sites (three streams) at TNJER

Anurans were sampled using Visual Encounter Survey (VES). This involved active searching along the streams and surrounding areas within the time frame of 3 hours from 8 pm to 11 pm. Samplings were carried out by four people and specimens collected using the hand-grabbing method with the aid of a headlamp. Each specimen that were captured were identified in whenever possible. Otherwise, the specimen was put in different plastic bags, individually for further confirmation in the laboratory. Species identification was done by referring to [4], and also through the online database on amphibians by [5].

3. Results

Although this study was done in a relatively small area, of about 2ha (along three streams) it managed to record 20 anuran species with a total of 772 individuals from five families. This result accounted for 38% of the total anuran fauna recorded from TNJER and 18% of the total anuran fauna in Peninsula Malaysia. Considering TNJER as a whole and based on collections made from 1985 to 2015 a species cumulative curve (SAC) was plotted against a time frame of 30 years (Fig. 2). The curve shows that it is far from reaching the asymptote; indicating of possible discovering new record/species.

On the contrary, comparing to Singapore with a land size of approximately 71,910ha,

only 30 amphibian species had been recorded (two caecilians and 28 anurans) based on [6]. Singapore has a larger land mass of 50% yet has a poorer species diversity than TNJER. From the conservation point of view, this is enough reason to protect anuran diversity in TNJER.

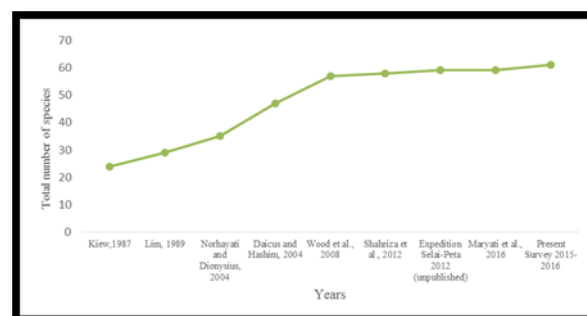


Fig. 2 Species accumulation curve for the anuran fauna based on the research that has been done at TNJER.

In addition, TNJER is very special as it home to two endemic species of anuran namely *Ansonia endauensis* and *Ingerophrynus gollum*. As in this study, 47 individuals of *A. endauensis* and 24 individuals of *I. gollum* has being recorded throughout the nine months ampling. This finding that these species are abundant and easily found at TNJER. Besides that, there are two other species that were harvested for their meat by the local people; *Limnonectes blythii* and *Limnonectes malesianus*. The size of these frogs could reach one kilogram per individual and the current price per kilogram could reach RM60-70. This could affect the population of these species as demand from restaurants is high. The picture of all species mentioned above is listed in Appendix 1.

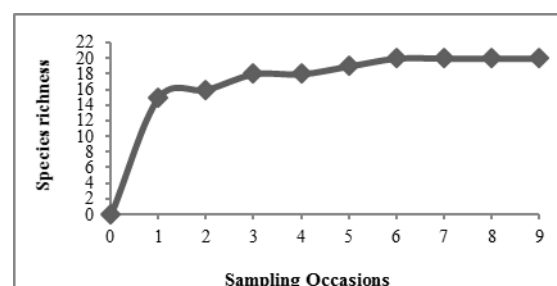


Fig. 3 The species accumulation curve of current study

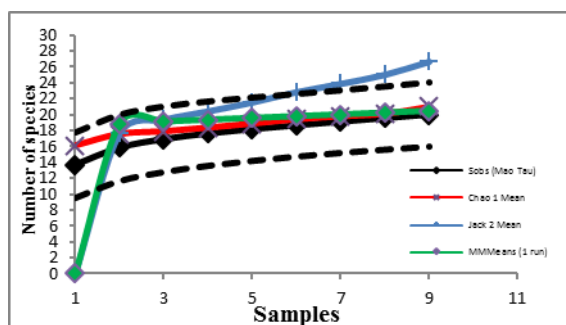


Fig. 4 The non-parametric estimators

Focusing on the 20 species recorded in the current study, species cumulative curve (SAC) was plotted (Fig. 3). Results indicated that asymptote had been reached by the sixth collection. To verify further the total richness of this area analyses using nine non-parametric indicators were tested (Fig. 4). The result showed that chances of finding new species ranges from 20 (MMeans) to 27 (Jack 2). Based on the species cumulative curve, MMeans estimator was found to be more realistic.

4. Discussion

Considering TNJER as a vast protected area, the SAC produced (Fig. 2) from a 30 years collection of anuran showed no sign of reaching the asymptote. This shows that there is a probability of finding new records or perhaps even new species. It could happen because of the number of individuals that must be sampled/ added up to the community to reach an asymptote could be much larger [7]. SAC is said to reach asymptote when the possibility of adding a new species to the list is nearly zero and the curve has already stabilized [8]. Comparatively a nine months collection from a much smaller area of 2 ha (SAC, Fig. 3) reached asymptote at the 6th collection event and did not show any increment for the next three collections. This would mean that the actual species richness of the 2ha plot is 20 species and no additional species is expected to be found there. This was verified by using nine non-parametric estimators. Although, the estimators estimated that, there is a possibility of adding up one to seven more species compared to the observed species (20 species), the potentials of each estimator need to be evaluated. One of the methods to evaluate the estimators is by using direct approach (least sample need to reach

asymptotes and lack erratic pattern of the curve). Chao 1 seemed to be most accurate estimator compared to others, it produces a small gap between the species observed and there was no erratic pattern shown in the curve (Fig. 4). Although MMeans seem more realistic, it is less favorable for estimating the species richness as this estimator is usually used for the qualitative measure.

In addition, the presence of two endemic species in TNJER highlighted the importance of this protected area for biodiversity conservation in Malaysia. It is now the prerogative of the park management to ensure that more effort is carried out to gather more information about the two endemic species and understand more of their ecology for better management of the species in particular and the park in general. This is to ensure that the population of these species can be maintained in perpetuity. With regard to harvesting of the two species; *Limnonectes blythii* and *Limnonectes malesianus* results from this study which indicated their abundance, it indicated that the population of these species are still unaffected. However more studies had to be carried out to verify this, or other alternatives had to be innovated such as frog ranching in the wild.

To conserve anuran may need efforts to popularize the group such as using them as products of nature tourism as well as organizing frog camps for younger children. To make this effort worth, few training courses have been done by the team at UTHM. One of the courses is the training on anuran tourism. This will help the tourist guides to vary their nature package and also to boost their confidence in nature tourism.

5. Conclusion

Finding from this study is evident which prove that TNJER is relatively rich with anuran assemblages. A conservation effort to maintain TNJER needs to be planned and implemented as it is one of the last remaining southernmost bastions for biodiversity conservation in Malaysia. All sectors: government, private or universities need to work together in order to preserve this forest for the future generation.

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References

- [1] Amphibia Web. (2017). Retrieved on May 29, 2017, from <http://www.amphibiaweb.org>
- [2] Maryati, M., Awang, M. T., Lili, T., & Kueh, B. H (2016). Anurans of Taman Negara Johor Endau-Rompin. Johor: UTHM Publisher.
- [3] Chan, K. O., Daicus, B., & Norhayati, A. (2010). "A Revised Checklist of the Amphibians of Peninsular Malaysia" in Russian Journal of Herpetology, Vol. 17 No. 3. pp. 202-206.
- [4] Frost, D. R., Grant, T., Faivovich, J., Bain, R. H., Haas, A., Haddad, C. F. B., Channing, A., Wilkinson, M., Donnellan, S. C., Raxworthy, C. J., Campbell, J. A., Blotto, B. L., Moler, P., Drewes, R. C., Nussbaum, R. A., Lynch, J. D., Green, D. M., & Wheeler, W. C. (2006). "The amphibian tree of life" in Bulletin of the American Museum of Natural History, Vol. 297. pp 1-370.
- [5] Norhayati, A. (2009). amphibian.my: Amphibians and Reptiles of Peninsular Malaysia. Retrieved on December 25, 2014. from <http://amphibia.my>.
- [6] Baker, N. & K. K. P. Lim. (2012). Wild Animals of Singapore: A Photographic Guide to Mammals, Reptiles, Amphibians and Freshwater Fishes. Reprinted with corrections and updates. Draco Publishing and Distribution Pte. Ltd. and Nature Society (Singapore), Singapore. 180pp.
- [7] Chao, A., Colwell, R. K., Lin, C. W. & Gotelli, N. J. (2009). "Sufficient sampling for asymptotic minimum species richness estimators" in Ecology, Vol. 90. pp.1125–1133.
- [8] Soberon, J. and Llorente, J. (1993). "The use of species accumulation functions for the prediction of species richness" in Conservation Biology, Vol. 7. pp. 480-488.

Appendix 1



Ansonia endauensis

Ingerophrynus gollum



Limnonectes blythii

Limnonectes malesianus