

Diversity and Threats Encountered by Reptilian Fauna along Cauvery Basin, Kumbakonam, Tamil Nadu, India

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Abstract

In India, Western Ghats and Eastern Himalayas are rich in herpetofauna. The fascinating ecosystem harbor many endemic herpetofauna. Of the 500 species of reptiles recorded in India, Western Ghats harbour about 156 species and about 93 of them are considered to be endemic to the area. Snakes and other reptile species may prove to be a valuable indicator species in local ecosystems. Hence the present study was taken up to examine the community structure, species richness, diversity and abundance of herpetofauna and to assess the impact on the diversity and density along the Cauvery bank of Kumbakonam region. Visual encountered method was involved searching for herpetofauna in an area or habitat and recording all animals visible on the surface. The opportunistic observations of 11 species of herpetofauna were recorded in the study area includes three species of house lizards, each one species of garden lizard, skink, monitor lizard, 2 species of fresh water turtles and 3 species of snakes. The present study shows that the distribution of reptiles in Cauvery basin of Kumbakonam region is largely determined by temperature, microhabitat availability and various geophysical constraints. Habitat alterations is impacted almost all endemic reptile species of the area.

Keywords: Diversity; Reptiles, Snakes; Cauvery Basin; Opportunistic Survey

Introduction

Reptiles are cold-blooded animals found in almost all the parts of the world, except the severe colder regions. In India, all the three living orders of reptiles have their representatives - Crocodylia (crocodiles), Testudines (turtles and tortoises) and Squamata (lizards and snakes). An updated checklist of 518 species of reptiles which includes 3 species of crocodiles, 34 species of turtles and

tortoises, 202 species of lizards and 279 species of snakes belonging to 28 families recorded till date from India [1]. The diversified climate, varying vegetation and different types of soil in the country form a wide range of biotopes that support a highly diversified reptilian fauna. The Western Ghats, Eastern Himalaya, and the Andaman and Nicobar Islands are endowed with varied and unique reptilian fauna [2].

The monumental works on Indian reptiles are, 'The Reptiles of British India' by Gunther, et al. [3], 'Fauna of British India - Reptilia and Batrachia' by Boulenger, et al. [4] and Smith, et al. [5-7]. The work of Smith stood the test of time and forms the standard work on the subject. Further contributions were made by Tiwari et al. [8], Sharma [9-14], Murthy [15-17], Das [18-22], Tikedar, et al. [23], Das et al. [24], Das, et al. [25], Daniel [26], Whitaker, et al. [27], Sharma [14], Thrope, et al. [28], Mukherjee, et al. [29], Gower, et al. [30], Manamendra-Arachchi, et al. [31], Das, et al. [32], Giri [33], Giri, et al. [34], Giri, et al. [35], Giri, et al. [36], Zambre et al. [37], Haralu [38], Pook, et al. [39], Van Rooijen, et al. [40], Mahony S [41,42].

In India, Western Ghats and Eastern Himalayas are rich in herpetofauna. The fascinating ecosystem harbor many endemic herpetofauna. Of nearly 500 species of reptiles in India, Western Ghats harbour about 156 species and about 93 of them are considered to be endemic to the area [43-45]. Aengals, et al. [46] mentions 12 species of reptiles as endangered. The altitude, climatic gradients support and nourish different species of herpetofauna. They are distributed in a wide variety of habitats ranging from rain forest to desert and almost found in all niches from rock crevices to tree bark. Some of them are endemic to particular habitat and some of them are very common, found throughout the hills country. Amphibians and reptiles render incalculable services to agriculture. Insects occupy first place amongst pest that damage standing crops. Majority of frogs and lizards feed on insects which are destroying the crops and forest ecosystem. Snakes have an irreplaceable role in ecology as the natural predators of rats and agricultural pests. Particularly in predominantly agricultural economies like India, the burgeoning rodent population, made worse by human overcrowding, proliferation of garbage and our unhygienic habits, has become one of the greatest scourges.

Snakes are singularly designed and equipped to hunt for rats in their narrow subterranean burrows and hiding places in the open and in the granaries, storages etc. Similarly, those snakes which regularly feed on insects have been responsible for destroying vast number of insects which are pests in our ecosystem. These groups of animals are mostly nocturnal in nature and some of them are active round the clock. They render great service by exterminating nocturnal and diurnal insects. The significance of amphibians and reptiles for the biosphere

of our planet consequently to mankind, is so great that it is difficult to equate it with that of another group of organisms. Snakes and other reptiles may prove to be a valuable indicator species in local ecosystems. These groups of animals are mostly nocturnal in nature and some of them are active round the clock. They render great service by exterminating nocturnal and diurnal insects. The significance of amphibians and reptiles for the biosphere of our planet consequently to mankind, is so great that it is difficult to equate it with that of another group of organisms. Snakes and other reptiles may prove to be a valuable indicator species in local ecosystems.

However, extensive loss and fragmentation of tropical forests in the past several decades have set the stage for an extinction crisis in the near future as remnant fragments undergo further fragmentation and degraded forests shed species more rapidly [47]. Recent thrust on biodiversity conservation necessitates a comprehensive knowledge of the fauna, their distribution and abundance that are important prerequisites for the management of an area, especially in the Cauvery basin areas. Currently, Habitat fragmentation is a primary cause of decline for many species of wildlife particularly the herpetofauna. Hence the present study was taken up to examine the community structure, species richness, diversity and abundance of herpetofauna and to assess the impact on the diversity and density along the Cauvery bank of Kumbakonam region.

Materials and Methods

The Cauvery delta is usually hot; the climate of Kumbakonam and other surrounding towns is generally healthy and moderate. Kumbakonam is cooler than Chennai, the capital of Tamil Nadu. The maximum temperature in summer is about 40°C while the minimum temperature is about 20°C. Kumbakonam receives an annual rainfall of 114.78 cm every year. The region is covered with mainly alluvial or black soil which is conducive for paddy cultivation. Other crops grown in Kumbakonam include mulberry, cereals and sugarcane (Figure 1).

The study was conducted during the period between December 2017 and March 2018 along the river banks, ponds, agricultural fields, wood lands and abandoned buildings, etc. with the following methods.

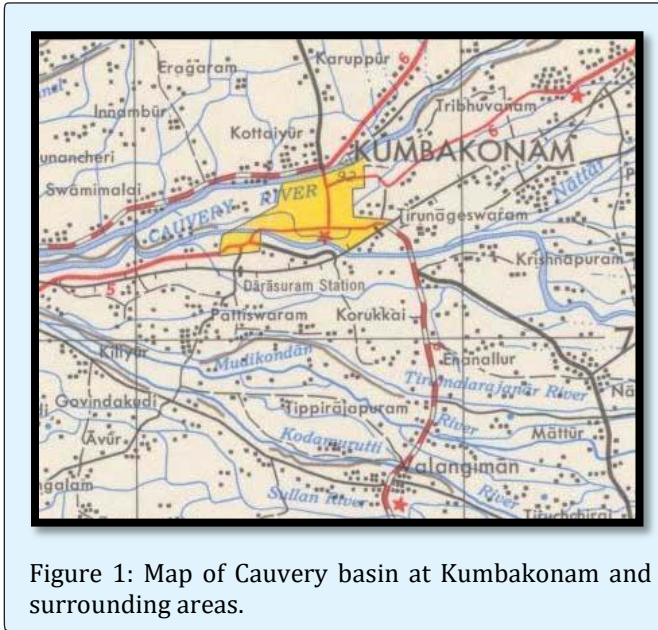


Figure 1: Map of Cauvery basin at Kumbakonam and surrounding areas.

Visual Encounter Survey

This method involved searching for herpetofauna in an area or habitat and recording all animals visible on the surface [48,49]. While walking on the field, scanned the vegetation path, and other possible places for the recordings the species observed from the path. Often, searched the leaf litter as semi fossorial species emerge slightly disturbed which allowed them to be recorded. The animal thus found is recorded in the data sheet such

as species, time of the day, area, vegetation's, altitude and location of the herpetofauna above the ground. Actual site of the herpetofauna when first observed was descriptively noted and later classified in to various micro habitats such as tree trunk, ground, leaf litter and rock. Sex, color variation, height from ground upon sighting, micro habitat, injuries, defects presence of ecto parasites, threats (Presence of predators, habitat changes, etc) were also noted. The sampling duration in each locality was largely depending up on the size of the area.

The raw data which were collected in the study area were pooled together for statistical analysis. Herpetofaunal density was estimated by using the simple formula:

$$\text{Relative density} = \frac{\text{No. of Individuals of a species}}{\text{Total No. of individuals of all species}} \times 100$$

Results

Three species of house lizards, each one species of garden lizard, skink, monitor lizard, 2 species of fresh water turtles and 3 species of snakes were identified and recorded. Photographs were taken for identification (Figures 2 & 3). The opportunistic observations of 11 species of herpetofauna were recorded in the study area are given in Table 1.

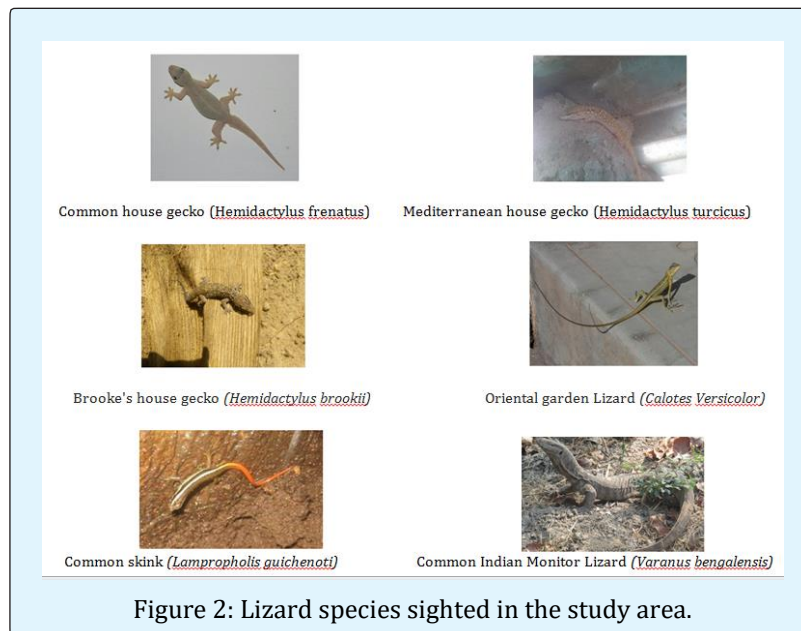


Figure 2: Lizard species sighted in the study area.

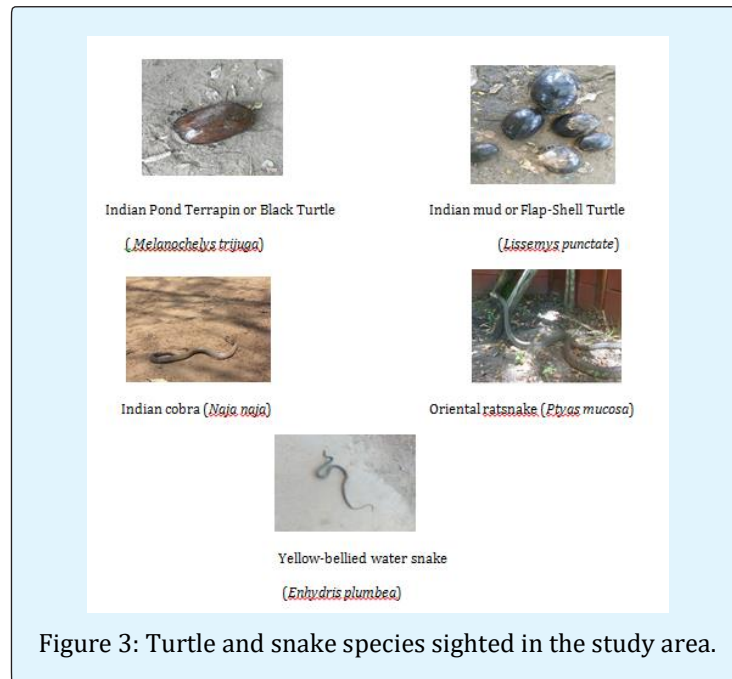


Figure 3: Turtle and snake species sighted in the study area.

Sl. No.	Common Name	Scientific Name	Number of individuals sighted	Relative density
1	Indian Pond Terrapin or Black Turtle	<i>Melanochelys trijuga</i>	2	3
2	Indian mud or Flap-Shell Turtle	<i>Lissemys punctate</i>	1	2
3	Common house gecko	<i>Hemidactylus frenatus</i>	23	37
4	Mediterranean house gecko	<i>Hemidactylus turcicus</i>	7	11
5	Brooke's house gecko	<i>Hemidactylus brookii</i>	3	5
6	Oriental garden lizard	<i>Calotes versicolor</i>	18	29
7	Common skink	<i>Lampropholis guichenoti</i>	2	3
8	Common Indian Monitor Lizard	<i>Varanus bengalensis</i>	2	3
9	Oriental ratsnake	<i>Ptyas mucosa</i>	1	2
10	Yellow-bellied water snake	<i>Enhydryis plumbea</i>	2	3
11	Indian cobra	<i>Naja naja</i>	1	2

Table 1: Reptiles recorded during the study period.

Diversity Indices

The diversity index of the reptiles species recorded is given in the Table 2. Among the 11 species of reptiles recorded a total of 62 individuals were noted and the Dominance of reptiles shows 0.2419 with a lower and upper limits of 0.1899±0.334. The Simson index of 0.7581 with lower and upper limits of 0.6649±0.8091 and the Shannon diversity index of 1.763 with lower and upper limits of 1.377±1.934 (Table 2 & Figure 4).

		Lower	Upper
Taxa_S	11	7	11
Individuals	62	62	62
Dominance_D	0.2419	0.1899	0.334
Simpson_1-D	0.7581	0.6649	0.8091
Shannon_H	1.763	1.377	1.934
Evenness_e^H/S	0.5297	0.4711	0.6974

Table 2: Diversity indices of the reptile species sighted.

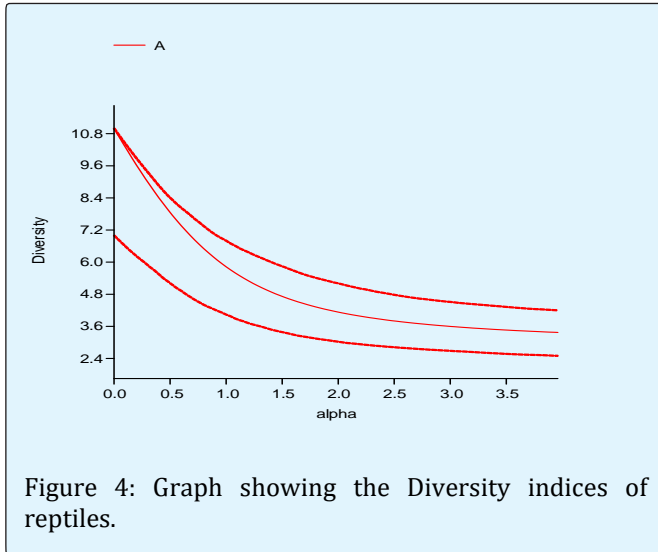


Figure 4: Graph showing the Diversity indices of reptiles.

Discussion

A total of eleven species of reptiles were sighted shows the less number of species available in the study area. This may be due to the destruction of micro habitats of the reptilian fauna. Lizards of the study area include 3 species of Geckos, one species of Skink, Garden lizard and Monitor lizard. Two species of fresh water turtles and three species of snakes are recorded. When interviewed to the local residents that they opined many species of lizards were disappeared from the area in the near past such as Chamaleon zeylanicus and many other lizard species are decreasing sharply. They also mentioned that abundance of bricks choolas, intentional killing of snakes when they appeared, poisoning of crops, construction of buildings, etc. were the major reasons for depletion of reptilian fauna in the Cauvery basin regions. Similarly the increasing human population of India has produced increased development and road networks that have brought worrying pressure on populations of flora and fauna in its biodiversity. The study area has experienced massive changes over the last decades with the development of plantations and towns. This has led to increased vehicle traffic and the subsequent increase in mortality of reptiles and amphibians on roads [50]. Similar reports in the Western Ghats are also under threat from habitat loss and fragmentation, as well as intensive harvesting of non-timber products, hunting, invasive species and grazing by livestock [51-54].

The large numbers of reptile species known from the Western Ghats, some of which are described in this study area, combined with the large numbers of species still

being described, highlight the need for a more concerted scientific study of the Cauvery delta region as well as a need for greater protection of the habitat that remains.

Conclusion

Based on these significant additions of species to the existing picture, the study further emphasize the prioritization of this habitat from a conservation perspective. This study indicated that the area rich and must contain many more species of reptiles. It is recommended that further studies in the Cauvery basin at the earliest warranted. Also everyone should realize that the protection of habitat is an important aspect in the conservation of such species. The present study shows that the distribution of reptiles in Cauvery basin of Kumbakonam region is largely determined by temperature, microhabitat availability and various geophysical constraints. Habitat alterations is impacted almost all endemic reptile species of the area. Regarding their food habits, lizards were more opportunistic feeders than snakes. Niche analysis showed that the reptiles of this region have low to moderate survival capabilities with respect to utilization of various spatio-temporal and trophic resources.

This work has made fairly good progress in the tenure that it was proposed for a short period. Yet the work needs more time before any strong conclusion can be reached. All information provided in this work are preliminary and baseline data that need further work in future for designing any strong conservation policies involving the farmers of these areas.

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