A note on opportunistic records of reptiles from the Moyar River Valley Landscape, Tamil Nadu, southern India

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Abstract

A comprehensive record of reptiles found in the Moyar River Valley Landscape (MRVL) is presented in this manuscript. The observations did not adhere to standardized survey methods, and are based on opportunistic encounters during our vegetation survey in different habitats of the MRVL between December 2017 and December 2019. A total of 135 live individuals and 31 road-killed specimens, representing 37 species of reptiles were recorded of which two species are Vulnerable, 13 are Least Concern and 22 species are Not Evaluated in accordance with the criteria of the IUCN Red List of Threatened Species. The recorded species belonged to six families of lizards (Agamidae, Chamaeleonidae, Gekkonidae, Lacertidae, Scincidae, and Varanidae), six families of snakes (Colubridae, Elapidae, Erycidae, Pythonidae, Typhlopidae, and Viperidae), two families of chelonians (Geoemydidae, and Testudinidae), and one family of Crocodylia (Crocodylidae). The road-killed specimens were recorded between the year 2018 and 2020 and come under Indian Wildlife Protection Act, 1972. Though the present work did not follow a specific survey method, the contribution provides baseline information on the reptile diversity of the MRVL and presents interesting findings from the Sathyamangalam and Mudumalai Tiger Reserves in north-western Tamil Nadu.

Key words: Checklist, conservation, diversity, protected area, reptiles, wildlife-vehicle collisions

Introduction

The Moyar River Valley Landscape (MRVL hereafter) is located at the juncture of the Western Ghats and Eastern Ghats in the Nilgiri Biosphere Reserve and is among the dry tropical landscapes that support a rich flora and fauna, and is habitat for numerous endangered species (Thirumurugan et al., 2021). The Western Ghats and the Eastern Ghats have garnered the attention of researchers in the past few decades, yet the MRVL remains unexplored in terms of reptilian diversity. Of late, a substantial amount of research has been conducted on the herpetofaunal diversity of southwestern India (Das, 2002; Ganesh et al., 2007; Nande and Deshmuk, 2007; Giri, 2008; Giri and Bauer, 2008; Mirza and Pal, 2008; Bhupathy et al., 2009; Hutton and David, 2009; Rooijen and Vogel, 2009; Chandramouli and Ganesh, 2010; Bhupathy and Nixon, 2011; Bhupathy and Sathishkumar, 2013; Ganesh et al., 2013; Srinivasaulu et al., 2014; Palot, 2015; Deepak et al., 2016; Aengals et al., 2018; Ganesh et al., 2018; Mirza et al., 2018; Gowande et al., 2021; Jins et al., 2021; and Aengals et al., 2022).

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About 157 reptile species, which constitutes almost 30% of total reptile diversity of India, have been recorded from the Western Ghats (UNESCO, 2012). Similarly, recent studies in the central Eastern Ghats documented a total of 105 species which includes 35 lizard species, 42 snake species and 4 chelonian species (Ganesh and Guptha, 2021), whereas, a study in the southern Eastern Ghats (Ganesh and Arumugam, 2016) documented 62 species, which included 32 new findings from hill tops of four hill ranges.

The reptile diversity of Tamil Nadu comprises 177 species, of which 77 are in the IUCN Red List of Threatened Species (Baranidharan et al., 2019). A few studies on specific reptile specie in the MRVL have been undertaken. These include Das et al. (2014), Baranidharan et al. (2019), Ramesh et al. (2019), Thirumurugan et al. (2020), Samson et al. (2021), Vishnu and Ramesh (2021), and Vishnu et al. (2021). However, these studies were not focused on the entire reptilian fauna present in the MRVL. Since the reptile assemblage of the area has not been intensely investigated, the objective of this study was to produce a checklist of reptiles in the MRVL, and also to provide a record of road kills through vehicle collision encountered during the course of this study.

**Material and Methods**

**Study area**

The MRVL (Fig. 1) is located between 11.700° N, 76.590° E and 11.470° N, 77.140° E; elevation ranges between 209 and 1950 m above the sea level (a.s.l). It is located at the center of the Nilgiri Biosphere Reserve, with the Mudumalai Tiger Reserve on its western side, and the Sathyamangalam Tiger Reserve on its eastern side (Vishnu et al., 2021). It receives a mean annual rainfall of 850 mm and the mean minimum and maximum temperatures were 21 °C and 28 °C, respectively (Nikhil, 2019). The Moyar River is perennial, flowing west to east. It originates in the Nilgiri Mountains of the Western Ghats and traverses the Mudumalai and Sathyamangalam Tiger Reserves, and other protected areas of Tamil Nadu contributing to the survival of wildlife.

The major vegetation types (Fig. 2) of the valley are tropical dry deciduous, southern tropical thorn forest, tropical moist deciduous forest, and riparian forests along the streams interspersed with cultivated areas and reservoirs (Champion and Seth, 1968; Prabhakar and Pascal, 1994).

Reptiles were observed opportunistically during our vegetation surveys in the MRVL, that lasted for 132 days and including 528 man-hours of field work, between December 2017 and December 2019 across different seasons. In addition to this, we also carried out road cruising by night (Crump and Scott, 1994), attended rescue calls from the local inhabitants, around the base camp (Bhavani Sagar village), and recorded road-killed specimens between the years 2018 and 2020. All species were photographed and their geo-coordinates, habitats and microhabitats noted. Nomenclature follows all recent taxonomic advances (Uetz et al., 2022). The threat status of species is reported using the criteria of the IUCN Red List of Threatened Species (IUCN, 2022).
Results

Species accounts

We recorded 11 species of lizards belonging to seven genera; 23 species of snakes belonging to 21 genera, two species of Testudines belonging to two genera, and a species of crocodile which are arranged alphabetically (Tables 1 and 2).

Squamata Oppel, 1811
Agamidae Gray, 1827
Calotes Cuvier, 1817
Calotes calotes (Linnaeus, 1758), Fig. 3A
Species observation record: We recorded one individual in riparian forest of the Moyar River on 9 March 2018 at 1128 h running on dried leaf litter. Another individual was sighted near the bank of the Moyar River on 25 April 2019 at 1044 h crawling on a dried fallen branch of Mangifera indica. The third individual was observed digging sand in the Koolituraipatti area on 23 December 2019 at 1251 h.

Calotes versicolor (Daudin, 1802), Figs. 3B, 8A
Species observation record: We found one gravid female in Thengumrahada village on 3 July 2018 at 1353 h basking on the trunk of a Phyllanthus reticulatus tree. We also observed two individuals in Thengumrahada village on 27 October 2018 at 1427 h, and 25 December 2018 at 0758 h, respectively, basking on a branch of Cocos nucifera, approximately 2 m above ground. Two road-killed individuals were found on the Sathyamangalam-Bhavani Sagar Road at 1930 h on 17 September 2018.

Psammophilus Fitzinger, 1843
Psammophilus dorsalis (Gray, 1831), Fig. 3C
Species observation record: We observed two individuals in the Thalamalai area on 6 March 2018 at 1429 h basking together on a rock under a Memecylon umbellatum tree near a stream.
Table 1: List of reptile species recorded during the study in the Moyar River Valley Landscape, Tamil Nadu, India.

<table>
<thead>
<tr>
<th>Family</th>
<th>Serial No.</th>
<th>Species</th>
<th>No. of live individuals</th>
<th>Microhabitats</th>
<th>Presence in the study area</th>
<th>IUCN conservation status</th>
</tr>
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<tr>
<td>Agamidae</td>
<td>1</td>
<td>Calotes calotes</td>
<td>3</td>
<td>Forest area, Riverine area</td>
<td>Via this study</td>
<td>NE</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>Calotes versicolor</td>
<td>3</td>
<td>Forest area, Highway area</td>
<td>Known</td>
<td>NE</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>Psammophilus dorsalis</td>
<td>2</td>
<td>Riverine area</td>
<td>Known</td>
<td>LC</td>
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<tr>
<td>Chamaeleonidae</td>
<td>4</td>
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<td>3</td>
<td>Agricultural area, Human settlement, Highway area</td>
<td>Known</td>
<td>LC</td>
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<tr>
<td>Gekkonidae</td>
<td>5</td>
<td>Hemidactylus brookii</td>
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<td>Known</td>
<td>LC</td>
</tr>
<tr>
<td></td>
<td>6</td>
<td>Hemidactylus leschenaultii</td>
<td>2</td>
<td>Forest area</td>
<td>Via this study</td>
<td>NE</td>
</tr>
<tr>
<td></td>
<td>7</td>
<td>Hemidactylus whitakeri</td>
<td>3</td>
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<td>Via this study</td>
<td>NE</td>
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<tr>
<td>Lacertidae</td>
<td>8</td>
<td>Ophisops leschenaultii</td>
<td>6</td>
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<td>Via this study</td>
<td>NE</td>
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<tr>
<td>Scincidae</td>
<td>9</td>
<td>Eutropis bibronii</td>
<td>2</td>
<td>Forest area</td>
<td>Via this study</td>
<td>LC</td>
</tr>
<tr>
<td></td>
<td>10</td>
<td>Eutropis carinata</td>
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<td>Via this study</td>
<td>LC</td>
</tr>
<tr>
<td>Varanidae</td>
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<td>Varanus bengalensis</td>
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<td>LC</td>
</tr>
<tr>
<td></td>
<td>12</td>
<td>Ahaetulla oxyrhynchus</td>
<td>4</td>
<td>Forest area, Agricultural area, Highway area</td>
<td>Via this study</td>
<td>NE</td>
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<tr>
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<td>13</td>
<td>Boiga forsteni</td>
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<td>Forest area</td>
<td>Via this study</td>
<td>LC</td>
</tr>
<tr>
<td></td>
<td>14</td>
<td>Boiga trigonata</td>
<td>0</td>
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<td>Via this study</td>
<td>LC</td>
</tr>
<tr>
<td></td>
<td>15</td>
<td>Coelognathus helena</td>
<td>2</td>
<td>Human settlement, Highway area</td>
<td>Known</td>
<td>NE</td>
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<tr>
<td></td>
<td>16</td>
<td>Dendrelaphis tristis</td>
<td>3</td>
<td>Forest area, Agricultural area, Highway area</td>
<td>Via this study</td>
<td>NE</td>
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<tr>
<td></td>
<td>17</td>
<td>Fowlea piscator</td>
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<td>Via this study</td>
<td>NE</td>
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<tr>
<td></td>
<td>18</td>
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<td>Via this study</td>
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<tr>
<td></td>
<td>19</td>
<td>Oligodon arnensis</td>
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<td>Via this study</td>
<td>NE</td>
</tr>
<tr>
<td></td>
<td>20</td>
<td>Oligodon taeniolatus</td>
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<td>Agricultural area, Human settlement</td>
<td>Via this study</td>
<td>LC</td>
</tr>
<tr>
<td></td>
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<td>Ptyas mucosa</td>
<td>4</td>
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<td>NE</td>
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<tr>
<td></td>
<td>22</td>
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<td>Via this study</td>
<td>NE</td>
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<tr>
<td></td>
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<td>NE</td>
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<tr>
<td>Elapidae</td>
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<td>Bungarus caeruleus</td>
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<td>Human settlement, Highway area</td>
<td>Via this study</td>
<td>NE</td>
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<tr>
<td></td>
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<tr>
<td></td>
<td>26</td>
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<td>NE</td>
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<td>Highway area, Human settlement</td>
<td>Via this study</td>
<td>NE</td>
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<tr>
<td>Pythonidae</td>
<td>28</td>
<td>Gongylophilus conicus</td>
<td>2</td>
<td>Human settlement, Highway area</td>
<td>Via this study</td>
<td>NE</td>
</tr>
<tr>
<td>Typhlopidae</td>
<td>29</td>
<td>Python molurus</td>
<td>26</td>
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<td>Known</td>
<td>NE</td>
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<td>Viperida</td>
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<td>Grypotyphlops acutus</td>
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<td>Known</td>
<td>LC</td>
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<tr>
<td></td>
<td>31</td>
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<td>Human settlement</td>
<td>Via this study</td>
<td>NE</td>
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<td>32</td>
<td>Craspedocephalus gramineus</td>
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<td>Forest area</td>
<td>Via this study</td>
<td>LC</td>
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<tr>
<td></td>
<td>33</td>
<td>Daboia russelli</td>
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<td>Riverine area, Highway area</td>
<td>Via this study</td>
<td>NE</td>
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<tr>
<td></td>
<td>34</td>
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<td>Geoemydidae</td>
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<td>Melanochelys trijuga</td>
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<td>Via this study</td>
<td>LC</td>
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<tr>
<td>Testudinidae</td>
<td>37</td>
<td>Geochelone elegans</td>
<td>4</td>
<td>Riverine area</td>
<td>Known</td>
<td>VU</td>
</tr>
</tbody>
</table>

Threatened status based on the IUCN Red List of Threatened Species (Accessed in: December 2022): LC= Least concern; NE= Not evaluated; VU= Vulnerable.
Figure 3: Reptile species found in the Sathyamangalam Tiger Reserve, India. A. Calotes calotes. B. Calotes versicolor. C. Psammophilus dorsalis. D. Ophisops leshennaultii. E. Chamaeleo zeylanicus. F. Hemidactylus leshennaultii. Photographs: A, C, F by Thirumurgan; B by Vishnu; D by Karty; E by Muthukrishnan.

Chamaeleonidae Rafinesque, 1815
Chamaeleo Laurenti, 1768
Chamaeleo zeylanicus Laurenti, 1768, Figs. 3E, 8B
Species observation record: We observed one individual in Thengumrahada on 5 October 2019 at 1055 h basking on a fence of an agricultural land. Another individual was sighted near Kallampalayam village on 19 October 2018 at 1412 h crossing forest trail road near human habitation. Third individual was sighted in Thengumrahada on 1 July 2019 at 2045 h hanging with its tail coiled on the branch of Erythroxylum monogynum. We also observed two road killed individuals on Naal Road, Bhavanisagar on 12 July 2018 at 1800 h, and on forest trail road, Gejallati area on 20 July 2018 at 1153 h, respectively.
Species observation record: We observed one individual in the Mudumalai Tiger Reserve on 3 December 2017 at 1327 h camouflaged on Bombax sp., and second individual in the Thengumaraahada village on 29 June 2019 at 1439 h in the hollow of a dead tree, approximately two meters above ground.

**Hemidactylus whitakeri** Mirza, Gowande, Patil, Ambedkar and Patel, 2018, Fig. 4A

Species observation record: We observed one individual in the Sathyamangalam Forest on 21 December 2017 at 2241 h running near the forest trail road. Two individuals were observed near our base camp in Bhavani Sagar at night hiding in bushes near the roadside.

**Lacertidae Oppel, 1811**

**Ophisops leschenaultii** (Milne-Edwards, 1829), Fig. 3D

Species observation record: We observed one individual in riverine area of the Moyar on 29 June 2019 at 1132 h running on dried leaves and debris. A total of six individuals were recorded mostly near the Moyar River.

<table>
<thead>
<tr>
<th>No.</th>
<th>Species</th>
<th>Date</th>
<th>Locality</th>
<th>Time</th>
<th>No. of road killed individuals</th>
</tr>
</thead>
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<tr>
<td>1</td>
<td>Calotes versicolor</td>
<td>17-09-2018</td>
<td>Sathyamangalam-Bhavani Sagar road</td>
<td>1930 h</td>
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<tr>
<td>2</td>
<td>Chamaeleo zeylanicus</td>
<td>12-07-2018</td>
<td>Nal road, Bhavani Sagar</td>
<td>1800 h</td>
<td>1</td>
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<tr>
<td>3</td>
<td>Elaphe rufescens</td>
<td>20-07-2018</td>
<td>Forest trail road, Gejallali area</td>
<td>1153 h</td>
<td>1</td>
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<td>4</td>
<td>Eutropis bibronii</td>
<td>19-12-2017</td>
<td>Bhavani Sagar</td>
<td>1150 h</td>
<td>1</td>
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<td>5</td>
<td>Acanthodactylus ewingii</td>
<td>24-06-2018</td>
<td>Bhavani Sagar-Mettupalayam road</td>
<td>1036 h</td>
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<td>6</td>
<td>Boiga trigonata</td>
<td>23-05-2019</td>
<td>Vilamundi road, Bhavani Sagar</td>
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<td>1</td>
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<td>7</td>
<td>Coelognathus helena</td>
<td>25-07-2018</td>
<td>Bhavani Sagar-Mettupalayam road</td>
<td>1800 h</td>
<td>1</td>
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<td>8</td>
<td>Dendrelaphis tristis</td>
<td>12-06-2019</td>
<td>Masinagudi, MTR</td>
<td>1508 h</td>
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<td>21-08-2018</td>
<td>Allimoyar road</td>
<td>2030 h</td>
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<td>10</td>
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<td>30-05-2018</td>
<td>Karachikorai check post, Bhavani Sagar</td>
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<td>1</td>
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<td>Karachikorai check post, Bhavani Sagar</td>
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<td>12</td>
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<td>Thengumrahada village road</td>
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<td>Kargudi, Mudumalai tiger reserve</td>
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<td>08-10-2019</td>
<td>Trail road, STR</td>
<td>1125 h</td>
<td>1</td>
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Serpentes Linnaeus, 1758
Colubridae Oppel, 1811
Ahaetulla Link, 1807
Ahaetulla oxyrhyncha (Bell, 1825), Figs. 4E, 8C

Species observation record: We observed one individual in Thengumrahada village on 4 July 2018 at 1237 h moving on Melia dubia; second individual on 17 July 2018 at 1156 h on Calotropis gigantea; and third individual on 3 November 2018 at 1850 h resting on Prosopis juliflora. We also found an individual in the agricultural field in Thengumrahada village on 17 November 2018 at 1521 h basking on the fence. A road killed individual was found on 24 June 2018 at 1036 h on the Bhavani Sagar-Mettupalayam Road.

Figure 4: Reptile species found in the Sathyamangalam Tiger Reserve, India. A. Hemidactylus whitakeri. B. Hemidactylus brookii. C. Eutropis bibronii. D. Varanus bengalensis. E. Ahaetulla oxyrhyncha. F. Boiga forsteni. Photographs: A by Karthy; B by Vishnu; C, D, F by Thirumurugan; E by Muthukrishnan.
Figure 5: Reptile species found in the Sathyamangalam Tiger Reserve, India. A. *Dendrelaphis tristis*. B. *Fowlea piscator*. C. *Lycodon fasciolatus*. D. *Oligodon taeniolatus*. E. *Ptyas mucosa*. F. *Bungarus caeruleus*. Photographs: A, B, E by Thirumurugan; C by Vishnu; D by Karthy; F by Muthukrishnan.

**Boiga Fitzinger, 1826**

*Boiga forsteni* (Duméril, Bibron and Duméril, 1854), Fig. 4F

Species observation record: We observed one individual in Thengumrahada village on 5 December 2018 at 1513 h basking inside a hollow trunk of *Sapindus emarginatus* with its head out.

**Boiga trigonata** (Schneider, 1802)

Species observation record: We found one road-killed individual on 23 May 2019 at 0830 h while road cruising at the Vilamundi road in Bhavani Sagar.

**Coelognathus Fitzinger, 1843**

*Coelognathus helena* (Daudin, 1803), Fig. 8D
Species observation record: We observed two individuals near our base camp in Bhavani Sagar on 3 April 2018 at 1229 h, and on 5 July 2019 at 1415 h, basking on the roadside. We also found two road killed individuals on the Bhavani Sagar-Mettupalayam Road on 25 July 2018 at 1800 h, and on the Masinagudi Road (Mudumalai Tiger Reserve) on 12 June 2019 at 1508 h, respectively.

**Dendrelaphis Boulenge, 1890**

*Dendrelaphis tristis* (Daudin, 1803), Figs. 5A, 8E

Species observation record: We observed one individual in the TN Palayam area on 24 December 2017 at 0914 h basking on *Tamarindus indicus*. The second individual was recorded in Bhavani Sagar on 2 May 2019 at 1804 h resting on *Jasminum* bush in agricultural land. The third individual was observed in the Sathyamangalam Forest on 18 September 2019 at 1320 h on *Prospis juliflora* sapling. We sighted one road killed individual on the Sathyamangalam-Mettupalayam Road on 10 July 2018 at 0859 h.

**Fowlea Theobald, 1868**

*Fowlea piscator* (Schneider, 1799), Fig. 5B

Species observation record: We observed one individual in Thengumrahada village on 15 May 2019 at 1958 h feeding on a frog on open ground. We recorded two sightings in Thengumrahada village on 12 October 2019 at 1625 h, and on 16 October 2019 at 0940 h, hiding in the crevices of a concrete in fresh water channel. One road killed individual was recorded on the Allimoyar Highway on 2 May 2019 at 1829 h, and on 5 July 2019 at 1415 h, respectively.

**Lycodon Fitzinger, 1826**

*Lycodon fasciolatus* (Shaw, 1802), Figs. 5C, 9A

Species observation record: We observed one individual in Thengumrahada village on 5 February 2017 at 1910 h on *Sesbania grandiflora*; second individual on the Bhavani Sagar-Mettupalayam Road on 3 June 2019 at 1020 h resting on the edge of road; third individual near our base camp in the Bhavani Sagar on 23 October 2019 at 0841 h crossing a concrete road in the human settlement area. Another individual was found in our base camp on 22 November 2019 at 1030 h on the ceiling of the bathroom. We also observed one road killed individual on the Sathyamangalam-Mettupalayam Highway on 25 May 2018 at 0623 h.

**Oligodon Fitzinger, 1826**

*Oligodon arnensis* (Shaw, 1802), Fig. 9B

Species observation record: We observed one road killed individual on the Bhavani Sagar-Mudukkanturai Road on 5 September 2019 at 2059 h.

*Oligodon taeniolatus* (Jerdon, 1853), Fig. 5D

Species observation record: We sighted one individual near agricultural land in Thengumrahada village on 17 January 2018 at 2008 h. We also observed one road killed individual on 23 February 2018 at 2025 h on the Thengumrahada village Road.

**Ptyas Fitzinger, 1843**

*Ptyas mucosa* (Linnaeus, 1758), Fig. 5E

Species observation record: We observed combat between two individuals in Thengumrahada village on 4 July 2018 at 0945 h. Another individual was sighted in the Sathyamangalam Forest on 20 January 2019 at 1015 h climbing on *Borassus flabellifer*, approximately 2 m above the ground. We also observed one individual in Bhavani Sagar on 28 May 2019 at 0949 h on the ceiling of our base camp.

**Rhabdophis Fitzinger, 1843**

*Rhabdophis plumbicolar* (Cantor, 1839), Fig. 8F

Species observation record: We observed two road killed individuals near the Karachikorai check post in Bhavani Sagar on 30 May 2018 at 1908 h, and on 11 July 2018 at 1338 h, respectively.

**Sibynophis Fitzinger, 1843**

*Sibynophis subpunctatus* (Duméril, Bibron and Duméril, 1854)

Species observation record: We observed one individual near our base camp in Bhavani Sagar on 10 September 2019 at 0845 h going across a concrete road.

**Elapidae Boie, 1827**

*Bungarus Daudin, 1803*

*Bungarus caeruleus* (Schneider, 1801), Fig. 5F

Species observation record: We observed one individual near our base camp in Bhavani Sagar on 15 May 2019 at 0948 h on the road near the human settlement area. We also found two road-killed individuals on the Sathyamangalam Road on 7 June 2019 at 2037 h, and on the Mettupalayam Road on 18 June 2019 at 1012 h, respectively.

**Calliophis Gray, 1834**

*Calliophis bibronii* (Jan, 1858), Fig. 9C

Species observation record: We observed one dead individual in the tribal village of Kargudi in the Mudumalai Tiger Reserve on 4 August 2018 at 1130 h. The species was confirmed by its ventral scales.

**Naja Laurenti, 1768**

*Naja naja* (Linnaeus, 1758), Figs. 6A, 9D

Species observation record: We observed one individual on the Moyar-Masinagudi Road on 7 December 2017 at 1429 h basking near road side of the deciduous forest. A second individual was sighted in our base camp on 23 November 2019 at 1400 h, and a third was encountered in the scrub forest of the Sathyamangalam Forest on 5 December 2019 at 1100 h. We also observed one road killed individual on the Bhavani Sagar-Sathyamangalam Road on 14 October 2018 at 0708 h.

**Erycidae Daudin, 1803**

*Eryx Daudin, 1803*

*Eryx johnii* (Russell, 1801), Figs. 6B, 9E
Species observation record: We encountered one individual on the Bhavani Sagar-Mettupalayam Road on 23 May 2019 at 0100 h basking on the edge of the road. Another individual was sighted near the human habitation on the Sathyamangalam Tiger Reserve Road on 18 November 2019 at 0730 h. We also observed one road killed individual on the Bhavani Sagar-Sathyamangalam Road on 18 July 2018 at 0928 h.

_Gongylophis Wagler, 1830_

_Gongylophis conicus_ (Schneider, 1801), Fig. 6C

Species observation record: We observed one individual in Thengumrahada village on 15 May 2019 at 2008 h crossing the road. Another individual was sighted near the Karachikorai check post on 31 December 2019 at 2251 h resting on the roadside. We also recorded one road killed individual on the Erode-Sathyamangalam Road near Kodiveri village on 11 August 2018 at 0900 h and another on the Bhavani Sagar-Mettupalayam Road on 6 June 2019 at 2229 h.

Figure 6: Reptile species found in the Sathyamangalam Tiger Reserve. A. _Naja naja_. B. _Eryx johnii_. C. _Gongylophis conicus_. D. _Python molurus_. E. _Daboia russelii_. Photographs: A by Bagath Singh; B by Shipra; C, D, E by Thirumurugan.
Pythonidae Fitzinger, 1826
*Python Linnaeus, 1758*

*Python molurus* (Linnaeus, 1758), Figs. 6D, 10A
Species observation record: We observed a total of 26 individuals in various habitats and microhabitats of the Sathyamangalam Forest, mostly basking in riverine areas, approximately 1.5–2 m away, under thick shrubs of *Prospis juliflora*, inside a dried hollow *Mangifera indica*, hiding under crevices of rocks. We also observed four mating incidents in the months of January and February 2019. We also recorded two road killed individuals on the Bannari-Dhimbam Road on 18 August 2018 at 1102 h, and on the Bhavani Sagar-Thoddampalayam Road on 3 May 2019 at 1020 h respectively.

Typhlopidae Merrem, 1820
*Grypotyphlops* Peters, 1881
*Grypotyphlops acutus* (Dumeril and Bibron, 1844), Fig. 9F
Species observation record: We observed one dead individual just outside the perimeter of Thengumrahada village on 13 December 2017 at 1643 h.

Indotyphlops Hedges, Marion, Lipp, Marin and Vidal, 2014
*Indotyphlops braminus* (Daudin, 1803)
Species observation record: We observed one individual on 4 January 2018 at 1003 h, and another on 12 July 2019 at 0941 h inside our base camp in Bhavani Sagar. A third individual was observed on 3 July 2018 at 0814 h, near the human settlement area and another individual was sighted on 19 August 2018 at 1501 h, near agricultural land in Thengumrahada village.

Viperidae Oppel, 1811
*Craspedocephalus* Kuhl and Van Hasselt, 1822
*Craspedocephalus gramineus* (Shaw, 1802), Fig. 7A
Species observation record: We observed one individual on the Talamalai-Bejallati Ghat Road on 6 August 2021 at 1318 h basking under the roots of *Pterocarpus marsupium* and *Ligustrum perrottetii*.

Daboia Gray, 1842
*Daboia russelli* (Shaw and Nodder, 1797), Figs. 6E, 10B
Species observation record: We observed one individual in the Mokkaturai area in the Sathyamangalan Tiger Reserve on 16 June 2019 at 1500 h coiled under the fallen *Mangifera indica* near the riverbank. We also found two road killed individuals on the Sathyamangalam Road on 3 October 2018 at 0629 h, and on the Bhavani Sagar Road on 21 November 2018 at 0338 h.

Figure 7: Reptile species found in the Sathyamangalam Tiger Reserve. **A.** *Craspedocephalus gramineus*. **B.** *Geochelone elegans*. **C.** *Melanochelys trijuga*. **D.** *Crocodylus palustris*. Photographs: A, B, D by Thirumurugan; C by Muthukrishnan.
Figure 8: Road killed reptile species found on State and National Highways (Bhavani Sagar to Nal Road; Bhavani Sagar to State Highway 15; National Highway 948; National Highway 181; State Highway 15; State Highway 700), and in and around the Sathyamangalam Tiger Reserve, India. A. *Calotes versicolor*. B. *Chamaeleo zeylanicus*. C. *Ahaetulla oxyrhynca*. D. *Coelognathus helena*. E. *Dendrelaphis tristis*. F. *Rhabdophis plumbicola*. Photographs by Vishnu.
Figure 9: Road killed reptile species found on State and National Highways, and in and around the Sathyamangalam Tiger Reserve, India. A. Lygodon fasciolatus. B. Oligodon arnensis. C. Calliophis bibroni. D. Naja naja. E. Eryx johnii. F. Grypotyphlops acutus. Photographs: A, E by Vishnu; B, C by Thirumurugan; D by Muthukrishnan; F by Karthy.
Figure 10: Road killed reptile species found on State and National Highways, and in and around the Sathyamangalam Tiger Reserve, India. A. Python molurus. B. Daboia russellii. C. Echis carinatus. Photographs: A by Thirumurgan; B by Muthukrishnan; C by Karthi.

**Echis Merrem, 1820**

*Echis carinatus* (Schneider, 1801), Fig. 10C

Species observation record: We sighted two individuals on the Mettupalayam Road on 24 May 2019 at 2241 h coiled on grass, near roadside. We also observed two road killed individuals in the Sujjilkuttai area on 19 June 2018 at 0801 h, and near the Bhavani Sagar Dam on 21 July 2018 at 1243 h.

**Crocodylia Owen, 1842**

*Crocodylidae Cuvier, 1807*

*Crocodylus Laurenti, 1768*

*Crocodylus palustris* (Lesson, 1831), Fig. 7D

Species observation record: We observed a total of ten individuals in the riverine area of the Sathyamangalam Tiger Reserve, basking near the river banks, holm, bunds or dead trees, and their debris or swimming in the Moyar River. We observed one individual from the Thekkathimalai Hills (Eastern Ghats, 550 m elevation) on 29 June 2019 at 1632 h basking on the bank of the Moyar River. On 9 September 2019 at 1134 h, we observed an adult mugger basking with a juvenile on the opposite side of the riverbank (Mudumalai Tiger Reserve). On 16 October 2019 at 1226 h, we observed one individual approximately one meter away from the river bank that jumped back into the river as we approached the site, and at 1240 h another individual was observed basking on an island in the river.

**Testudines Batsch, 1788**

*Geoemydidae Theobald, 1868*

*Melanochelys Gray, 1834*

*Melanochelys trijuga* (Schweigger, 1812), Fig. 7C

Species observation record: We observed one individual on 21 March 2018 at 1110 h and another
individual at 1408 h in Theppakadu and Mavanalla villages in the Mudumalai Tiger Reserve during our survey in riverine habitat. The two individuals were sighted on a log and a rock in the middle of the Moyar River, respectively.

**Testudinidae Batsch, 1788**

*Geochelone Fitzinger, 1835*

*Geochelone elegans* Schoepff, 1795, Fig. 7B

Species observation record: We found one individual in the riverine area of the Moyar River on 28 January 2019 at 1400 h crawling on gravels approximately one meter away from the riverbank. Another individual was sighted in the Mudumalai Tiger Reserve on 28 September 2019 at 1011 h camouflaged in shrubs. A mating pair was recorded near Thengumrahada village on 4 October 2019 at 0951 h approximately two meters away from the riverbank. One road killed individual was found on the forest trail road in the Sathyamangalam Tiger Reserve on 8 November 2019 at 1125 h.

**Discussion**

Among the lizards, the highest diversity was observed in the families Agamidae, and Gekkonidae with three species, two species from Scincidae, whereas a single species from each of three families i.e., Lacertidae, Chamaeleonidae, and Varanidae were recorded (Table 1; Fig. 11). The highest diversity in snake species was recorded from the family Colubridae (12 species), followed by Viperidae (three species), Elapidae (three species), Erycidae (two species), Typhlopidae (two species), and Pythonidae (one species). Three species, *Python molurus*, *Crocodylus palustris* and *Varanus bengalensis*, fall under the Schedule I, Part II of the Indian Wildlife Protection Act, 1972. *Fowlea piscator*, *Ptyas mucosa*, *Naja naja*, *Daboia russelii*, fall under the Schedule II, Part II, whereas *Chamaeleo zeylanicus* falls under Schedule II, Part I of the Indian Wildlife Protection Act, 1972. *Geochelone elegans*, and rest of the snake species (except those under Schedule I and II) fall under Schedule IV of the Indian Wildlife Protection Act, 1972.

The herpetofauna of the Sathyamangalam Tiger Reserve and adjoining forests are still unexplored compared to other parts of the Western Ghats and Eastern Ghats. In recent decades, herpetological surveys in the Western Ghats and the Eastern Ghats regions of Tamil Nadu have given new insights to the reptilian diversity. A preliminary study conducted by the State Forest Department and WWF India to assess the faunal diversity of the Moyar River Valley gave 38 species of reptiles (WWF, 2019). Chandramouli and Ganesh (2010) recorded 46 species of reptiles from the Cardamom and Ponmudi Hills of the southern Western Ghats. Bhupathy and Nixon (2011) were able to record 10 species of reptiles from the upper Nilgiri Hills restricted to altitude between 1800 and 2400 m a.s.l. A study by Bhupathy and Sathishkumar (2013) in the Meghamalai Hills of the southern Western Ghats, which is one of the species rich regions in the Western Ghats, yielded 90 species of reptiles. However, a study by Chaitanya et al. (2018) found 64 species of reptiles from the same region. Ganesh et al. (2018) encountered 33 species of reptiles from the Biligiri Hills adjoining the Sathyamangalam Tiger Reserve.

Coming to habitat characteristics and preferences by reptiles, the species sightings were high in the riverine area and the forest area around it. The study area has a diverse variety of habitat types which are utilized by the species according to their needs. This is reflected by numerous sightings of species around the riverbank and surrounding riparian forest. The species were mostly sighted basking on rocks near the river banks, crawling on the dried leaves, debris, sand, or inside fallen tree branches. The Moyar River acts as an important water source for faunal species and humans residing in Thengumrahada village situated near the riverbank, leading to their co-existence and interaction which is reflected by the presence of reptiles in agricultural areas and even by road killed individuals on forest trail roads.

The study recorded a total of 31 road killed individuals (Table 2; one tortoise, five lizards, and 25 snakes) during the field survey and night recce (Fig. 12). The road kills were encountered on Bhavani Sagar to Nal Road and Bhavani Sagar to State Highway 15. The highways (National Highway 948, National Highway 181, State Highway 15 and State Highway 700) and roads passing through the National Parks are the major sites of reptile deaths. The highest number of road kills was recorded in the months of June and July between the years 2018 and 2020. The reptiles move toward roads for basking during these months when the area receives South-West monsoons. The reptiles are ectotherms and often use roads as thermoregulatory surfaces, since roads get heated up by sunlight, and thus become warmer than any other surface (Samson et al., 2016). This attracts nocturnal reptiles to the roads for thermoregulation of their body temperatures (Bernardino and Dalrymple, 1992; Bambaradeniya et al., 2001; Selvan et al., 2012; Karunarathna et al., 2013). Due to their limited mobility as well as drivers’ inattention, these reptiles eventually die, leading to high amount of deaths caused by road kill alone (Bennett, 1991; Rosen and Lowe, 1994; Vijayakumar et al., 2001; Row et al., 2007; Samson et al., 2016). A road killed individual (*Geochelone elegans*) on the forest trail road inside the Tiger Reserve proves that the species are vulnerable even inside the protected areas.
Figure 11: Map prepared using QGIS showing reptile species recorded along the Moyar River Valley Landscape, Tamil Nadu, India.

This study records a small fraction of the actual undetected and unreported reptile diversity of the MRVL. Our observations show a bias in reptile species diversity towards riverine habitats and scrub forests. This may be due to the fact that reptiles are hard to detect in a dense forest habitat unless systematically surveyed. A majority
of the reptile surveys in the Western Ghats and the Eastern Ghats followed time constrained visual encounter method (Chandramouli and Ganesh, 2010; Bhupathy and Nixon, 2011; Chaitanya et al., 2018; Ganesh et al., 2018) and belt transect (Bhupathy and Sathishkumar, 2013). For proper inventory study, a combination of different survey methods like drift fence with funnel and pitfall trap (Fisher et al., 2008), nocturnal spotlight surveying, and arboreal cover boards for tree dwelling geckos (Nordberg and Schwarzkopf 2019), noosing, and adhesive boards for agamid, skinks and lacertids (Henderson et al., 2016) can be applied in this landscape. The scarcity of information about the distribution of species in the MRVL provides ample opportunity to study the ecology and natural history of the reptiles.

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Conflict of interest

All the authors declare that there are no conflicting issues related to this research article.

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