

Contribution to the research of reptile species of South Park, Sofia city – species, distribution, and conservation threats

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Abstract. Some reptile species can be found in human settlements, but they have been rarely examined in more detail. Here, we provide information on the herpetofauna of Sofia's South Park. Seven species were identified, thus indicating relatively high species richness for an urban area of approximately 1.5 square kilometres. The biggest threats identified were some invasive taxa and intensive human presence. Some recommendations were therefore made to mitigate the negative impact on the populations of the species.

Key words: reptiles, urban environment, conservation threats.

Introduction

The fact that some reptile species have adapted to urban environments indicates that they warrant considerable research. However, limited information exists on the herpetofauna in Bulgarian cities (Delov et al. 2005; Mollov 2005, 2011, 2019; Mollov & Velcheva 2010; Pulev & Sakelarieva 2013; Tzankov et al. 2015).

The study aimed to summarise the information on reptile species that had been observed in South Park for almost 20 years.

Material and Methods

South Park, located in the southern part of Sofia, is among the city's largest urban parks, spanning approximately 1.48 square kilometres. The park encompasses a range of habitats, including deciduous, coniferous, and mixed forests, shrublands, meadows, a river, several swamps of varying sizes, and man-made ponds. Unlike many other urban green spaces, certain areas within South Park are subject to minimal human intervention, thus providing favourable conditions for diverse wildlife.

Between 2005 and 2024, the study area was regularly surveyed using random transect walks and point observations. Data on species occurrences, behavioural specifics, and potential conservation threats were recorded in a database. When possible, photographic and video evidence was collected. Supplementary records were obtained from collaborating researchers, volunteers, as well as visitors of the park, including contributions via the Facebook group Amphibians and Reptiles in Bulgaria (ARB), which currently has more than 20,000 members.

Results and Discussion

During the study, we identified the following reptile species (Fig. 1):

Pond Slider, *Trachemys scripta* (Thunberg in Schoepff, 1792)

Trachemys scripta was widespread in the park. It is a potentially invasive species which dominated the native *E. orbicularis*. Popular as a pet, *T. scripta* is often released into nature, especially in urban areas such as city parks. The subspecies *scripta* and *elegans* were observed during the study, with a maximum number of about 15 individuals for a single-day trip vs. 2 individuals of *E. orbicularis*.

European Pond Turtle, *Emys orbicularis* (Linnaeus, 1758)

The species was predominantly found in ponds that were rich with aquatic and coastal vegetation. It was outnumbered by *T. scripta*; nevertheless, *E. orbicularis* was regularly observed during the research.

Sand Lizard, *Lacerta agilis* Linnaeus, 1758

Lacerta agilis was regularly observed in a restricted area in the southern part of the park. It was found in typical meadow habitats, surrounded by urban areas from the south and east. The population in the park is probably the last surviving patch of a previously larger distribution range of the species in the highly urbanised area.

Common Wall Lizard, *Podarcis muralis* (Laurenti, 1768)

With only two records of single individuals in 2019, the species remains rare at the western boundaries of the park. However, our observations in some neighbouring areas suggest that *P. muralis* could be expected in more locations in future research.

Grass Snake, *Natrix natrix* (Linnaeus, 1758)

Natrix natrix was common in most of the wetlands that were rich with vegetation. Additionally, the species was registered in the neighbouring wooded areas. Individuals of different age groups were observed. The feeding events observed indicate that *Pelophylax ridibundus* (Pallas, 1771) is probably the main prey of the species, although predation on *Hyla orientalis* Bedriaga, 1890 was also recorded.

Dice Snak, *Natrix tessellata* (Laurenti, 1768)

Similar to *N. natrix*, *N. tessellata* was often observed near or in water bodies that were rich with vegetation. Single individuals move longer distances and can also be found in the neighbouring urban areas.

Aesculapian Snake, *Zamenis longissimus* (Laurenti, 1768)

Zamenis longissimus was regularly registered in wooded patches and areas of deposited waste or abandoned building materials, which can be used for shelter. Both adults and juveniles were recorded, thus indicating that the species probably reproduces successfully.

The reptile species identified comprise 70% of the reptiles reported by Tzankov *et al.* (2015) for the city of Sofia. Another study of the herpetofauna in the city of Plovdiv documented 9 species of reptiles (Mollov & Velcheva 2010). Having in mind the significant differences in the size of the study areas of our and other similar research (e.g. Mollov & Velcheva 2010), we can conclude that reptile diversity in South Park can be evaluated as good for a green area of approximately 1,5 sq km.

This is likely because of the various types of habitats, which provide suitable shelters and breeding grounds. The presence of inaccessible places with little human impact is another important precondition, along with the generally positive or neutral attitude of the visitors of the park towards reptiles. Most of the species were related to the wetlands and their vicinity (*E. orbicularis*, *T. scripta*, *N. natrix*, *N. tessellata*). The other species were mainly registered in the preserved open meadow habitats (*L. agilis*), forest/scrubland patches (*Z. longissimus*) or dryer open areas at the park boundaries (*P. muralis*). These results agree with the habitat preferences of the reptile species found.

We identified the following conservation threats for the herpetofauna of South Park:

• Intensive human presence and the possibility of a negative reaction towards the reptiles. The biodiversity in urban areas shows a tendency to decline, a process linked to the levels of urbanisation (McKinney 2002, 2006; Groffman *et al.* 2014). Like any other larger green space in Sofia, South Park is a very popular destination for recreational activities and is therefore intensively visited year-round. Although accidental snake-human contacts are probably common, we did not register any cases of animal abuse towards the target species. Only one case of an Aesculapian Snake killed in the park was reported and photographed in the ARB group. On the contrary, at least 3 Dice Snakes were successfully relocated from the neighbouring urban areas after being observed by us or citizens with a positive attitude towards snakes. However, intensive visiting of the area could cause stress and distort some of the wildlife activities, such as feeding or thermoregulation. Moreover, the intensively managed parts of the park provide fewer opportunities for feeding, shelter, etc., and most of the reptiles were concentrated in the wetlands, the coastal vegetation, and the dense wood/shrub patches.

We can therefore define the following recommendations:

- Installation of information plates that give details about the species distributed in the park, their biology, and conservation specifics. Relevant information about the snake species and the adequate ways to act in cases of accidental close contact could prevent the majority of any potential incidents, mainly caused by panic.
- Preservation of the park areas with a lower level of management of the vegetation.
- Establishment of proper informational campaigns for popularising the wildlife in the city parks.



Fig. 1. Species diversity and localities of the reptiles in South Park, Sofia city.

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