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Unusual winter activity of *Bufo bufo* (Anura: Bufonidae)

Bufo bufo (Anura: Bufonidae)'nın olağan dışı kış aktivitesi

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ABSTRACT

As ectotherms, amphibians in the northern hemisphere are forced into hibernation due to seasonal periods of low temperatures, shorter days or reduced food supplies. Although it has been reported in recent years that some ectothermic animals may be active even in winter due to the effect of global climate change, winter activity records for toads are uncommon. Therefore, we would like to report a winter activity case from north Anatolia, Turkey via the common toad, *Bufo bufo*. Documenting these unusual winter events not only adds to the biological knowledge of the species, but also provides valuable preliminary evidence for analyzing climate change patterns.

Öz

Ektotermik canlılardan biri olan amfibiler, kuzey yarımküredeki mevsimsel düşük sıcaklıklar, gündüz süresinin kısalması veya azalan gıda kaynakları nedeniyle kış uykusuna yatmak zorunda kalırlar. Son yıllarda küresel iklim değişikliğinin etkisiyle bazı ektotermik hayvanların kışın bile aktif olabileceği bildirilse de, kara kurbağaları için kış aktivitesi kayıtları nadirdir. Bu nedenle, Kuzey Anadolu, Türkiye'den bir kara kurbağası olan *Bufo bufo* aracılığıyla bir kış etkinliği vakasını bildirmek istiyoruz. Bu olağandışı kış olaylarını belgelemek, yalnızca türlerin biyolojik bilgisine katkıda bulunmakla kalmaz, aynı zamanda iklim değişikliği modellerini analiz etmek için değerli ön kanıtlar sağlar.

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1. INTRODUCTION

Hibernation is an animal's state of inactivity and can be interpreted as a good survival tactic in conditions where food is limited or simply difficult to find during a long, low-temperature winter period (Roots, 2006). Hence, most ectothermic animals and some endothermic animals go into hibernation (Nedergaard & Cannon, 1990; Geiser, 2013). As ectotherms, amphibians can be active and initiate reproductive activity even in winter, depending on the changing weather conditions (Covaci-

Marcov et al., 2011; Sas et al., 2012; Altunışık, 2019; Bülbül et al., 2019).

The common toad, *Bufo bufo* (Linnaeus, 1758) has a widespread species and included in the "least concern" (LC) category by the IUCN Red List since 2009. It is distributed in the whole European continent and western part of Turkey and northern parts of Morocco and Algeria (Agasyan et al., 2009) (Figure 1).

Bufo bufo, like other toads, is active mainly in the twilight. Depending on altitude and latitude, from

September to the beginning of November to March to June, toads go into hibernation alone or in groups. Hibernation takes place on land and, on rare occasions, in lakes and springs. In most cases, hibernation is completed in April or May. Females reproduce from March to June (in general from late April to early May) (Amphibiaweb, 2021). According to the literature (Agasyan et al., 2009; Bülbül et al., 2019), it is noteworthy that this toad was active before March.



Figure 1. Distribution map of *Bufo bufo* (IUCN, 2021)

Herein, we would like to report an unusual winter activity of *B. bufo*. Documenting these extraordinary winter events is noteworthy because it offers useful preliminary data for understanding global climate change trends in local contexts.

2. MATERIAL AND METHOD

In this study, a female *Bufo bufo* specimen has been reported in Bartın province, northwestern Turkey (41.33 N, 32.17 E; 50 m a.s.l.), Turkey (Figure 2). The sex of the individual was determined by looking at the presence of nuptial pads. On the other hand, abiotic factors such as air temperature and moisture of the weather in the areas where the specimen was found were also recorded. After the specimen was photographed and the required data collected, it was released to its natural habitat.

3. RESULTS AND DISCUSSION

A common toad individual was observed on 8th February 2018 at 12:30 p.m. According to meteorological data (pers. comm.) average air temperature on that day was 18.0 °C and the moisture of the weather was 64%. The habitat in which we observed the species is located within the borders of Kutlubey Campus of Bartın University, Turkey and there are couples of buildings around it.

There is an artificial pond about 200 m away from this habitat and it is known that there is human activity around it. We did not observe any other amphibian and reptile species during this observation. However, a different activity from *Zigana* in north eastern Turkey has been reported for the common toad in March 2018 (Bülbül et al., 2019). It is unusual for the common toad to appear at an earlier date in terms of time.



Figure 2. A specimen of *Bufo bufo*

Since there is a close relationship between body and ambient temperatures in ectothermic vertebrate animals, climate change is thought to have a greater effect on them than on endothermic vertebrate animals (Cunningham et al., 2016; Winter et al., 2016). Although amphibians live in terrestrial habitats during the adult phase of their life cycle, they are always dependent on water. They benefit from the aquatic habitats during feeding, breeding, larval development and hibernation. They use both terrestrial and aquatic environments, so any changes in these areas have an immediate impact on them (Mahaney, 1994; Hecnar, 1995; Shi, 2000). Moreover, the humidity conditions of these habitats are also very crucial for the survival of amphibian species (Green, 2017). Because the body surfaces of amphibians are highly permeable, water is indispensable for the skin to maintain its moisture and perform skin respiration (Watt & Oldham, 1995; Shi, 2000).

A common toad was observed as a single specimen on the road. This situation may be important in terms of showing that the air temperature and humidity together due to the global climate change are suitable for the species to be active in the middle of winter. In recent

years, winter activities of amphibians and reptiles have increased that appears to be triggered by global warming (Altunışık, 2019; Bülbül et al., 2019; Kaczmarek, 2018; Koç et al., 2018; Özkan & Bülbül, 2021). These animals aroused from hibernation with the increase of temperature, will need a lot of food to continue their vital activities. However, it is difficult to find preys such as insects and worms in the winter season. Therefore, they may be exposed to the danger of mortality in the future.

The importance of research on the impact of climate change on animal populations have risen with global warming (Altunışık et al., 2021; Ashton, 2002; Green, 2017). Winter activity of amphibians and reptiles have been observed to increase in recent years as a result of global warming (Altunışık, 2019; Bülbül et al., 2019; Özkan & Bülbül, 2021). Documenting these unusual winter events not only adds to the biological knowledge of the species but also provides valuable preliminary evidence for analysing climate change patterns.

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