



## An Understudied Cause of the Population Decline of the Egyptian Vulture *Neophron percnopterus* (Linnaeus, 1758): a Perspective

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**Abstract:** The study brings attention to the underestimated link between stray dog eradication campaigns and the large-scale disappearance of the Egyptian Vulture. Throughout its range, the species is exceptionally attracted to rubbish dumps and locally large proportions of the countries' national populations may be congregated at one or several such sites. Dog eradications campaigns have been, and in some areas continue to be, common methods for dog population control. The problem animals are frequently poisoned, sometimes directly at rubbish dumps, while with varying intensity the poisoned animals from the wider area are disposed of at the dumps. This creates especially risky situation for the Egyptian Vultures, and such events may have been the driving force behind its population collapse throughout vast parts of its range. Monitoring at the rubbish dumps, that are important for the species together with collaboration with municipalities are recommended to avoid future mass-poisoning cases.

**Key words:** stray dog mass poisoning, rubbish dump, vultures, extinction

### Introduction

There are an estimated 200 million stray dogs in the world, which through rabies disease transmission are the main reason for the annual mortality of at least 59,000 people globally, with 95% of these deaths primarily in rural areas of Africa and Asia (WOAH 2023). This creates human-animal conflict, which is managed mostly by municipalities (DALLA VILLA et al. 2010). In developing countries, it is most often temporarily relieved by illegal culling of dogs (often by poisoning), sometimes in the tens of thousands (IRWIN 2003, ABEBE 2013, OPPEL et al. 2021a, OIPA 2023). For example, in Egypt, in the year 2000 alone, 316 069 dogs were culled by varying methods (KING et al. 2004). The culling of dogs is illegally used as an emergency response, based on the belief

that reducing the dog populations will diminish rabies transmission (DALLA VILLA et al. 2010, TAYLOR et al. 2017).

The increase in the population of stray dogs is facilitated by the presence of accessible rubbish dumps (ABEDI et al. 2017) and the percentage of stray dogs is higher at rubbish dumps than elsewhere (WANDELER et al. 1993, MARKANDYA et al. 2008), which puts them among the target areas during stray dog eradication campaigns (MULLIE et al. 2017). Subsequently, often the poisoned dogs may be left on the rubbish dumps, or dogs poisoned elsewhere are disposed of at dumps, frequented by necrophagous species like vultures, exposing them at great risk of secondary poisoning (VAASSEN & AYKURT 2003, ABEBE 2013, GRUBAC et al. 2014, ARKUMAREV et al. 2019, OPPEL et al. 2021a, GURUNG et al. 2023).

One endangered species exceptionally attracted to rubbish dumps throughout its global range is the Egyptian Vulture (DONAZAR et al. 1996, LIBERATORI & PENTERIANI 2001, KATZENBERGER et al. 2017, MCGRADY et al. 2018). It occurs in Southern Europe, Africa, Middle East, Central Asia and the Indian subcontinent, showing a preference for close association with humans (ARCHER & GODMAN 1937, NAOROJI 2009).

In this publication, I review the current knowledge on Egyptian Vulture *Neophron percnopterus* (Linnaeus, 1758) concerning its habit of foraging on rubbish dumps. Around settlements, the species' often shares its preferred foraging habitat with large stray and free-range dog populations. I provide evidence how this behaviour can potentially increase the risk of unsustainably high mortality. Combined with other factors, this might have led to the extinction of its urban populations and contributed to its widespread population declines. Here, I provide a scoping review aiming to bring into perspective an understudied cause of decline for the Egyptian Vulture.

## Materials and Methods

Around 900 scientific and popular publications (mainly in English) and reports, mostly from the period 1960–2023, have been reviewed. These articles mentioned the Egyptian Vulture from around its global range and I extracted the information concerning its use of rubbish dumps. In addition, 110 publications and reports mentioning control of stray dog populations globally were also reviewed.

## Results

Up until the end of the 19<sup>th</sup> Century, the Egyptian Vulture was extremely abundant commensal with humans, having an urban component of its population and nesting on buildings and trees (see WADLEY 1951 for a colony on trees in Turkey). Hundreds of pairs were present in big cities like Istanbul (ALLEON & VIAN 1869), Delhi (GALUSHIN 1971), Damascus (BAUMGART et al. 1995) and Khartoum (NIKOLAUS 2006).

Concentrations of thousands of Egyptian Vultures at dumps and near human habitation have been reported from Jodhpur, India – 1171 (CHHANAGANI 2009), around Aden, Yemen – 1343 (JENNINGS 2010) and Afar, Ethiopia – 1424 (ARKUMAREV et al. 2014). Hundreds of Egyptian Vultures at rubbish dumps have been observed in Spain (DONAZAR et al. 1996), Turkey (VAASSEN & AYKURT 2003, KATZENBERGER

et al. 2017), Chad (SALVAN 1967), Somalia (A. JAMA, *in litt.*), Socotra Island, Yemen (PORTER & SULEIMAN 2012), Oman (AL FAZARI & MCGRADY 2016), Uzbekistan (V. DOBREV, pers. comm.) and Nepal (GHIMIRE et al. 2020). In countries with smaller populations, groups of tens of Egyptian Vultures at dumps are recorded in Northern Macedonia (GRUBAC et al. 2014), Greece (HANDRINOS 1985), Egypt (WHITE et al. 2008), Sudan (ANGELOV & HASHIM 2019) and Djibouti (RAYALEH & MCGRADY 2019).

While foraging around human habitation or at refuse tips and around slaughterhouses, Egyptian Vultures have frequently been associated with dogs. SHAW (1823) mentions that “extensive flocks of them are also found in Cairo, where they feed on offal and dead animals in the streets, promiscuously with the dogs”. In the mid–19<sup>th</sup> century, the urban population of the species in Istanbul, Turkey, was described to feed on refuse in the streets together with 30 000–40 000 dogs (ALLEON & VIAN 1869).

## Discussion

The overlap of foraging grounds of Egyptian Vultures with dogs in (and around) settlements creates an especially risky situation for the vultures when dog eradication campaigns are implemented, considering the practice of setting poison baits out in the open for stray dogs (TUCKER 2005). A nationwide study for Greece found out that 12.5% of reported poisoning cases originate after setting of poison baits to control stray dogs around settlements (NTEMIRI et al. 2018).

During the 20<sup>th</sup> and 21<sup>st</sup> Centuries, the Egyptian Vulture experienced steep population declines throughout most of its range. It is already widely recognised that the increased mortality, mostly due to poisoning, is the main reason for the decline (HERNANDEZ & MARGALIDA 2009, NIKOLOV et al. 2016). However, as the specific types of poisoning causing mortality in breeding areas in Europe are becoming well known (BOTHAS et al. 2017), it is still unclear why the once huge African and Asian populations (including urban ones) collapsed.

A rarely cited but revealing record of mass poisoning of 60–70 Egyptian Vultures in 1993 on a rubbish dump in Northern Macedonia (after culling of dogs), decimated in a single day 60% of the country's national population (GRUBAC et al. 2014). Egyptian Vultures poisoned on rubbish dumps have been found also in the former USSR (ABULADZE & SHERGALIN 1998), Eritrea and Cape Verde (ARKUMAREV et al. 2019 and references therein). Given the incidental nature of recording such cases and

the information presented above, there is a reason to assume that they were common and may continue to be present across the vast range of the species. Culling campaigns for stray dogs are occurring in 46 of the 172 member countries of the World Organization for Animal Health (DALLA VILLA et al. 2010). Dog poisoning still commonly occurs across the Egyptian Vulture range in Asia and Africa (KASHKAROV & LANOVENKO 2011, OPPEL et al. 2021a), where rubbish dumps are large and numerous (ORO et al. 2013). In Spain, in only 5.2% of the poisoning incidents involving vultures, the bait was set specifically for scavengers (HERNANDEZ & MARGALIDA 2009). Similarly, in Sudan, WILSON (1982) mentioned nationwide poisoning of hyenas (Hyae-nidae) with severe repercussions on vulture populations. For the White-backed Vulture *Gyps africanus*, MURN & BOTHA (2017) showed that a single poisoned elephant carcass once every two years may cause the extinction of a population of c. 900 pairs after c. 50 years.

Surprisingly, contrary to most of the range, Egyptian Vultures have always been in favourable status in Oman and Socotra Island, Yemen (ANGELOV et al. 2020). In these countries, due to cultural traditions, there are no viable dog populations, which lead to a common hypothesis between different researchers that lethal control of dogs by poison may be the explanation for the observed declines within the rest of the range (JENNINGS 2010, HILLE & COLLAR 2011, PORTER & SULEIMAN 2012, ANGELOV et al. 2020).

The threat of poisoning after campaigns for stray dog eradication has previously been proposed as an important cause for the decline of the endangered Hooded Vulture *Necrosyrtes monachus* in Africa (ODINO et al. 2014, MULLIE et al. 2017; see also ARKUMAREV et al. 2019). The species replaces the Egyptian Vulture towards the equator (NIKOLAUS 1987) and it is similarly commensal with humans and aggregates at rubbish dumps (MUNDY 2000, OGADA & BUIJ 2011, HENRIQUES et al. 2018).

Throughout Europe, Asia and Africa, there has never been an international coordinated monitoring of Egyptian Vultures at rubbish dumps, where the largest known foraging congregations occur and the possibility for illegal poisoning of dogs is daily threatening thousands of Egyptian Vultures. Moreover, vultures perching on electricity pylons around rubbish dumps may suffer additional mortality due to electrocution (ANGELOV et al. 2013, OPPEL et al. 2021b). As rubbish dumps are known for incidentally causing mass mortality among vultures, they may represent the biggest sinks for the species global

population, especially outside Europe. The strengthening of international cooperation, monitoring and conservation programs with local municipalities need to be initiated to gather more information and prevent mass mortality of vultures feeding on rubbish dumps. There is a need to enforce the control on poisoned dog management so that they are not accessible as food to any scavenging wildlife.

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