MULTI-SPECIES ACTION PLAN TO CONSERVE AFRICAN-EURASIAN VULTURES (VULTURE MSAP)

CMS Raptors MOU Technical Publication No. 5
CMS Technical Series No. xx

Vulture MsAP

CMS · RAPTORS MOU · BirdLife INTERNATIONAL · VCF Vulture Conservation Foundation · VULTURE Specialist Group

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Milestones in the production of the Plan

- November 2014 – Mandate established at CMS COP11 (Resolution 11.14)
- October 2015 – Endorsed by Signatories at MOS2 Raptors MOU
- February 2016 – Publication of Project Charter to develop Vulture MsAP
- Jun-Aug 2016 – Appointment of Overarching and Regional Coordinators
- October 2016 – African Regional Workshop in Dakar, Senegal.
- October 2016 – European Regional Workshop in Monfragüe, Spain.
- November 2016 – Asian Regional Workshop in Mumbai, India.
- January 2017 – First draft of the Vulture MsAP finalised.
- February 2017 – Middle East Regional Workshop in Sharjah, United Arab Emirates.
- February 2017 – Overarching Workshop in Toledo, Spain.
- March 2017 – Second draft of the Vulture MsAP finalised.
- March-April 2017 – Public Consultation Exercise for 2nd draft Vulture MsAP.
- April 2017 – Review and incorporation of comments received.
- May 2017 – Production of final draft of Multi-species Action Plan.
- May 2017 – Submission of Multi-species Action Plan to the CMS Secretariat.
- July 2017 – Vulture MsAP reviewed by Sessional Committee of the CMS Scientific Council.
- August 2017 – Publication on CMS website as COP12 Meeting Document.
- October 2017 – 12th Meeting of the Conference of Parties to CMS (COP12).

Geographical scope

128 Range States, which host populations of one or more of the species that are the focus of the Multi-species Action Plan (Figure 2).

Species scope

This Multi-species Action Plan covers 15 of the 16 species classified as the Old World vultures (Table 2), Palm-nut Vulture being excluded as explained in Section 1.2.

Reviews

This plan should be reviewed and updated every six years: mid-term review in 2023, final review in 2029. An emergency review could be undertaken if there is a significant change to the species' status before the next scheduled review.

Recommended citation

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Authority for taxonomy, sequence and species names

del Hoyo, J., Collar, N. J., Christie, D. A., Elliot, A. and Fishpool, L. D. C. (2014) *Handbook of the Birds of the World/BirdLife International Illustrated Checklist of the Birds of the World, Volume 1: Non-passerines*. Lynx Editions, Barcelona and BirdLife International, Cambridge.

Disclaimer

Information sources

This Multi-species Action Plan is based on information provided freely by the large number of experts and specialists listed in Annex 1, together with the published and unpublished literature cited. Much of the additional uncited information on individual species (distribution, population size and trend, Red List status, ecology, threats and conservation action) derives from the factsheets on the BirdLife Data Zone http://datazone.birdlife.org (BirdLife International 2016a). Species range maps were updated by BirdLife International from those used for the 2016 BirdLife/IUCN Red List of birds. For African species, the outstanding work of **Rob Davies** (HabitatInfo) and **Ralph Buij** (Wageningen University) has greatly contributed to these maps as well as to the information on threats to African vultures including supplementary maps, using information from the African Raptor Databank (http://www.habitatinfo.com/african-raptor-databank/) and tracking data from a range of research projects across the continent. Refinement and updating of distribution maps was enhanced, particularly for three of the Asian species, by observations downloaded from eBird (http://ebird.org/content/ebird/).

Photograph credits (page numbers)

Andre Botha: White-headed Vulture (32, 56), Hooded Vulture (34, 73), White-backed Vulture (24, 39), Cape Vulture (14, 19, 20, 44), Rüppell's Vulture (23, 46), Lappet-faced Vulture (13, 52, 55), Bearded Vulture (117); **Emmanuel Keller**: Griffon Vulture (cover); **Angel Sanchez**: Bearded Vulture (26), Egyptian Vulture (frontispiece, 28), Griffon Vulture (48, 74), Cinereous Vulture (50, 110); **Tulsi Subedi**: White-rumped Vulture (37); **Phearun Sum**: Red-headed Vulture (31), Slender-billed Vulture (42, 78), White-rumped Vulture (94); **Mandy West**: Himalayan Griffon (35), Indian Vulture (41).

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Content

Foreword

Vultures are a characteristic, distinctive and spectacular component of the biodiversity of the environments they inhabit. They also provide critically important ecosystem services by cleaning up carcasses and other organic waste in the environment: they are nature's garbage collectors and this translates into significant economic benefits. Studies have shown that in areas where there are no vultures, carcasses take up to three or four times longer to decompose. This has huge ramifications for the spread of diseases in both wild and domestic animals, as well as elevating pathogenic risks to humans. In addition, vultures hold special cultural value in many countries, including historically such as Nekhbet, a goddess in ancient Egyptian mythology.

The IUCN Red List status of African-Eurasian vultures has seen drastic changes for the worse in recent years: by the end of October 2015 the majority of species were listed as Critically Endangered, the highest category of threat, indicating a very high risk of extinction in the wild. Unless effective conservation action is implemented or expanded across the range of these birds, there is a significant likelihood that several of these species will indeed become extinct in the near future.

The main reason for this is major population declines driven by poisoning, both intentional and otherwise. The precipitous population decline of three species in India and elsewhere in South Asia during the 1990s was due primarily to secondary poisoning by the veterinary drug diclofenac. In Africa, the threat of poisoning has accelerated in recent years, with a range of drivers, which all lead to carcasses being laced with highly toxic substances; sometimes vultures are the targets, sometimes they are, through their scavenging habits, the unintended victims. The immense scale and extent of the population declines of vultures in Africa have only recently been exposed and has led to the term 'African Vulture Crisis'.

Thanks to intensive conservation efforts, populations of some vultures have recovered in some parts of Europe, although the fact that diclofenac has recently been licensed for sale in parts of Europe remains a concern. Other threats to vultures, operating variably in all regions, include such problems as habitat loss or degradation, food availability, collisions and electrocution by electricity power lines.

Recent studies of the movement of vultures using satellite telemetry has shown the vast cyclical movements undertaken by this group of species. Accordingly, conservation actions can only be effective if implemented at the flyway level, which requires a broad approach and the engagement of all Range States. This realisation, and the wider appreciation of the seriousness of the African Vulture Crisis and increasing threats to vultures elsewhere, have been key catalysing factors that led to swift international agreement on the urgent need to develop an action plan to conserve African-Eurasian vultures under the Convention on the Conservation of Migratory Species of Wild Animals (CMS).

The Multi-species Action Plan to Conserve African-Eurasian Vultures (Vulture MsAP) is the result of extensive consultation with stakeholders, conservation and species experts, aims to rapidly halt current population declines in all the 15 African-Eurasian vulture species. This includes bringing the conservation status of each species back to a favourable level and providing conservation management guidelines applicable to all Range States.

Some outstanding work has been and continues to be done to conserve vultures. Long may this continue! However, the threats are both severe and challenging to address, and a step change in conservation action is required, led by Governments and supported by all stakeholders, including many who have so far not recognised the importance of vultures. Lessons learned and good practice can be applied more widely but new and creative solutions need to be found to address the clear and present danger that threatens to drive this spectacular group of birds to extinction. The many stakeholders concerned with vulture conservation must work together, and not rest until all vulture species are safe from this threat, ensuring that the millions of people who also benefit from them in many ways can continue to do so.

Executive Summary

Vultures, by cleaning up carcasses and other organic waste in the environment, provide critically important ecosystem services that also directly benefit humans. This Multi-species Action Plan to Conserve African-Eurasian Vultures (Vulture MsAP) aims to provide a comprehensive strategic conservation Action Plan covering the geographic ranges of all 15 migratory Old World vultures and to promote concerted, collaborative and coordinated international actions towards the recovery of these populations to acceptable levels by 2029. The species that are the focus of this plan are:

- Bearded Vulture *Gypaetus barbatus*
- Egyptian Vulture *Neophron percnopterus*
- Red-headed Vulture *Sarcogyps calvus*
- White-headed Vulture *Trigonoceps occipitalis*
- Hooded Vulture *Necrosyrtes monachus*
- Himalayan Griffon *Gyps himalayensis*
- White-rumped Vulture *Gyps bengalensis*
- White-backed Vulture *Gyps africanus*
- Indian Vulture *Gyps indicus*
- Slender-billed Vulture *Gyps tenuirostris*
- Cape Vulture *Gyps coprotheres*
- Rüppell's Vulture *Gyps rueppelli*
- Griffon Vulture *Gyps fulvus*
- Cinereous Vulture *Aegypius monachus*
- Lappet-faced Vulture *Torgos tracheliotos*

With the exception of Western Europe, where populations of most species are increasing, vulture populations in Africa, Europe and Asia are in decline, facing a range of threats from a variety of anthropogenic factors. The IUCN Red List status of vultures has seen drastic changes in recent years: by the end of October 2015 the majority of species was listed as 'Critically Endangered'. The precipitous collapse of populations of at least three species of vulture in South Asia over the last 25 years is mainly ascribed to food (i.e. carcase) contamination by the use of a single anti-inflammatory veterinary drug (diclofenac).

On the African continent vulture populations have also declined considerably in most areas over the last 30 years. However, the range and extent of threats facing these species are more varied compared to that of south Asia with various forms of acute poisoning currently known to be the main reason for the decline. These are driven by several factors, some being particularly influential: conflicts between humans and carnivores due to risks perceived by humans, including to their domestic livestock, which unintentionally kill vultures; poachers actively targeting vultures to prevent them exposing their activities to wardens by soaring above illegally killed elephants and other game; and deliberate collection of vultures for illegal trade and belief-based use to fuel superstitions.

Poisoning in various forms is a concern throughout vultures' ranges. Other threats, also operating to varying extents over large areas include habitat loss and degradation, decreasing food availability, fragmentation of remaining populations, human disturbance, collisions with wind turbines and powerlines, and electrocution on electricity infrastructure.

This plan is the result of extensive consultation with stakeholders, conservation and species experts and has the following aims:

- To rapidly halt current population declines in all species covered by the Vulture MsAP;
- To reverse recent population trends to bring the conservation status of each species back to a favourable level;
- To provide conservation management guidelines applicable to all Range States covered by the Vulture MsAP.

To achieve these aims, the plan proposes the following objectives and recommends associated results and actions towards its implementation, as well as high level indicators and targets for their achievement:

1. To achieve a significant reduction in mortality of vultures caused unintentionally by toxic substances used (often illegally) in the control and hunting of vertebrates;
2. To recognise and minimise mortality of vultures by non-steroidal anti-inflammatory drugs (NSAIDs) and occurrence and threat of toxic NSAIDs throughout the range covered by the Vulture MsAP;
3. To ensure that CMS Resolution 11.15 on the phasing out the use of lead ammunition by hunters is fully implemented;
4. To reduce and eventually to halt the trade in vulture parts for belief-based use;
5. To reduce and eventually to halt the practice of sentinel poisoning by poachers;
6. To substantially reduce vulture mortality caused by electrocutions linked to energy generation and transmission infrastructure;

7. To substantially reduce vulture mortality caused by collisions linked to energy transmission and generation infrastructure;
8. To ensure availability of an appropriate level of safe food to sustain healthy vulture populations;
9. To ensure availability of suitable habitat for vultures to nest, roost and forage;
10. To substantially reduce levels of direct persecution and disturbance of vultures caused by human activities;
11. To support vulture conservation through cross-cutting actions that contribute to addressing knowledge gaps;
12. To advance vulture conservation by effective promotion and implementation of the Vulture MsAP.

The Vulture MsAP extends over 12 years and will require a concerted effort throughout this period to ensure successful implementation. The 125 actions recommended in the Vulture MsAP focus on aspects related to research and monitoring, policy and legislation, education and awareness and direct conservation action and all contribute to the successful implementation of the plan across its entire range. Most (108) actions are categorised as either High or Medium priorities for implementation. The remaining 17 actions are judged to be Essential, as their immediate implementation is considered most important to ensure that progress towards achieving the goal of the Vulture MsAP is made as quickly as possible. These Essential actions focus on addressing specific aspects of the critical threats, cross-cutting conservation actions that can be implemented by most Range States to the benefit of vultures, and the establishment of a functional framework for the implementation of the plan across the entire range.

The many key stakeholders and their respective roles in achieving these objectives are identified, alongside policy opportunities and barriers to effect wide-scale changes. An overview of international conventions, agreements and policies also provide context in terms of existing structures and possible synergies that can be used to support and assist the achievement of the objectives of the Vulture MsAP. Range States are encouraged to use this document as a guide for the drafting of national vulture conservation action plans suited to the situation, needs and available information in their respective countries.

Finally, information is presented on the proposed structure, processes and resources required for successful implementation. This includes details of the coordination team, steering committee, global and regional working groups and other support structures considered essential to ensure effective implementation. It also provides guidance on the monitoring, evaluation and review processes to be followed during the implementation of the Vulture MsAP, as well as components that should be included in communications, fundraising and resource mobilisation plans to promote and garner support for the plan from Range States and other target audiences. The document concludes with a series of Annexes, which provide supplementary information that was collected during the course of the development of the Vulture MsAP and is considered potentially valuable to support planning and implementation.

How to use this Action Plan

This Multi-species Action Plan to Conserve African-Eurasian Vultures (Vulture MsAP) begins with an introduction on the rationale, aim, objectives, time frame and methods that were followed to develop the Plan for consideration at the 12th Conference of the Parties to the Convention on Migratory Species (Section 1). Section 2 explains the overall geographical and species scope of the Plan, moving on to accounts of the 15 species (Section 3); from this, the reader can learn about each of the species, identify which occur in any given area or country of interest, and recognise the main threats to their survival.

The threats are described in more detail (Section 4) and mapped according to their severity in each region. Data are insufficient to identify threats and their severity for each country, but in most cases the severity of a threat is comparable in all countries across a given region; where this is believed not to be the case, this is stated. In this way, the reader can then identify the threats in any given area (Annex 3). Due to the more substantial data available and feedback received from the European Region, more information on threats at a country-scale is available and has been included in Annexes 2.2–2.5.

This analysis points to the most appropriate objectives, results and actions needed (Section 7) to combat each threat, via further general information on those most likely to be concerned with or affected by vulture conservation actions (stakeholders: Section 5), and relevant policy and legislation (Section 6). Supplementary information and links for further information are provided in Annex 7.

Each action proposed is not necessarily appropriate across the entire MsAP range, and it is important to carefully assess the situation, the data and resources available and the key threats for any given area or species before taking them forward for implementation or incorporation into a localised species action plan.

The Plan also contains information on, or links to, existing plans and policies focused on relevant threats, individual species or groups of species (including through links presented in Annexes). Two of these documents were developed concurrently with the development of the Vulture MsAP and were consulted extensively with regard to the two species concerned. These are:

- Flyway Action Plan for the Conservation of the Balkan and Central Asian Populations of the Egyptian Vulture (EVFAP, Annex 4) and
- Flyway Action Plan for the Conservation of the Cinereous Vulture (CVFAP, Annex 5).

A Blueprint for the Recovery of Asia's Critically Endangered *Gyps* Vultures (Annex 7) already exists. It was developed by the Saving Asia's Vultures from Extinction (SAVE) consortium and is annually updated by the SAVE members. The Blueprint provides clear guidance in terms of regional vulture conservation; the recommended actions in the Vulture MsAP reflect this.

Acronyms & abbreviations

AMCEN	African Ministerial Conference on the Environment
ARDB	African Raptor Databank
AWF	African Wildlife Foundation
BCN	Bird Conservation Nepal
BirdLife	BirdLife International
BNHS	Bombay Natural History Society
CITES	Convention on International Trade in Endangered Species of Wild Fauna and Flora
CMS	Convention on the Conservation of Migratory Species of Wild Animals
COP	Conference of the Parties
CR	Critically Endangered (an IUCN Red List category of threat)
CU	Coordinating Unit (of the CMS Raptors MOU)
CZA	Central Zoo Authority (India)
DEA	Department of Environmental Affairs (South Africa)
EAC	East African Community
ECOWAS	Economic Community of West African States
EN	Endangered (an IUCN Red List category of threat)
EWT	Endangered Wildlife Trust (South Africa)
FAP	Flyway Action Plan
IFC	International Finance Corporation
IGAD	Intergovernmental Authority on Development
IUCN	International Union for the Conservation of Nature
IUCN SSC VSG	IUCN Species Survival Commission: Vulture Specialist Group
IVRI	Indian Veterinary Research Institute
LC	Least Concern
MOU	Memorandum of Understanding
MsAP	Multi-species Action Plan
NGO	Non-governmental Organisation
NSAIDs	Non-steroidal anti-inflammatory drugs
NT	Near Threatened (an IUCN Red List category of threat)
OECD	Organisation for Economic Co-operation and Development
RSC	Regional Steering Committee (of South Asian Governments)
PPWG	CMS Preventing Poisoning Working Group
RSPB	Royal Society for the Protection of Birds (UK)
SAVE	Saving Asia's Vultures from Extinction (consortium)
SEO/BirdLife	Sociedad Española de Ornitología (Spanish Ornithological Society – BirdLife Spain)
SsAP	Single-species Action Plan
TPF	The Peregrine Fund, Inc. (USA)
UNEA	United Nations Environment Assembly
UNEP	United Nations Environment Programme
UNFCCC	United Nations Framework Convention on Climate Change
USAID	United States Agency for International Development
VCF	Vulture Conservation Foundation
VICH	International Cooperation on Harmonisation of Technical Requirements for Registration of Veterinary Medicinal Products
VSG	Vulture Specialist Group (See IUCN SSC VSG)
VSZ	Vulture Safe Zone
VU	Vulnerable (an IUCN Red List category of threat)
Vulture MsAP	Multi-species Action Plan to Conserve African-Eurasian Vultures
WCS	Wildlife Conservation Society
WWF	World Wide Fund for Nature

1 Background and approach

1.1 Rationale

Mandate

The mandate for the development of this international Multi-species Action Plan to Conserve African-Eurasian Vultures (Vulture MsAP) was established at the 11th Conference of Parties to the Convention on the Conservation of Migratory Species of Wild Animals (CMS) in November 2014. CMS Resolution 11.14 on the Programme of Work on Migratory Birds and Flyways was adopted, and Action 9 of the Resolution, under the Species-specific Conservation Actions section, seeks to promote the development, adoption and implementation of species action plans for priority species in line with CMS priorities for concerted and cooperative action. Action 9 refers to all African-Eurasian Vultures (except Palm-nut Vulture *Gypohierax angolensis*) via the CMS Memorandum of Understanding on the Conservation of Migratory Birds of Prey (Raptors MOU). Resolution 11.14 also recognises both the IUCN SSC Vulture Specialist Group and BirdLife International as key collaborating partners.

At the Second Meeting of signatories to the Raptors MOU held in Trondheim, Norway, in October 2015, signatories formally recognised all Old World Vultures (except Palm-nut Vulture) as migratory species by listing them in Annex 1 and Table 1 of Annex 3 of the Raptors MOU (Coordinating Unit of the Raptors MOU 2015). In addition, the Technical Advisory Group (TAG) was tasked to support the Coordinating Unit in facilitating development of the Vulture MsAP. In February 2016, the Coordinating Unit established an Interim Steering Group, including representatives from IUCN SSC Vulture Specialist Group, BirdLife International and other specialists, to guide the planning and preparations for the development of the Vulture MsAP.

Mission

To bring together representatives of Range States, partners and interested parties, to develop a coordinated Vulture MsAP for submission to the 12th Meeting of the Conference of the Parties (COP12) to the CMS, scheduled to be held in October 2017.

Aim and Objectives

The overall aim is to develop a comprehensive strategic conservation Action Plan covering the geographic ranges of all 15 migratory Old World vultures to promote concerted, collaborative and coordinated international actions through achievement of three objectives:

- To rapidly halt current population declines in all species covered by the Vulture MsAP;
- To reverse recent population trends to bring the conservation status of each species back to a favourable level; and
- To provide conservation management guidelines applicable to all Range States covered by the Vulture MsAP.

Timeline and milestones

This reflects the outline timetable that has been followed to ensure that the overall delivery deadline, established by CMS Resolution 11.14, is met.

January 2016
- Interim Steering Group established

February 2016
- Project Charter published by Coordinating Unit
- Engagement via email with all Range States and key stakeholders

March 2016
- Vulture Working Group established

April 2016
- Critical funding support received from Switzerland

July 2016
- African, European and Asian Regional Coordinators appointed

August 2016
- Overarching Coordinator appointed

Aug/Sep & Dec 2016
- Species Questionnaires circulated in advance of Regional Workshops

September 2016
- Vulture Steering Group established

October/November 2016

- Regional Workshops held – Africa, Europe and Asia

January 2017

- 1st Draft Vulture MsAP, including regional components, completed

February 2017

- Middle East Regional Workshop held; Overarching Workshop held

Mid-March 2017

- 2nd Draft of Vulture MsAP finalised

March/April 2017

- Month-long Public Consultation Exercise

April/May 2017

- Comments incorporated into final draft Vulture MsAP

24 May 2017

- Submission to CMS Secretariat (COP12 document deadline)

July 2017

- Review by Sessional Committee of the CMS Scientific Council

August 2017

- Publication of Vulture MsAP & draft Resolution on COP12 website

October 2017

- Consideration by CMS Parties at COP12, Manila, Philippines

1.2 Methods

Background

Species Action Plans are recovery plans aimed at the conservation of a threatened species with the goal to restore them to a favourable conservation status. A Multi-species Action Plan has the same goal, but focuses on several species with declining populations facing a range of threats within an identified geographical scale. Conservation actions for such mobile and wide ranging species as vultures can only be effective if implemented across international political boundaries at the flyway scale; this requires a broad collaborative approach and the engagement of all Range States. These fundamental necessities underpin the principles for developing such plans: scientific rigour; stakeholder consultation; participation and consensus; and consideration of existing efforts. The methods used to develop this Vulture MSAP adhere to these principles.

Species assessment and status review

The 15 species of vultures stipulated by consensual agreement in the Vulture MsAP Project Charter were assessed by means of extensive literature review. Evidence for threats were identified, and the success or otherwise of conservation measures taken, were similarly assessed. Species conservation status is based on the information provided by the IUCN Red List's delegated authority in terms of the status of threatened birds, BirdLife International.

Questionnaires

To acquire the most current information and feedback with regard to species population status and trends as well as existing threats and conservation actions focused on vultures within range countries, questionnaires were used. The questionnaires requested information per species from Range States and species experts on biological information, threats and conservation effort. This tool also enabled the capture of current information that was not yet accessible through peer reviewed scientific literature and other publications. Questionnaires were drafted and distributed to stakeholders in all Range States for completion and submission at least 10 days prior to the commencement of each regional workshop. However, questionnaires completed subsequent to these deadlines and during the regional workshops were also considered and included in the overall datasets derived from these responses. A summary of the quantity of questionnaire feedback can be seen in Table 1.

Coordination

Overall planning, direction and oversight of the development of the Vulture MsAP was provided by the Coordinating Unit of the CMS Raptors MOU. BirdLife International and the Vulture Conservation Foundation were contracted to supervise and manage particular aspects of the process. Three Regional Coordinators and one Overarching Coordinator were appointed, primarily to take responsibility for the collection of regional information, coordination and arrangement of regional workshops and to contribute to the drafting of the Vulture MsAP. In February 2016, all Range States were invited to submit nominations for the Vulture Working Group which ultimately included over 60 individuals. A subset was invited to form a 20-person Steering Group which met regularly via online teleconference.

Regional Workshops

Four regional workshops were held between October 2016 and February 2017 within the Vulture MsAP range, each relating to a significant part of the global range of African-Eurasian vultures (Table 1). A total of 212 delegates attended these workshops, the aim of which was to gather the information necessary to develop the regional component of the Vulture MsAP, including all vulture species that occur in the region being covered by the Plan, with special attention given to species status, threats and priority conservation actions. The workshops all followed a similar agenda and were conducted with facilitation provided by a range of experienced participants who were briefed on the methods to be followed.

Workshop methods

To collate information on species status and biology, information from published literature, presentations at the regional workshops and questionnaire replies were used to update information on each species as reflected in the species accounts. Identified threats were categorised, based on the feedback received, from additional infor-

Table 1. Vulture MsAP Regional Workshops.

Region	Date	Location	Number of Delegates (Total = 212)	Questionnaire Responses (Total = 208)
Africa	18–21 October 2016	Dakar, Senegal	54	62
Europe	26–29 October 2016	Extremadura, Spain	79	89
Asia	29–30 November 2016	Mumbai, India	37	44
Middle East	6–9 February 2017	Sharjah, United Arab Emirates	42	13

mation presented and questionnaire responses received prior to each of the regional workshops. Group discussions assessed and categorised threats in terms of the scope, severity and time frame, while also evaluating the quality of evidence that these assessments were based upon. Each threat was then ranked in order of its impact at levels ranging from critical to low, and subsequently analysed to determine demographic impacts, drivers and root causes. These allowed problem trees to be drawn up, an example of which, for unintentional poisoning (Figure 1) is shown below. The threats are presented, along with supporting scientific evidence, in Section 3.

Group discussions were aimed at identifying and understanding the drivers and root causes of each threat and to identify appropriate actions to reduce their respective impacts. Each action was also allocated a level of priority and timeframe for implementation within the Vulture MsAP framework. Parties responsible for implementation as well as key stakeholders for each action were also identified. The combined outcome of these processes is reflected in Section 7 - Framework for Action.

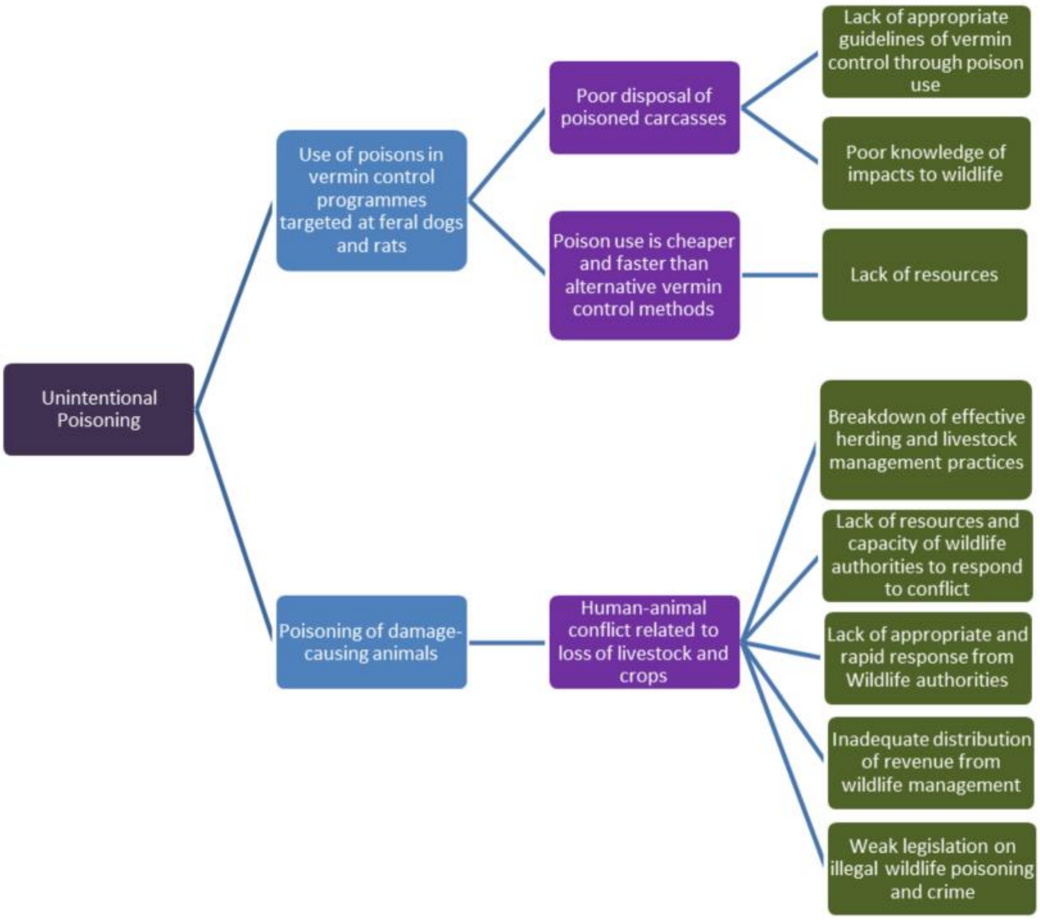

Figure 1. An example of a problem tree for Unintentional Poisoning produced from results of threat analysis at the African Regional Workshop.

Overarching Workshop

An Overarching Workshop was held on 16 - 19 February 2017 at Toledo, Spain which was attended by 40 participants. The key objectives were to undertake the following tasks to assist in the preparation of a consultative 2nd draft of the Vulture MsAP:

- Review the first consolidated draft of the Vulture MsAP, incorporating the four regional components from Africa, Asia, Europe and the Middle East, and other inputs;
- Elaborate certain key strategic components of the Vulture MsAP which were not collectively considered at the four Regional Workshops; and
- Engender and develop multi-lateral support, including identifying 'Vulture Champions'.

External review

In January 2017, a first draft of the Vulture MsAP had been circulated for initial review to 50 specialists involved in the Vulture MsAP Steering Group, the Technical Advisory Group to the Raptors MOU and pre-registered participants for the Overarching Workshop. A revised version, which incorporated the comments received from the initial review process coupled with the key outcomes of the Middle East Regional Workshop, was posted online as a meeting document for consideration at the Overarching Workshop. Additional information and suggested amendments gathered at the Overarching Workshop were incorporated to produce a 2nd Draft of the Vulture MsAP.

As part of a month-long Public Consultation Exercise, which commenced on 16 March 2017, the Coordinating Unit of the CMS Raptors MOU posted the 2nd Draft on the Raptors MOU website (found at http://www.cms.int/raptors/en/news/public-consultation-exercise-2nd-draft-multi-species-action-plan-conserve-african-eurasian) and circulated the link to more than 1000 email addresses, including contacts within the Range States covered by the Vulture MsAP.

Written feedback was received from 58 respondents, raising more than 250 separate issues. All these comments and suggestions were carefully reviewed and, where appropriate, incorporated in the Vulture MsAP.

The final draft Vulture MsAP was submitted to the CMS Secretariat in May 2017, for consideration at the 2nd Meeting of the Sessional Committee of the CMS Scientific Council (July 2017), and by the 12th Meeting of the Conference of the Parties to CMS (October 2017).

2 Scope

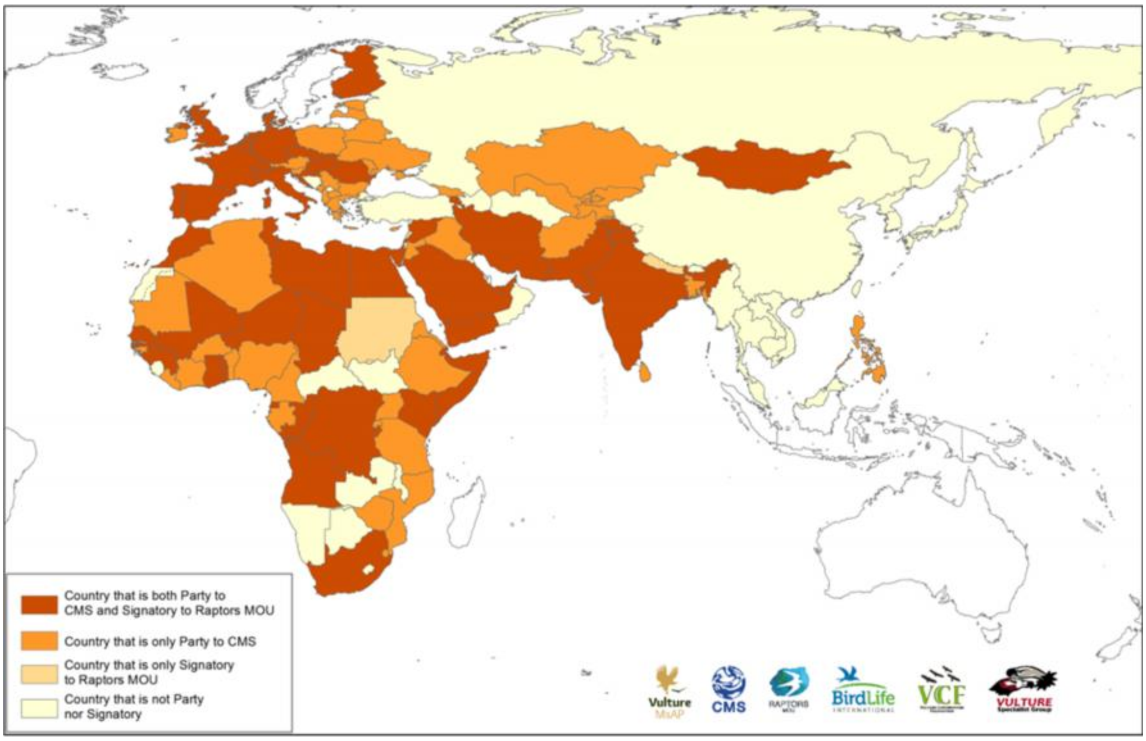

Figure 2. Map showing Vulture MsAP Range States of Africa and Eurasia (shaded), together with Parties to CMS and Signatories to the Raptors MOU .

2.1 Geographic scope

The Vulture MsAP covers most of the combined land masses of Africa and Eurasia, an area supporting a readily defined community of vulture species, several with ranges spanning more than one continent. A total of 128 Range States (Figure 2) host populations of one or more species of African-Eurasian vultures and are therefore included within the geographic range of the Vulture MsAP. This includes a small number of Range States where vultures have been recorded only rarely or in very small numbers of non-breeding individuals, so no specific conservation actions are proposed in these countries .

2.2 Taxonomic scope

The Vulture MsAP covers 15 of the 16 species classified as Old World vultures (Table 2). Taxonomy and nomenclature (del Hoyo *et al.* 2014) are as used by CMS and also the IUCN Red List, which for birds is maintained by BirdLife International. All species are listed in Annex I of the Raptors MOU.

The remaining Old World vulture species, Palm-nut Vulture *Gypohierax angolensis*, is excluded from the Vulture MsAP because it is not considered a migratory species; nor is it an obligate scavenger (it is primarily frugivorous), which is at the root of the threats facing the other species (especially poisoning). Consequently it is treated as Least Concern in the Red List.

The seven vulture species of the Americas are not closely related to those of Africa and Eurasia and face different (and in most cases much lesser) threats; they are not considered further in this Vulture MsAP.

Table 2. Species covered by the Vulture MsAP. Nomenclature and sequence follow del Hoyo *et al.* (2014).

Species	Range	Global Threat Level (Red List category)[1]
Bearded Vulture *Gypaetus barbatus*	Europe, Asia, Africa	NT
Egyptian Vulture *Neophron percnopterus*	Europe, Asia, Africa	EN
Red-headed Vulture *Sarcogyps calvus*	Asia	CR
White-headed Vulture *Trigonoceps occipitalis*	Africa	CR
Hooded Vulture *Necrosyrtes monachus*	Africa	CR
Himalayan Griffon *Gyps himalayensis*	Asia	NT
White-rumped Vulture *Gyps bengalensis*	Asia	CR
White-backed Vulture *Gyps africanus*	Africa, (Europe) [2]	CR
Indian Vulture *Gyps indicus*	Asia	CR
Slender-billed Vulture *Gyps tenuirostris*	Asia	CR
Cape Vulture *Gyps coprotheres*	Africa	EN
Rüppell's Vulture *Gyps rueppelli*	Africa, (Europe) [2]	CR
Griffon Vulture *Gyps fulvus*	Europe, Asia, Africa	LC
Cinereous Vulture *Aegypius monachus*	Europe, Asia, (Africa) [2]	NT
Lappet-faced Vulture *Torgos tracheliotos*	Africa, Asia	EN

Notes:

[1] CR = Critically Endangered; EN = Endangered; NT = Near Threatened; LC = Least Concern.

[2] Cinereous Vulture occurs irregularly and in very small numbers in Africa; Rüppell's and White-backed Vultures similarly in Europe (although perhaps more regularly).

3 Biological assessment

3.1 Introduction

The 15 vulture species considered in this Vulture MsAP are large-bodied (2–10 kg) birds adapted for energy efficient soaring flight exploiting updraughts and thermals. They feed on organic tissues from carcasses of large mammals and other carrion located from the air, by seeing either the carcass itself or the responses of other vultures to it. They eat meat, offal, intestines and bones, typically of domestic cattle or wild ungulates, and can take sufficient food into the crop at one meal to last several days. Nests are typically on cliffs or in trees; some species are colonial breeders.

Eight species are placed in a single genus, *Gyps*, while each of the other seven species is in its own genus. *Gyps* vultures are typically widespread and abundant, historically accounting for the majority of individual vultures in both Africa and Asia. Five of the remaining seven species are fairly similar to *Gyps* in their size, structure and ecology (although Hooded Vulture is notably smaller), and together these 13 species form their own taxonomic group. The remaining two, Egyptian and Bearded Vulture, are relatively distinct from the others (and each other) in appearance and are not their closest relatives, but as raptors dependent on scavenging they are treated as vultures.

Legend for Distribution Maps

Resident: resident throughout the year, and breeding

Breeding visitor: occurs regularly only during the breeding season, and known to breed

Non-breeding visitor: occurs regularly during the non-breeding season. In the Eurasian context, this encompasses 'winter'. For vultures, this covers all non-breeding movements outside the breeding range

Probably extinct: formerly occurred in the area, but it is most likely that the species no longer occurs

Extinct: formerly occurred, but it is almost certain that the species no longer occurs and there have been no records in the last 30 years

Arrows indicate approximate migration routes where there may have been few actual observations, but data clearly indicate occurrence regularly, even if during a relatively short period of the year, on migration between breeding and non-breeding ranges. Solid arrows indicate a route confirmed by multiple tracking datasets; dashed arrows show a route inferred from point locality information.

3.2 Bearded Vulture *Gypaetus barbatus*

Red List Category: Near Threatened (2014); previously Least Concern.

Population size: 2,000–10,000 (1,300–6,700 mature individuals)

Population trend: Decreasing

Range: Africa, Europe, Asia

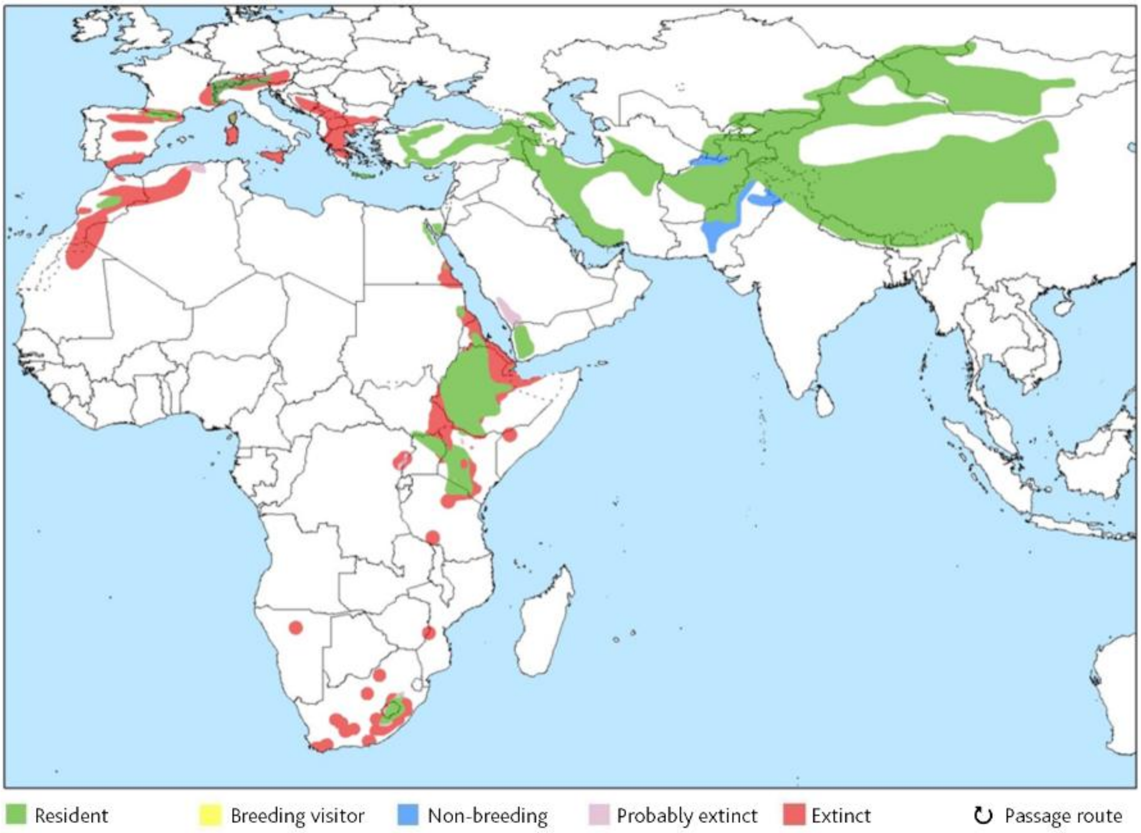

Figure 3. Distribution map of the Bearded Vulture *Gypaetus barbatus*.

Distribution: In Europe, the distribution is patchy, following a widespread decline over the last two centuries principally because of direct or indirect human causes; it has disappeared from almost all mountains ranges across Europe. The population in the Balkans was the last to become extinct, as late as in the beginning of this century (Andevski 2013), and the species remained only in the Pyrenees, Corsica and Crete. Since the mid-1980s the species has been reintroduced to several European mountain ranges, initially in the Alps, and more recently in Andalusia, Grands Causses and Picos de Europa. In Asia, the main and substantial populations occur along the full length of the Himalayas, extending from central China westwards through all the montane states of northern India, and Nepal, Pakistan, Afghanistan into central Asia as well as Mongolia. Middle Eastern populations extend from south-west Iran into much of Turkey, with more isolated populations in Yemen and south-west Saudi Arabia. Bearded Vultures occur in Ethiopia, Kenya and Tanzania in East Africa, Lesotho and South Africa in southern Africa, and Morocco. They could conceivably survive in Algeria and Mauritania.

Population size and trend: The current European population estimate is 590–749 pairs, which equates to 1,200–1,600 mature individuals. Population trends in Europe vary regionally and locally. Even though the population in western Europe (207) is increasing, the last two island populations, Crete and Corsica, are stable and near extinction respectively. There is a lack of information for the species in Turkey and the Caucasus. The species has been successfully reintroduced in the Alps (Austria, France, Italy and Switzerland) and Andalusia, Spain (Zink and Waldvogel 2015). Asian populations are regarded as being rela-

tively large and stable but with signs of significant, more localised declines. There are reports of declines in observations over recent decades, notably from Turkey, upper Mustang (Nepal), Uttarakhand (India) and Yemen, but birds are apparently surviving in these areas. The higher Himalayan populations together with those in south-east Kazakhstan and Armenia are all regarded as more stable. In Africa, the largest known populations are found in Ethiopia, where there is an estimated few hundred pairs (Angelov 2013), but this population has not been fully assessed. There is also a small population of less than 10 pairs in Kenya and northern Tanzania (BirdLife International 2016a). The geographically isolated population in Lesotho and South Africa is currently estimated at 200–250 individuals and has declined by more than 80% over the last three generations (Krüger 2015). In North Africa, there are an estimated 1–2 breeding pairs in Morocco but no current information from elsewhere.

Movements: It is resident but has vast home ranges; juveniles will wander even more widely than adults (Ferguson-Lees and Christie 2001). The home range of adult birds depends on their territorial status. Territorial individuals exploit home ranges of about 50 km^2, while non-territorial birds use areas of around 10,000 km^2 (Margalida *et al.* 2016). Although younger birds can exploit large areas moving across much of Europe before becoming territorial, the species shows philopatric behaviour, which has a negative effect in the expansion of occupied territories (Donázar 1993). Irregular movements for this species have also been recorded in Europe with recent records for this species from Denmark, the Netherlands and the United Kingdom. In southern Africa, tracking studies indicate that adult, breeding birds are largely sedentary and forage within close proximity of active nests; juvenile and immature birds can cover most of the species' range in the region while foraging, regularly crossing the border between Lesotho and South Africa (Krüger 2015).

Habitat: The species occupies remote mountainous areas, with precipitous terrain, usually above 1,000 m; and in Europe and Asia in particular areas where large predators such as wolves, snow leopard and golden eagles are present, and there are herds of mammals such as mountain goats, ibex, and sheep (Ferguson-Lees and Christie 2001). In Africa, it is also restricted to higher altitudes such as the Ethiopian highlands and the Ukuhlamba-Drakensberg, but in southern Africa it is almost entirely dependent on livestock carcasses due to the almost complete absence of wild ungulates over much of its range. Usually they are limited to alpine habitat, with vegetation being the distribution limiting factor (Hiraldo *et al.* 1979).

Ecology: As a scavenger, Bearded Vultures consume prey remains left by predators or other scavengers; 70% of the biomass of their diet is bones. Of the remainder, 25% consists of soft tissue and 5% skin (Hiraldo *et al.* 1979). Only during the period when they are raising young do they need soft tissue. Bearded Vultures preferentially consume large bones up to 25 cm in length and 3.5 cm in diameter (Llopis 1996). Bones too big to be swallowed whole are dropped on to a rocky surface from 20–70 m height, with the birds collecting the fragments and the marrow (Boudoint 1976). The species is mostly monogamous, but trios (two males and one female) are also often documented (Razin 2015). They construct large nests (averaging 1 m in diameter), composed of branches and wool, situated on remote overhanging cliff ledges or in caves that are re-used over the years. Breeding occurs from December to September in Europe and northern Africa; October-May in Ethiopia; May-January in southern Africa; year round in much of eastern Africa; and December-June in India (Ferguson-Lees and Christie 2001). Eggs are incubated for 54 days on average and nestlings fledge after almost four months in the nest (Margalida 2002). In the case where two eggs are laid, obligatory 'cainism' occurs in which the older sibling kills the younger (Thaler and Pechlaner 1980), a common trait in larger raptors.

Major threats:

Unintentional poisoning (poison baits). Feeding on carcasses poisoned by poison baits targeting mammalian predators is thought to be the most significant cause for declines in this species in Europe (Margalida *et al.* 2008), southern Africa (Krüger *et al.* 2014) and Morocco (Cherkaoui 2015). In Ethiopia, the species is threatened by the use of poisons to control dogs at refuse tips (BirdLife International 2017). In some parts of Spain, Bearded Vultures are believed to be at risk from organophosphate exposure when feeding on the carcasses of livestock that were given anti-parasitic treatment prior to death (Mateo *et al.* 2015).

Collision with energy infrastructure (powerlines). Mortalities of birds colliding with powerlines and other cables are known from Europe and southern Africa (Krüger *et al.* 2014). The planned expansion of the powerline network in the Ethiopian highlands could have a substantial impact on this species (BirdLife International 2017). Other types of cables with which this species is known to collide include ski-lift and cable car infrastructure.

Unintentional poisoning (lead). Lead poisoning is considered a high priority threat in practically every European country where the species occurs and should be taken seriously also at global level. Several studies in Spain and France confirm the negative effects on this species (Margalida 2008, Hernández and Margalida 2009, Berny 2015). A study by Krüger (2014) revealed lead accumulation in the bones of Bearded Vultures in southern Africa, indicating that this substance is either ingested by feeding on carcasses containing lead shot or fragments of lead bullets or by means of preening feathers contaminated with lead while bathing in pools of water. This contamination is likely also possible in other areas within the species' range where hunting activities occur.

Secondary threats:

Direct persecution. Recorded in Nepal where a bird was found shot (T. Subedi pers. comm.).

Decline of food availability. Food shortage has been suggested as a serious issue in the Nepalese Himalayas, although not yet clearly substantiated (T. Subedi pers. comm.).

Human disturbance. A range of human activities in close proximity to nesting sites may have an impact on breeding success and may cause abandonment of previously successful nests. These include recreational activities such as mountaineering, climbing and recreational aviation, such as paragliding. A range of developments and construction could have a similar effect. Pipeline construction through the Altai and Caucasus mountains, and powerline construction is planned from Tajikistan through Afghanistan to Pakistan and India (BirdLife International 2017) that could impact on this species.

Habitat loss and degradation. Rapid increases in grazing pressure and human populations driven by pastoralism in West Asia could reduce the amount of food and available nesting sites for this species (BirdLife International 2017).

Potential threats:

Unintentional poisoning (NSAIDs). Although the species is primarily a bone eater, the most significant potential threat to the species in South Asia may be from diclofenac, through ingestion of contaminated carcasses and resultant kidney failure (reviewed by Das *et al.* 2011). It is not known if diclofenac residues remain within bones of treated animals, but the local collapse in Gyps species could allow this species greater access to feed on soft tissues from which it would have been excluded (BirdLife International 2017).

Collision with energy infrastructure (wind farms). Proliferation of wind farms in various parts of the species' range should be closely monitored to assess and record any impact on the species. Rushworth and Krüger (2014) predicts devastating consequences for the southern African Bearded Vulture population should the several thousand turbines currently planned for development by the Lesotho government, materialise.

Genetic bottlenecks. Small, isolated populations of this species could in the long term suffer a reduction in genetic diversity which could influence breeding success and the long term survival of such populations unless they are carefully managed. This also applies to re-introduced populations in areas where genetic exchange with existing wild populations is unlikely.

Climate change. It is predicted that species breeding at higher altitudes, such as Bearded Vulture in southern Africa, may experience range contractions due to increased temperatures (Simmons and Jenkins 2007).

3.3 Egyptian Vulture *Neophron percnopterus*

Red List Category: Endangered (since 2007, last update 2016)

Population size: 218,000–57,000 (12,000–38,000 mature individuals)

Population trend: Decreasing

Range: Africa, Europe, Asia

Distribution: Egyptian Vulture is a Palearctic, Afrotropical and western Indo-Himalayan species: a breeding (summer) migrant across the northern part of the range, but with resident populations and non-breeding visitors further south. The northern breeding range includes southern Europe and North Africa eastwards through the Balkans, Turkey, Iran, Kazakhstan, Turkmenistan, Uzbekistan, Tajikistan, Kyrgyzstan, Georgia, Azerbaijan and Armenia. There are sedentary populations in Spain: on the Balearic Islands (on Menorca mainly) and (endemic subspecies *majorensis*) the Canary Islands, consisting of fewer than 40 pairs in each case (Kretzmann *et al.* 2003); recently, a wintering population of 120 individuals has been recorded in Extremadura (Sánchez *et al.* 2015). A very small resident population is also present on the islands of Cabo Verde .

The smaller Asian subspecies (*ginginianus*) is largely sedentary, remaining within the Indian sub-continent (Pakistan, India, Nepal), although other populations (of

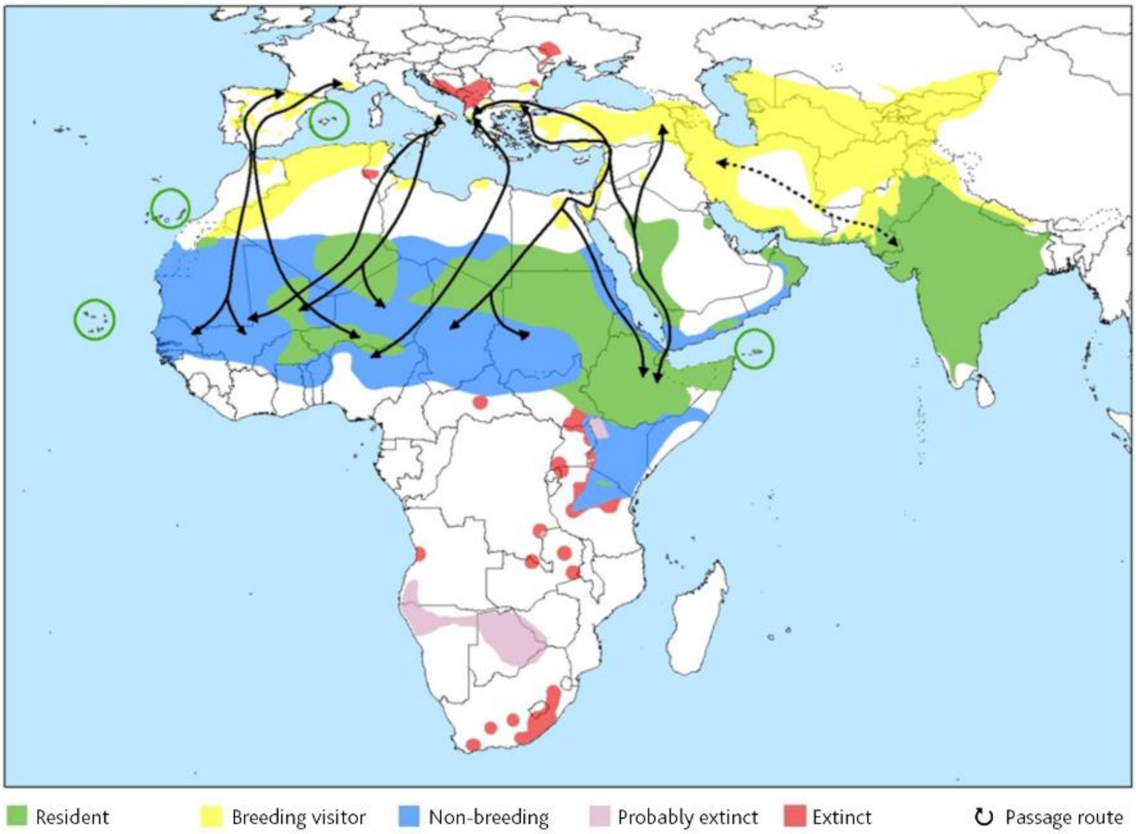

Figure 4. Distribution map of the Egyptian Vulture *Neophron percnopterus*.

the nominate race) are also sedentary in Arabia (Oman, Saudi Arabia, United Arab Emirates and Yemen) as well as much of the Central and East African range. The African range is huge, concentrated along a broad band of the Sahel from Sudan (Nikolaus 1987) and Ethiopia (holding the largest African breeding population: Mundy *et al.* 1992), Somalia, Eritrea and Djibouti west to Senegal (Rondeau and Thiollay 2004, Petersen *et al.* 2007, Wacher *et al.* 2013) and south to Kenya and northern Tanzania. It also occurs in North Africa (Morocco, Tunisia, Algeria, Libya and Egypt: Levy 1996). A few resident pairs may occur in Angola, but it is currently considered regionally extinct as a breeding species in South Africa (Taylor *et al.* 2015) and Namibia (Simmons *et al.* 2015).

Population size and trend: In Europe the largest populations are in Spain and Turkey (each estimated at 1,000–2,000 pairs). Other countries with significant populations (≥200 pairs) are: Azerbaijan, France, Georgia, Iran, Iraq, Kazakhstan, Oman, Portugal, Russia, Uzbekistan and Yemen. The European breeding population is estimated to number 3,000–4,700 breeding pairs, equating to 6,000–9,400 mature individuals (BirdLife International 2017). Europe forms 25–49% of the global range, so a very preliminary estimate of the global population size is 18,000–57,000 individuals, roughly equivalent to 12,000–38,000 mature individuals, although further validation of this estimate is needed (BirdLife International 2017). The population is generally decreasing all over its range, except for some isolated island populations in the Mediterranean on Menorca and in the south-western part of Asia, notably Socotra (Ferguson-Lees and Christie 2001, Porter and Suleyman 2012) and Masirah (Angelov *et al.* 2013c). In India, it has declined by more than 90% in the last ten years (Cuthbert *et al.* 2006); European populations have declined by 50–79% over the last three generations and there is evidence of high juvenile mortality on migration (Oppel *et al.* 2015). Western, eastern and southern African breeding populations also appear to have declined significantly, as have Arabian populations (Jennings 2010). Africa holds the main wintering grounds of the eastern migratory population, but the African estimate for annual wintering and migrating individuals is less than 2,000. Ethiopia holds probably the largest congregation of wintering Egyptian Vultures in eastern Africa, with over 1,000 individuals annually; however, a decline in these numbers has been reported over the last five years (Arkumarev *et al.* 2014). Buij and Croes (2014) states that the species occurs in Cameroon as a breeding resident and as a Palearctic migrant. In Chad, Djibouti, Niger, Nigeria, and Somalia the current population status is unknown (Meyburg *et al.* 2004, Oppel *et al.* 2015).

Movements: The populations breeding on the Canary Islands, Balearic Islands, Cabo Verde islands, Socotra and Masirah Island, on the Arabian Peninsula, and those on the Indian subcontinent are sedentary. Northern breeders conduct long distance intercontinental migrations, flying over land, and often utilise the narrowest part of the Strait of Gibraltar or the Bosphorus and Dardanelles on

their way to sub-Saharan Africa (García-Ripollés *et al.* 2010, López-López *et al.* 2014, Oppel *et al.* 2015). Other known migration bottlenecks are the Gulf of Iskenderun in Turkey (Oppel *et al.* 2014), Suez in Egypt (Bougain and Oppel 2016), and Bab el Mandeb between Yemen and Djibouti (McGrady *et al.* 2013).

On the Indian subcontinent, the population is elevated, especially in north-western India, by the migrant nominate race in the winter, but the exact regional distribution and status of the two races remains unclear. Egyptian Vultures are rare and irregular visitors to southern Africa, where they used to breed; a few may still do so in northern Namibia.

Migratory adult birds spend about 6–7 months on the breeding grounds (March-September) and the rest of the year along the flyway and in the wintering grounds. After the first migration (August-October), the juvenile Egyptian Vultures remain in the wintering regions for at least 1.5 years (in some cases up to three years) and do not attempt spring migration in the year after their first arrival in Africa (Oppel *et al.* 2015).

Habitat: In most parts of its breeding range, this species inhabits arid woodlands and semi-arid bush country, especially canyons and rocky areas, often near villages and along roads. It usually occurs singly or in pairs, less commonly in small groups, and rarely in large groups of more than 100. It soars low in search of food. It roosts on cliff faces or in dead trees and is rarely found far from nesting cliffs. It is less wary and more tolerant of humans than other vultures. The wintering habitat includes mainly sub-deserts and savanna in the Sahel zone (Oppel *et al.* 2015, Meyburg *et al.* 2004) where birds often roost on pylons (Arkumarev *et al.* 2014).

Ecology: The Egyptian Vulture typically nests on ledges or in caves on cliffs (Sarà and Di Vittorio 2003), crags and rocky outcrops, but occasionally also in large trees, buildings (mainly in India), electricity pylons (Naoroji 2006) and exceptionally on the ground (Gangoso and Palacios 2005). It forages in lowland and montane regions over open, often arid, country, while also scavenging at human settlements, being an opportunistic scavenger with a broad diet including carrion (not only livestock but often domestic chicken), tortoises, organic waste, insects, young vertebrates, eggs and faeces (Margalida *et al.* 2012, Dobrev *et al.* 2015, 2016). Although usually solitary, it will congregate at feeding sites, such as rubbish tips, or vulture restaurants (i.e. supplementary feeding stations), and will form roosts of non-breeding birds (Ceballos and Donázar 1990). Pairs perform energetic display flights. The species exhibits high site fidelity, particularly in males (Elorriaga *et al.* 2009, García-Ripollés *et al.* 2010, López-López *et al.* 2014).

Major threats:

Unintentional poisoning (poison baits). Feeding on carcasses poisoned by poison baits targeting and killing mammalian predators, which also present a source of food containing poison, is thought to be the most significant cause for declines in this species in Europe (Carrete *et al.* 2007, Carrete *et al.* 2009, Cortés-Avizanda *et al.* 2009, 2015, Hernandez and Margalida 2009, Sanz-Aguilar *et al.* 2015b, Oppel *et al.* 2016, Angelov 2009, Saravia *et al.* 2016). Disposal of poisoned feral dog carcasses from problem animal control actions at dumps in Ethiopia also pose a threat (BirdLife International 2017).

Electrocution on or collision with energy infrastructure. Incidents of mortality involving this species have been recorded on the Canary Islands (Donázar *et al.* 2002) and Oman (Al Fazari and McGrady 2016) and is considered a possible risk in regions of Spain (Donázar *et al.* 2007 2010, de Lucas *et al.* 2008) and in Africa, especially at congregation sites where a 30 km section of powerline near Port Sudan is known to have caused the deaths of hundreds of Egyptian Vultures and other birds of prey since its construction in the 1950s (Angelov *et al.* 2013).

Decline of food availability (wild and domestic ungulate populations). Improvement of slaughterhouse sanitation and declines in wild ungulate populations seem to have contributed to the decline of this species in Africa (Mundy *et al.* 1992, Ogada *et al.* 2016). Amended management practices at refuse dumps in Europe and the Middle East (Al Fazari and McGrady 2016) may also result in reduced availability of food.

Unintentional poisoning (NSAIDs). Veterinary drugs, especially NSAIDs have been implicated in the serious declines of this species recorded in South Asia (Cuthbert *et al.* 2006, Galligan *et al.* 2014), with population trends closely corresponding to those of *Gyps* vultures known to reflect diclofenac use in that region.

Secondary threats:

Direct persecution (belief-based use). At least four cases of direct persecution of Egyptian Vultures are known from West Africa (Nikolov 2014, Buij *et al.* 2016) while 15–16 individuals of this species have been shot in Macedonia between 1983–2002 (Grubac *et al.* 2014).

Poisoning (problem animal control). An estimated 60 Egyptian Vultures (>60% of the national population) were poisoned during a single incident in Macedonia in 1993 after the birds fed on a poisoned dog carcass (Velevski *et al.* 2003). The use of poisons to control feral dog populations in Ethiopia also poses a threat to wintering Egyptian Vultures (Abebe 2013).

Human disturbance and **Habitat degradation** are also considered threats to this species.

Note: *More details regarding the species' biology, threats and conservation effort is available in the 'Flyway Action Plan for the Conservation of the Balkan and Central Asian Populations of the Egyptian Vulture Neophron percnopterus (EVFAP)' (Annex 4).*

3.4 Red-headed Vulture *Sarcogyps calvus*

Red List Category: Critically Endangered (LC in 1988, NT in 1994, CR in 2007)

Population size: 3,500–15,000 birds (2,500–9,999 mature individuals)

Population trend: Decreasing or possibly stabilising

Range: Asia

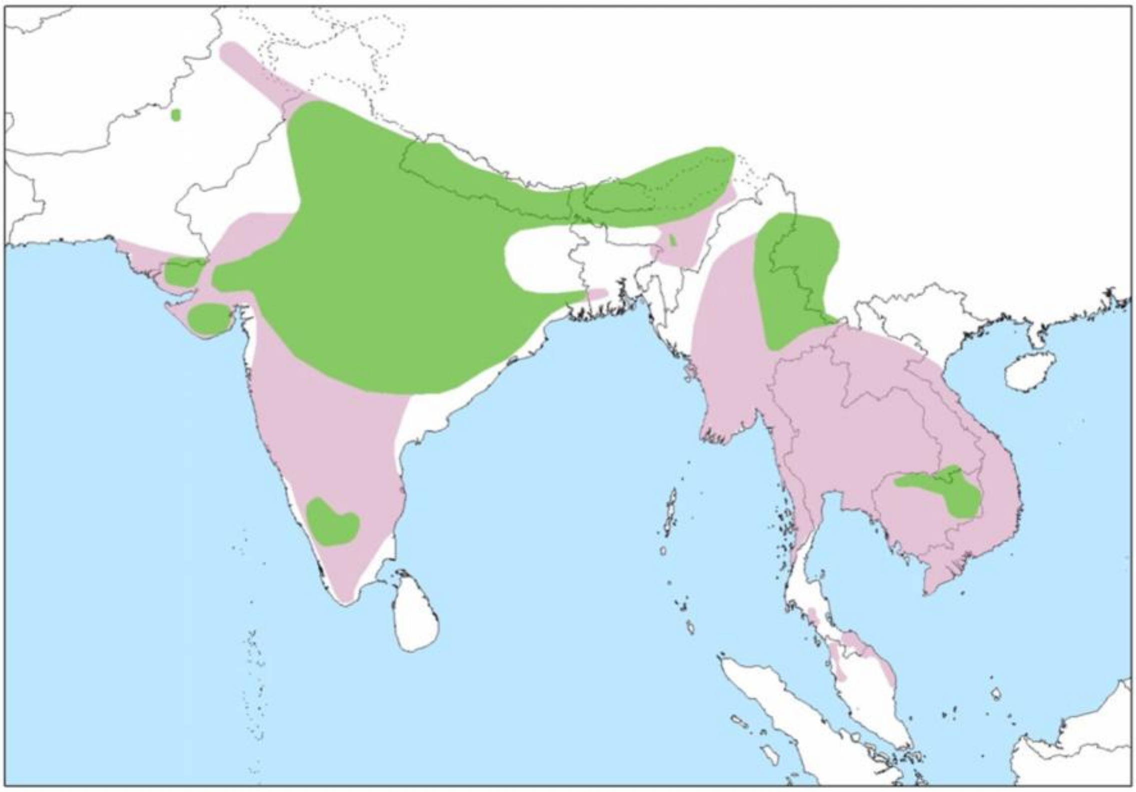

Figure 5. Distribution map of the Red-headed Vulture *Sarcogyps calvus*.

Distribution: Red-headed Vultures occur throughout most of India, and also Nepal, Bhutan, Myanmar and Cambodia (Ferguson-Lees *et al.* 2001, Nadeem et al. 2007, Hla et al. 2011, Inskipp et al. 2013) and Baluchistan and Sindh in Pakistan (Roberts 1991, WWF Pakistan pers. comm.). There are no recent records from Bangladesh, where it may be extinct.

Population size and trend: Cuthbert et al. (2006) calculated a decline in excess of 90% over a 10-year period in India. More recently, Galligan *et al.* (2014) reported a decline of 94% from 1992 to 2003 in India, with the rate of decline slowing and the population stabilising since the mid-2000s. The smaller Cambodia population is undoubtedly also under pressure, but there is no clear trend (Clements *et al.* 2012). A small population persists in Baluchistan, Pakistan, with 59 seen in 2005, as well as isolated pairs in Sindh up to 2016 (WWF Pakistan pers. comm.).

Movements: The species is largely sedentary; however, individuals can forage over considerable areas and there is some seasonal altitudinal movement (Ferguson-Lees and Christie 2001). Bildstein (2006) categorises it as an irruptive and local migrant. As with *Gyps* species, immatures are probably more nomadic (Ferguson-Lees and Christie 2001). Little is known about movements, but new satellite tracking data indicate that at least some birds move across international borders between India and Nepal (Coordinating Unit of the Raptors MOU 2015). Range of movement patterns may also have reduced in tandem with its decline (Naoroji 2006).

Habitat: Red-headed Vultures occur in a wide variety of

habitats, including open countryside, cultivated areas, savanna woodland and foothills usually below 2,500 m (del Hoyo *et al.* 1994, BirdLife International 2017).

Ecology: Red-headed Vultures are primarily carrion feeders, but they are also known to kleptoparasitise other vultures (especially Egyptian Vulture) and raptors (del Hoyo *et al.* 1994). They attend carcasses with other vultures but tend to be more timid. Breeding pairs are territorial and they exclude conspecifics. Nests are usually built in tall trees, often at the top, however smaller shrubs (2–3 m in height) will be used in the absence of taller trees. Because of their territorial behaviour, Red-headed Vultures generally occur at lower densities than other Asian vulture species.

Major threats:

Unintentional poisoning (NSAIDs). The anti-inflammatory drug, diclofenac, used to treat domestic livestock, may be a major cause of mortality, as is the case in *Gyps* vultures (Oaks *et al.* 2004, Shultz *et al.* 2004). However, the toxicity of diclofenac and other veterinary NSAIDs to Red-headed Vultures has not been tested experimentally and there are no relevant post-mortem findings for Red-headed Vultures indicating toxicity or lack of it. Given the similarity of recent population trends of this species to those of *Gyps* bengalensis and G. indicus (Galligan *et al.* 2014) and other species of raptors (Cuthbert *et al.* 2014), it is prudent to treat diclofenac as a major threat to this species pending improved information.

A second NSAID commonly used in South Asia, ketoprofen, has also been identified to be lethal to *Gyps* vulture species (Naidoo *et al.* 2009); measurements of residue levels in ungulate carcasses in India indicate that concentrations are sufficient to cause *Gyps* vulture mortalities (Taggart *et al.* 2007). There are risks of poisoning from other NSAIDs. Although there is no evidence either way concerning the toxicity of NSAIDs to Red-headed Vultures, it is sensible to regard NSAIDs as a major threat to this species.

Decline of food availability (wild and domestic ungulate populations). The primary reason behind this species' decline in South-east Asia (Myanmar and countries to the east) is thought to be the demise of large wild ungulate populations and improvements in animal husbandry resulting in a lack of available carcasses for vultures (BirdLife International 2016a).

Poisoning (problem animal control). Accidental poisoning at carcasses deliberately laced with pesticides to kill feral dogs or wild carnivores (BirdLife International 2017) is a major threat in South-east Asia, China and more recently in north-eastern India (Assam).

Secondary threats:

Habitat loss and degradation. The loss of trees (general forest loss and direct destruction of nesting trees) is a threat mainly in South-east Asia and China.

Electrocution on or collision with energy infrastructure. This risk is likely to be a threat in many parts of the range, although there is currently little documented evidence for this.

Intentional poisoning (belief-based use). Together with related persecution, this has been reported in Cambodia.

3.5 White-headed Vulture *Trigonoceps occipitalis*

Red List Category: Critically Endangered (LC in 2004, VU in 2007, CR in 2015)

Population size: 5,500 birds or 3,685 (2,500–9,999) mature individuals

Population trend: Decreasing

Range: Africa

Distribution: This species has an extremely large range in sub-Saharan Africa from Senegal, Gambia and Guinea-Bissau, east to Eritrea, Ethiopia and Somalia, and south to easternmost South Africa and Swaziland. Widespread declines are resulting in an increasingly fragmented distribution and it may be extinct in Somalia and Djibouti (E. Buechley pers. comm.). Across its range it is now largely confined to protected areas.

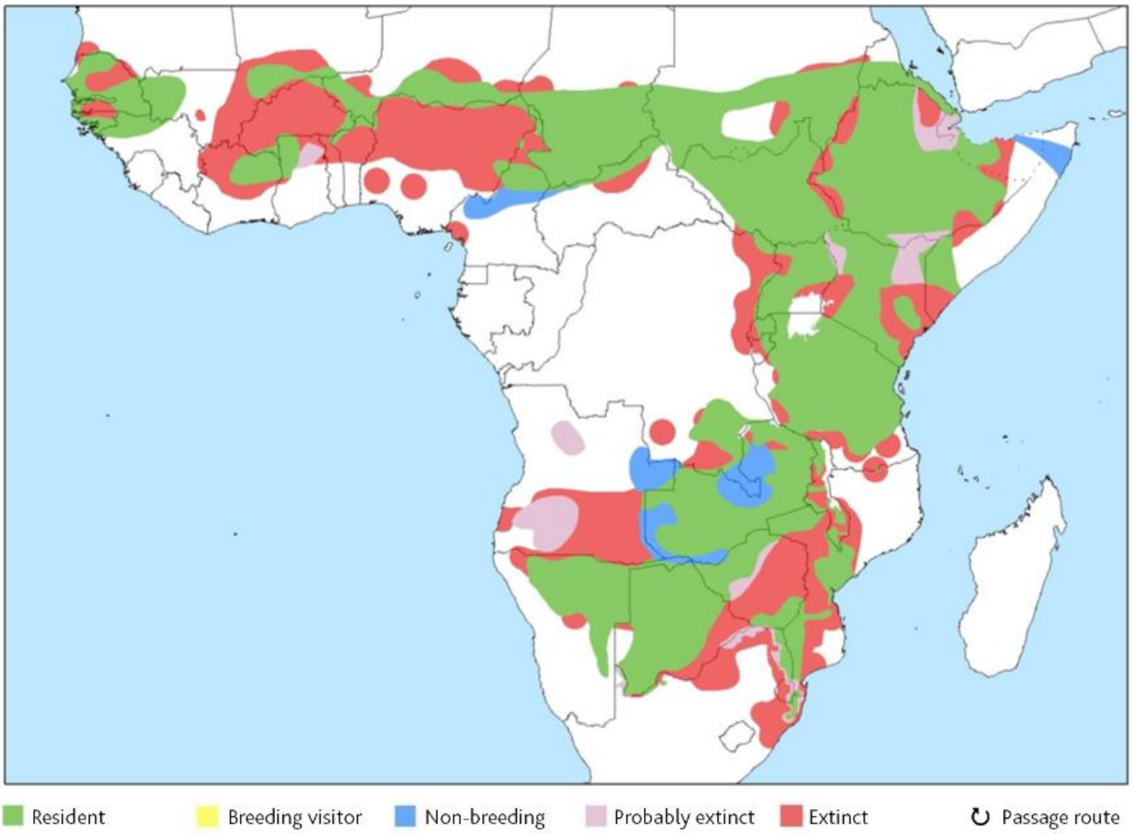

Figure 6. Distribution map of the White-headed Vulture *Trigonoceps occipitalis*.

Population size and trend: The most recent population estimate is approximately 5,500 individuals (Murn *et al.* 2015), consisting of just 3,685 (range 2,500–9,999) mature individuals. The species has undergone a rapid population decline across its range.

Movements: Adults are largely sedentary, perhaps more so than any other African vulture; however, there is evidence of seasonal movements in West Africa and immatures are more nomadic (del Hoyo *et al.* 1994, Ferguson-Lees and Christie 2001). Compared to many vulture species, there is little knowledge of the movements (Murn and Holloway 2014) but recent results from satellite tracked individuals in South Africa (Coordinating Unit of the Raptors MOU 2015) show individuals moving between South Africa and Mozambique, albeit with apparently smaller home ranges than some of the other African vultures.

Habitat: White-headed Vultures prefer mixed, dry woodland at low altitudes, avoiding semi-arid thorn belt areas (Mundy *et al.* 1992). It also occurs up to 4,000 m in Ethiopia, and perhaps 3,000 m in Kenya, and ranges across the thorny Acacia dominated landscape of Botswana (Mundy *et al.* 1992). It generally avoids human habitation (Mundy *et al.* 1992).

Ecology: It is a predator (Murn 2014) but also feeds on carrion and bone fragments from large and small carcasses. It feeds alone or in pairs, rarely more than two pairs congregating at larger carcasses. It often snatches food from other vulture species, consuming it nearby and it is often the first vulture species to arrive at a carcass (Mundy *et al.* 1992). It is known to take some small or weak live prey, but may also scavenge from other raptors (del Hoyo *et al.* 1994). The species is thought to be a long-lived resident that maintains a territory (Murn and Holloway 2014, del Hoyo *et al.* 1994). It nests and roosts in trees, most nests being in Acacia spp. or baobabs (Mundy *et al.* 1992). The species is highly sensitive to land use and is highly concentrated in protected areas (Murn *et al.* 2015).

Major threats:

Unintentional poisoning (poison baits). Especially in East and southern Africa, poisoned baits targeting mammalian carnivores causing livestock losses kill these birds when they feed on the baits themselves or the animals that were killed by them.

Decline of food availability (wild ungulate populations). Known declines are regarded as a threat in in West Africa (Craigie *et al.* 2010) and East Africa (Western *et al.* 2009).

Habitat loss and degradation. Land use changes through agricultural intensification and development threaten this species throughout its range (Mundy *et al.* 1992, BirdLife International 2017).

Intentional poisoning (belief-based use) is a major threat in West, Central and southern Africa (Roxburgh and McDougall 2012, Buij *et al.* 2016).

Secondary threats:
Intentional poisoning (sentinel poisoning). Especially in southern Africa (Roxburgh and McDougall 2012, Ogada *et al.* 2015), carcasses of large mammals such as elephant and buffalo are deliberately laced with poison after being poached, to reduce vulture numbers in areas where poachers are active.

3.6 Hooded Vulture *Necrosyrtes monachus*

Red List Category: Critically Endangered (LC in 2009, EN in 2011, CR in 2015)

Population size: 197,000 individuals

Population trend: Decreasing

Range: Africa

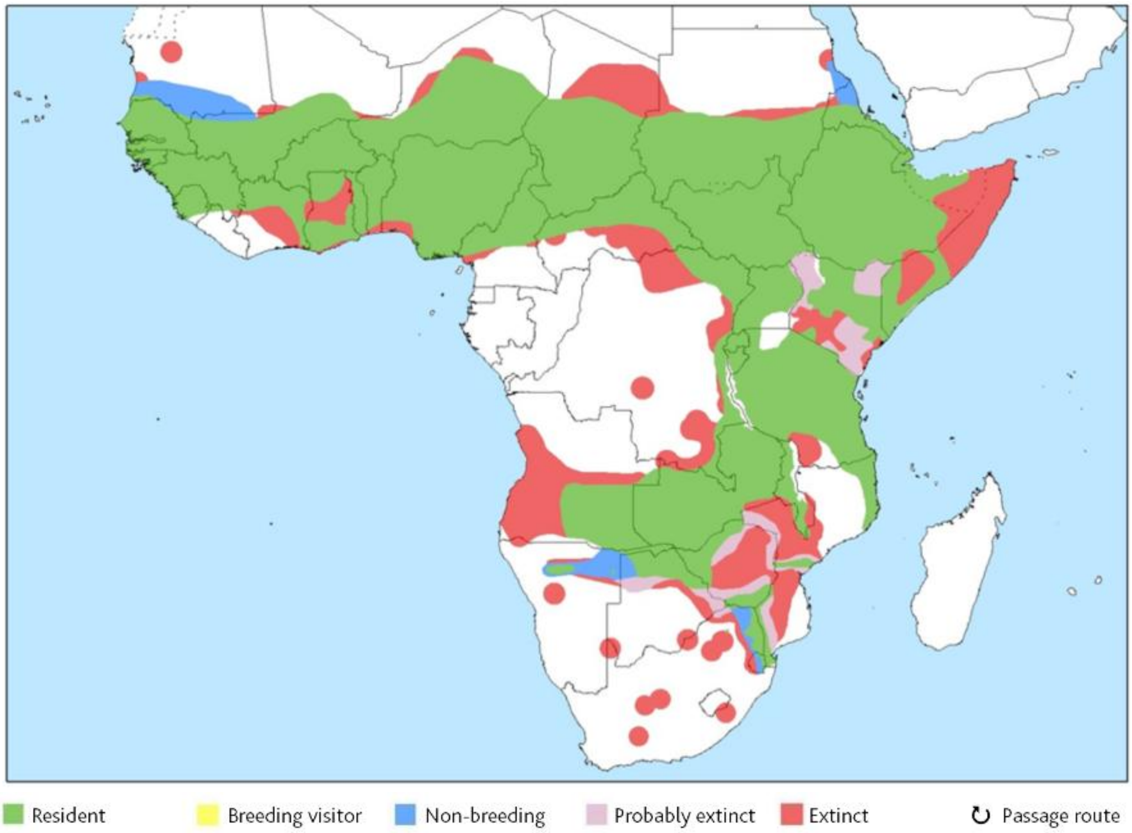

Figure 7: Distribution map of the Hooded Vulture *Necrosyrtes monachus*.

Distribution: A widespread resident throughout, and endemic to, sub-Saharan Africa, including densely forested areas in Central Africa.

Population size and trend: Estimated at 197,000 individuals (Ogada and Buij 2011) but rapidly declining; this decline has been projected at 83% (range 64–93%) over the last three generations (Ogada *et al.* 2016).

Movements: The species is generally considered sedentary, with some dispersal of non-breeders and immature birds, especially in response to rainfall (Ferguson-Lees and Christie 2001). Recent satellite tracking has shown that individuals move several hundreds of kilometres from their capture sites between South Africa, Mozambique and Zimbabwe (Coordinating Unit of the Raptors MOU 2015).

Habitat: In West Africa, it is often associated with human settlements, but is also found in open grassland, forest edge, wooded savannah, semi-desert and along coasts (Ferguson-Lees and Christie 2001). In southern Africa, it tends to avoid human settlements and often breeds in large trees along river courses (Roche 2006). It occurs up to 4,000 m, but is most numerous below 1,800 m.

Ecology: The species feeds on carrion, but in urban areas it congregates at slaughterhouse disposal sites and rubbish dumps. It is gregarious at larger carcasses but because of its smaller size is often dominated by larger species. Generally, north of the equator it is a human commensal, gathering in large numbers in urban areas (Ogada and Buij 2011). South of the equator it is generally more solitary and is largely found in conservation areas where it relies on natural food for most of its diet (Anderson 1999).

In West Africa and Kenya, it breeds throughout the year, but especially from September to July. Breeding in Northeast Africa occurs mainly in October-June, with birds in southern Africa tending to breed in May-December. It is an arboreal nester and lays a clutch of one egg. Its incubation period lasts 46–54 days, followed by a fledging period of 80–130 days. Young are dependent on their parents for a further 3–4 months after fledging (Ferguson-Lees and Christie 2001).

Major threats:

Intentional poisoning (belief-based use). Especially in West Africa (McKean et al. 2013, Saidu and Buij 2013, Buij et al. 2016), birds are killed for this purpose mainly through poisoning but locally by capture at abattoirs (e.g. Uganda: D. Pomeroy pers. comm.) A survey of traders in Nigeria found that more than 90% of vulture parts traded were that of Hooded Vultures (Saidu and Buij 2013) and Buij *et al.* (2016) estimate 5,850–8,772 individuals of this species were traded over a period of six years in West and Central Africa.

Intentional poisoning (food and bushmeat trade). The species is known to be consumed by people in West and Central Africa (Rondeau and Thiollay 2004).

Unintentional poisoning (poison baits). Especially in East Africa (Roxburgh and McDougall 2012), poisoned baits targeting at mammalian carnivores causing livestock losses kills these birds when they feed on the baits themselves or the animals that were killed by them.

Intentional poisoning (sentinel poisoning). Carcasses of large mammals such as elephant and buffalo are laced with poison after being poached, to reduce vulture numbers in areas where poachers are active.

Secondary or potential threats:

Decline of food availability results from improvements to slaughterhouse sanitation and rubbish disposal (Ogada and Buij 2011).

Disease. Avian influenza due to feeding on discarded poultry carcasses (Ducatez *et al.* 2007) is a potential threat, although this requires substantiation.

3.7 Himalayan Griffon *Gyps himalayensis*

Red List Category: Near Threatened (LC in 2004, VU in 2007, CR in 2015)

Population size: 66,000–334,000 individuals

Population trend: Decreasing but partial recovery in part of range

Range: Asia

Distribution: The Himalayan Griffon is present throughout the Himalayan mountain range and adjacent areas in Kazakhstan, Uzbekistan, Kyrgyzstan, Tajikistan, Afghanistan and Pakistan, and further east on to India, Nepal and Bhutan, to central China and Mongolia. Juveniles and subadults undertake a mainly southward migration into the

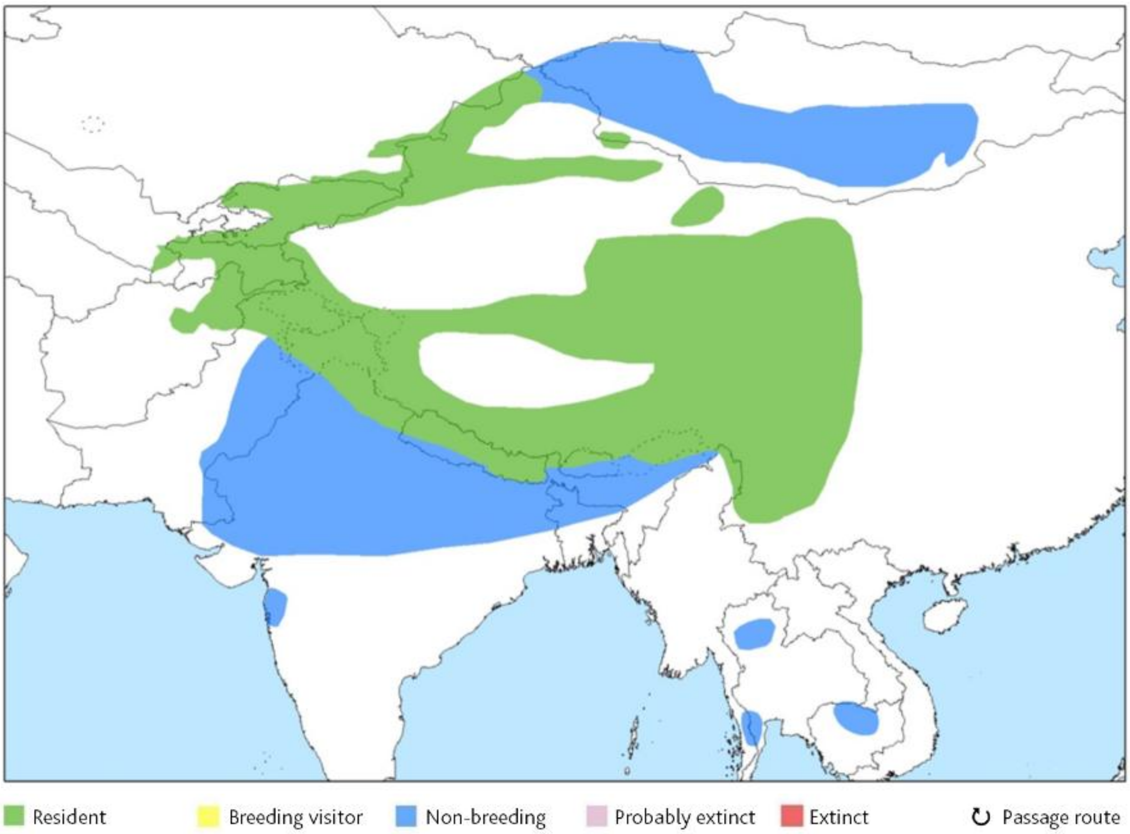

Figure 8. Distribution map of the Himalayan Griffon *Gyps himalayensis*.

Gangetic plain (the northern half of India, and all but the southern third of Bangladesh), also regularly passing as far east as Thailand and Cambodia in small numbers.

Population size and trend: The current population estimate is in the region of 66,000–334,000 mature individuals (Ferguson-Lees and Christie 2001, BirdLife International 2017), although this is not based on survey data. The population trend from counts in part of Nepal indicates a decline during the period when diclofenac was in widespread use, 1994–2006 (Acharya *et al.* 2009), but with a partial recovery up to 2014 (Paudel *et al.* 2015). These surveys only cover a very small part of the range and other studies have shown more stable trends.

Movements: Bildstein (2006) lists this species as a partial and rains migrant with some seasonal altitudinal movements in the winter (also Ferguson-Lees and Christie 2001, Naoroji 2006). Naoroji (2006) describes it as a common resident throughout the Himalayas 'prone to some altitudinal winter migration' where it descends into the lower foothills. Its winter movements and extent of wandering into the plains have not been fully monitored or documented. However, immature individuals routinely wander large distances beyond Sino-Himalaya and Central Asia in the winter, into the plains of South-east Asia (over 30 records between 1979 and 2008 involving many more individual vultures) and some even to southern India (Ding and Kasorndorkbua 2008, Praveen et al. 2014). A satellite tagged individual in India marked outside the species' breeding range was tracked to Kazakhstan (Naoroji 2006, V. Prakash and D. Pain pers. comm.).

Habitat: This species inhabits mountainous areas, mostly at 1,200–4,500 m, but has been recorded up to 6,000 m (Ferguson-Lees and Christie 2001). In winter it moves lower down, with juveniles wandering into open plains and grasslands; it has been observed foraging on rubbish dumps (BirdLife International 2016a).

Ecology: The Himalayan Griffon feeds exclusively on carrion (del Hoyo *et al.* 1994). It soars and glides over large areas often with other vultures in search of carcasses. Small numbers attend carcasses which can be consumed rapidly, and are dominant over other vulture species except Black Vultures. Del Hoyo *et al.* (1994) report that the species is often associated with domestic ungulate flocks in mountainous areas. Himalayan Griffons tend to nest singly or in small, loose colonies of up to six10 pairs, on cliffs. Little is known about its ecology and behaviour when foraging in winter on the plains and grasslands of South and South-east Asia.

Major threats:

Unintentional poisoning (NSAIDs). Diclofenac poisoning has been less well documented in Himalayan Griffon compared to other Asian *Gyps* vultures (Green *et al.* 2004) but the species is known to be susceptible to its negative effects (Das *et al.* 2010). Veterinary use of diclofenac is probably infrequent within the breeding range of

Himalayan Griffon so adults are unlikely to be exposed, but immatures are likely to be exposed to the drug when they migrate to lowland areas of India, Nepal, Bangladesh and Pakistan; indeed, there are documented incidents of this (Das *et al.* 2010). Increasing numbers of young/immature birds of this species are now moving into northern India in the absence of resident Gyps species (Acharya *et al.* 2009). Young birds probably always moved there, but the empty niche means that far more are now likely to be going into these areas with high diclofenac prevalence. Given the high sensitivity of vulture population growth rate to additional mortality of adults (Niel and Lebreton 2005, Green *et al.* 2004), but lower sensitivity to decreased recruitment of young, the effects of diclofenac on population trends of this species are likely to be lower than for lowland *Gyps* species. Other NSAIDs, known to be toxic to *Gyps* vultures, are likely also to affect this species.

Unintentional poisoning (poison baits). Accidental poisoning at carcasses deliberately laced with pesticides to kill feral dogs or wild carnivores has been recorded for this species (R. E. Green pers. comm.).

Secondary threats:

Electrocution on or collision with energy infrastructure is likely to be a threat in many parts of the range, although there is currently little documented evidence.

Intentional poisoning (belief-based use), together with related persecution, has been reported as a threat to vultures in Cambodia.

Decline of food availability is likely to be a threat particularly in China and South-east Asia.

3.8 White-rumped Vulture *Gyps bengalensis*

Alternative name: Oriental White-backed Vulture

Red List Category: Critically Endangered (CR since 2000)

Population size: 8,000 individuals

Population trend: Large decrease but stabilizing since 2007

Range: Asia

Distribution: The White-rumped Vulture occurs in Pakistan, India, Bangladesh, Nepal, Bhutan, Myanmar and Cambodia (del Hoyo *et al.* 1994, Eames 2007a, Eames 2007b, Hla *et al.* 2011). It is probably extinct in Iran, Afghanistan, Thailand, Laos and Vietnam. There are few records from Afghanistan and Iran which are vague, not recent and its status there is currently unknown (Naoroji 2006, BirdLife International 2016a) although likely to be extinct (H. Alireza pers. comm.); vagrants have reached Brunei and Russia.

Population size and trend: This species was not long ago described as possibly the most abundant large bird of prey in the world, numbering several tens of millions of individuals (Houston 1985). An extensive road transect survey in 2015 revised the population estimate for India down to 6,000 individuals (Prakash *et al.* in review). The smaller additional populations in Nepal (substantially fewer than 2,000 individuals: DNPWC 2015), Cambodia (130 individuals in 2014, 92 in 2015: Sum and Loveridge 2016), Myanmar, Bangladesh (260 individuals: MoEF 2016), Bhutan and Pakistan (250–350 individuals estimated in 2015: WWF Pakistan pers. comm.) are unlikely to increase the total overall figure above 8,000. Extremely rapid population declines of about 50% per year were documented in India and Pakistan (Prakash 1999, Gilbert *et al.* 2002), resulting in a decline in India of about 99.9% between 1992 and 2007 (Prakash *et al.* 2007). The species declined in Pakistan, from being abundant in the 1990s to extinction in most of the country, with low hundreds of pairs, mostly confined to Sind province. Nest counts in one breeding area in India and widespread road transect surveys across northern India show that the rapid decline began in about 1994, approximately coincident with the introduction of the veterinary NSAID diclofenac, based upon surveys of veterinary pharmacists (Cuthbert *et al.* 2015). Three road transect surveys in India in 2007, 2011 and 2015, indicate that the population in India has been approximately stable during that period and increasingly associated with areas within and near National Parks (Prakash *et al.* 2012, Prakash *et al.* in review). Road transect surveys in western Nepal from 2002 to 2009 showed a decline of 75%, but with a partial recovery in 2010 and 2011 (Chaudhary *et al.* 2012, Prakash *et al.* 2012).

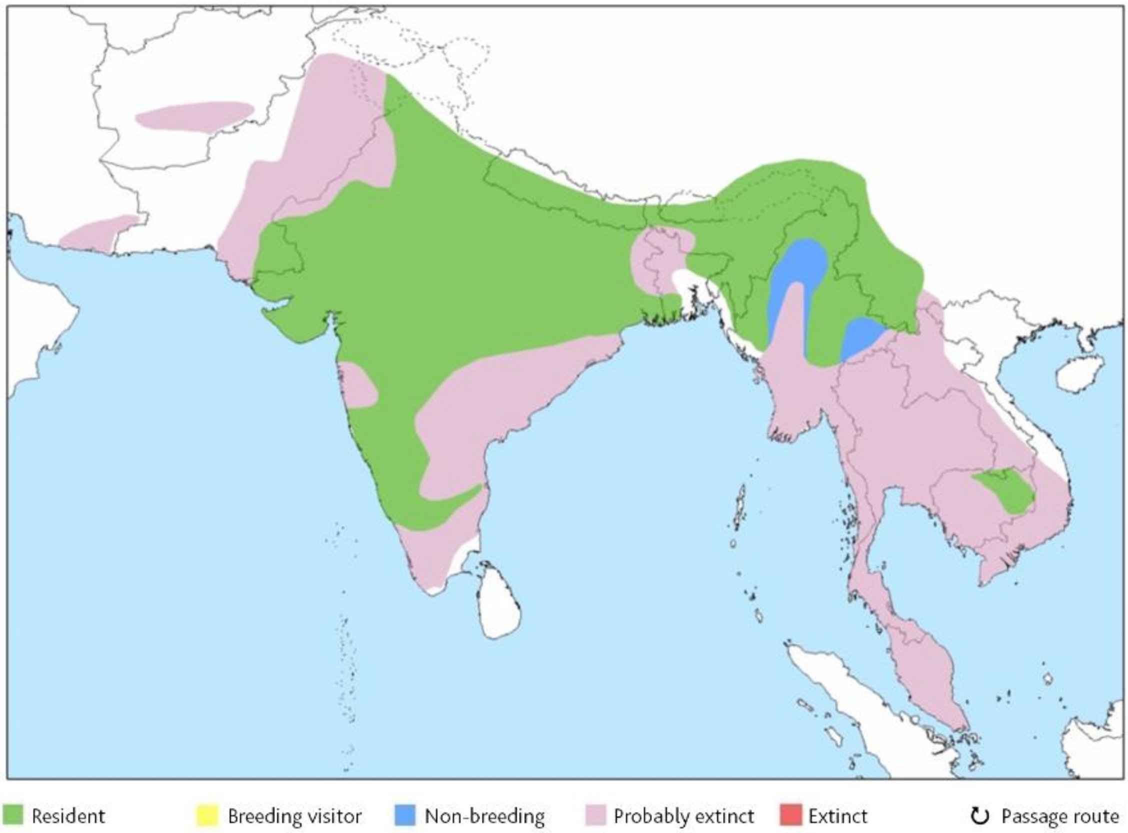

Figure 9. Distribution map of the White-rumped Vulture *Gyps bengalensis*.

Movements: The species is largely sedentary; however, individuals forage over large areas and immatures are thought to be nomadic (Ferguson-Lees and Christie 2001). Bildstein (2006) considers White-rumped Vulture to be a partial migrant. Del Hoyo *et al.* (1994) mention some seasonal altitudinal movements in Nepal. Vagrants have reached Russia and, remarkably including a sea crossing, Brunei. The movements and home ranges (varying from 1,824 km^2 to 68,930 km^2) of individual birds were shown to be reduced slightly when supplementary food was provided (Gilbert *et al.* 2007). Preliminary data from movements of satellite tracked individuals indicate that they can move over 1,000 km and regularly cross international borders between Nepal and India, as well as between Laos, Cambodia and Vietnam (Coordinating Unit of the Raptors MOU 2015).

Habitat: Formerly, when common, the White-rumped Vulture occurred in a wide range of open country habitats, as well as near villages, towns and cities and the recent remaining breeding populations are mainly in more tree-covered habitats, but also include the city centre of Ahmedabad in Gujarat. In the Himalayan foothills, it occurs up to about 1,500 m where it utilises sparsely wooded areas, open areas and human settlements (del Hoyo *et al.* 1994).

Ecology: White-rumped Vultures feed exclusively on carrion and often associate with other vulture species when scavenging at rubbish dumps and slaughterhouses. Food is located by soaring with other vulture species, and considerable aggregations can form. The species adapts well to supplementary food provided at vulture restaurants. It is a highly social species and is usually found in conspecific flocks and regular communal roost sites are used. White-rumped Vultures nest in small colonies in tall trees (5–30m in height), often near human habitation, and adjacent to roads, streams or canals (del Hoyo *et al.* 1994). A study by Murn *et al.* (2015) indicates that the spatial pattern of nests relies on both the distribution of trees and the ability of trees to support more than one nest. These results highlight that the preservation of larger nest trees and the sustainable management of timber resources are essential components for conservation management.

Major threats:

Unintentional poisoning (NSAIDs). The anti-inflammatory drug, diclofenac, used to treat domestic livestock, is the major cause of mortality (Oaks *et al.* 2004, Shultz *et al.* 2004). Mortality from this cause has continued in India well after the statutory ban on veterinary use of diclofenac (Cuthbert *et al.* 2016), though the prevalence and concentration of diclofenac in dead cattle has declined (Cuthbert *et al.* 2011, Cuthbert *et al.* 2014). Aceclofenac is closely chemically related to diclofenac and is in legal veterinary use, despite the fact that it metabolises quickly and almost entirely to diclofenac in the bodies of treated cattle (Galligan *et al.* 2016).

NSAIDs other than diclofenac are also a threat. Ketoprofen, commonly used in India, has also recently been identified to be lethal to the species; measurements of residue levels in ungulate carcasses in India have occurred recently in north-east India (Assam) and is a major threat in SE Asia (Naidoo *et al.* 2009, Taggart *et al.* 2007). The recent co-occurrence of extensive visceral gout in dead wild vultures of this species with high levels of a third NSAID, nimesulide, in the liver and kidneys indicates that this drug is probably also causing vulture deaths (Cuthbert *et al.* 2016).

Decline of food availability (wild and domestic ungulate populations). The demise of large ungulate populations and improvements in animal husbandry result in a lack of available carcasses for vultures (BirdLife International 2017); this is likely to be the primary reason behind long term decline in South-east Asia, where diclofenac is not used.

Unintentional poisoning (poison baits). Animal carcasses are deliberately laced with pesticides to kill feral dogs and wild carnivores (BirdLife International 2017); this is a major threat in South-east Asia and China and has also occurred recently in north-east India (Assam).

Secondary threats:

Habitat loss and degradation. The loss of trees (general forest loss and direct destruction of the nesting tree) is a threat mainly in South-east Asia and China.

Electrocution on or collision with energy infrastructure is likely to be a threat in many parts of the range, although there is currently little documented evidence.

Intentional poisoning (belief-based use), together with related persecution, has been reported in Cambodia.

3.9 White-backed Vulture *Gyps africanus*

Red List Category: Critically Endangered (LC in 2004, NT in 2007, EN in 2012, CR in 2015)

Population size: 270,000 individuals

Population trend: Decreasing

Range: Africa

Distribution: The White-backed Vulture is the most common and widespread vulture species in Africa, occurring extensively throughout West, East and southern Africa. It is normally absent from North Africa, although, having reached the Iberian Peninsula (in tiny numbers), it presumably passes through this region. The extent of declines and range contractions is complex and variable throughout the range. Range contraction is particularly marked in West Africa (Thiollay 2006), and the species may be extirpated in Nigeria, and hanging on in a few strongholds in Ghana and Niger. Declines are also recorded in Kenya, Somalia, South Sudan and Sudan, but status is apparently more stable in Uganda, Tanzania and parts of southern Africa.

Population size and trend: Currently estimated at 270,000 individuals and rapidly declining; this decline has been projected at 90% (range 75–95%) over the last three generations (Ogada *et al.* 2016).

Movements: The species is generally considered sedentary, but individuals will cover huge areas in search of food (BirdLife International 2017, Ferguson-Lees and Christie 2001). Juveniles, in particular, disperse over vast areas. For example, six immature birds tracked from South Africa were found to range across six countries (South Africa, Namibia, Angola, Zambia, Botswana and Zimbabwe) and three were noted to travel more than 900 km from their place of capture (Oschadleus 2002, Phipps *et al.* 2013a) with mean foraging range of 269,103 km^2. Some populations are thought to shift their ranges in response to food availability and seasonal rains (Bildstein 2006, Ferguson-Lees and Christie 2001).

White-backed Vultures tagged in Kenya are known to travel across large portions of Kenya and into Tanzania (Kendall *et al.* 2014). Like Rüppell's Vulture, this species has also been recorded with increasing frequency in the Iberian Peninsula over the last 10 years and these birds are assumed to accompany Griffon Vultures during their northward migration; however, numbers reaching Iberia appear to be significantly smaller than for Rüppell's, more suggestive of vagrancy, and this occurrence is not includ-

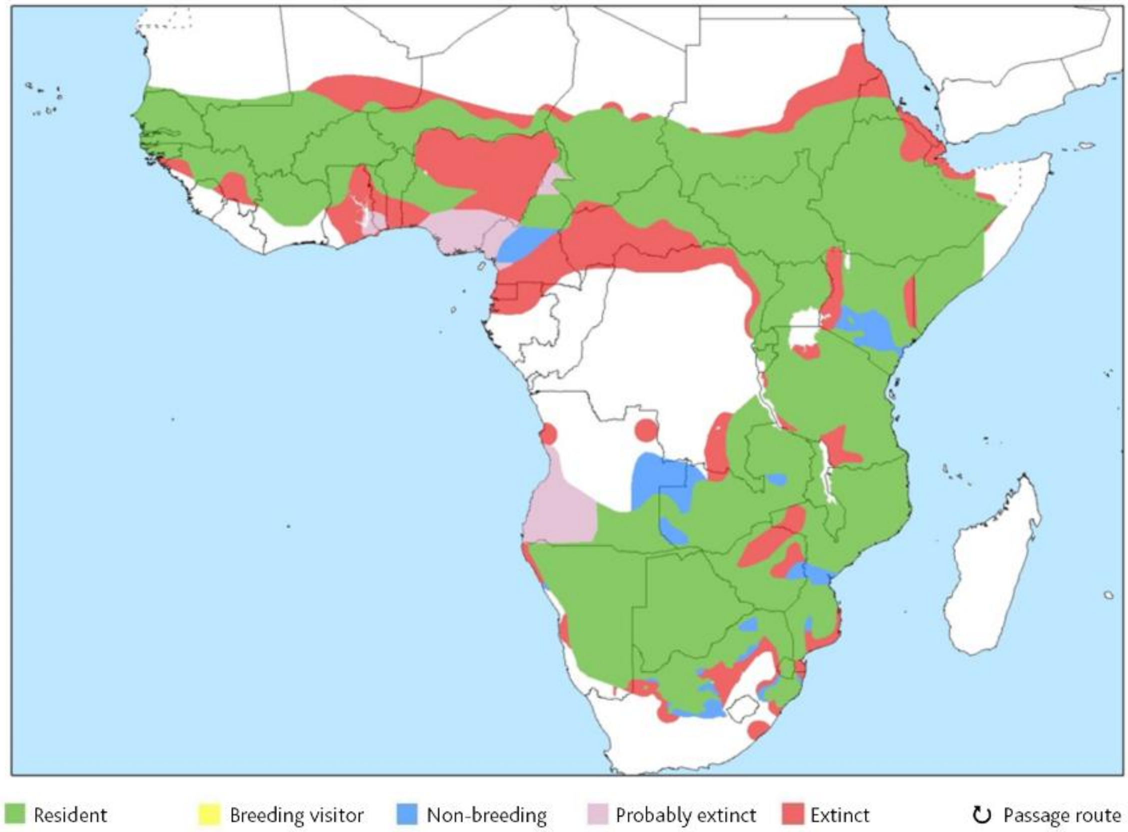

Figure 10. Distribution map of the White-backed Vulture *Gyps africanus*.

ed in the range map.

Habitat: Primarily a lowland species of open wooded savannah, particularly areas of Acacia. They require tall trees for nesting, usually in loose colonies of 2–13 nests (del Hoyo *et al.* 1994). The species has also been recorded nesting on electricity pylons in South Africa (Anderson and Hohne 2007, de Swardt 2013).

Ecology: White-backed Vulture is a highly gregarious species congregating at carcasses, in thermals and at roost sites. The species feeds on carrion and bone fragments of larger carcasses, mainly soft muscle and organ tissue. They soar together with other vultures, which can facilitate efficient foraging. After feeding, they often bathe together with other species at favoured sites (del Hoyo *et al.* 1994). In South Africa, Monadjem *et al.* (2013) showed that adult survival was high for vultures with many regularly visiting supplementary feeding sites.

Major threats:

Unintentional poisoning (poison baits) is a major threat, especially in East and southern Africa (Ogada and Keesing 2010, Otieno *et al.* 2010, Kendall and Virani 2012, Roxburgh and McDougall 2012, Botha *et al* 2015).

Intentional poisoning (sentinel poisoning). Prevalent in southern Africa (Roxburgh and McDougall 2012, Ogada *et al.* 2015, Murn and Botha 2017), this is the deliberate poisoning of the carcasses of large mammals such as elephant and buffalo after being poached to reduce vulture numbers in an area where poachers are active; large numbers of birds have been killed in this manner. All vultures occurring in areas where this is practiced are susceptible to this threat, but the threat to White-backed Vultures is particularly severe because of the large number of birds of this species that congregate at carcasses.

Intentional poisoning (belief-based use) is a threat especially in West and southern Africa (McKean and Botha 2007, McKean *et al.* 2013, BirdLife International 2017).

Habitat loss and degradation results mainly from rangeland conversion to crop farming (Virani *et al.* 2011) and from bush encroachment (Schultz 2007).

Decline of food availability (wild ungulate populations) affects populations especially in West Africa (Craigie *et al.* 2010) but also in East Africa (Western *et al.* 2009)

Secondary threats:

Electrocution on energy infrastructure. Mortality of this species on powerline poles has been documented (Anderson and Kruger 1995, BirdLife International 2016a).

Human disturbance of this species can include nest harvesting (Bamford *et al.* 2009).

3.10 Indian Vulture *Gyps indicus*

Alternative name: Long-billed Vulture

Red List Category: Critically Endangered (CR since 2002)

Population size: 12,000 individuals

Population trend: Large decrease since 1990s, approximately stable 2007–2011; possible recent decrease

Range: South Asia

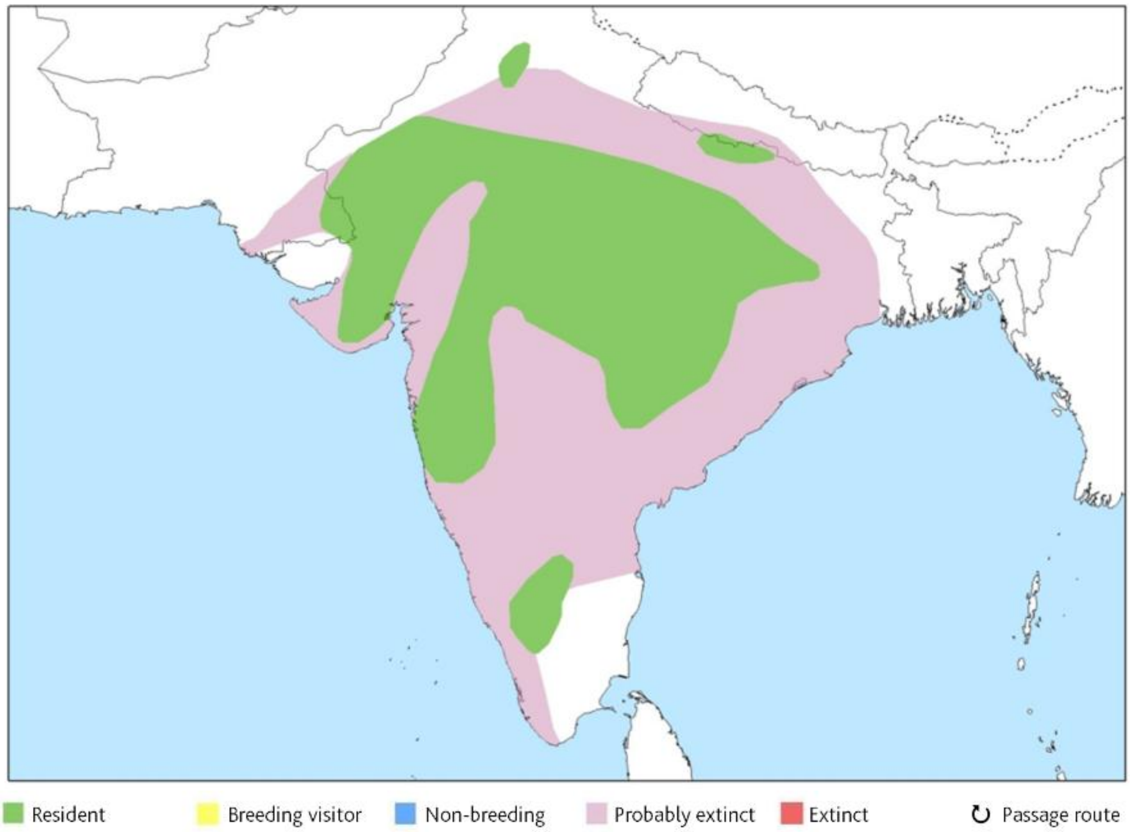

Figure 11: Distribution map of the Indian Vulture *Gyps indicus*.

Distribution: The Indian Vulture was previously widespread throughout all of India except the south-west, with small populations in south-east Pakistan, Nepal and Bangladesh (Naoroji 2006). Following the rapid declines, the population is now fragmented across its former range.

Population size and trend: An extensive road transect survey in 2015 revised the population estimate for India down to 12,000 individuals (Prakash *et al.* in review). Extremely rapid population declines of 15–20% per year occurred in India and Pakistan, resulting in an overall decline of more than 97% in India in a 10–15 year period beginning in the 1990s (Prakash *et al.* 2007). The species declined in Pakistan to a few hundreds of pairs, mostly in Sind province. However, the population there has shown a partial recovery in recent years. Three road transect surveys in India in 2007, 2011 and 2015, indicate that the population in India was approximately stable from 2007 to 2011 and associated with areas within and near National Parks (Prakash *et al.* 2012). However, there is some evidence of a further decline between 2011 and 2015 (Prakash *et al.* in review).

Movements: Largely sedentary, however individuals forage over considerable areas and immatures are perhaps more nomadic (Ferguson-Lees and Christie 2001). It is categorised by Bildstein (2006) as an irruptive and local migrant and Naoroji (2006) shows a distribution map of the species where it is present across much of India, described as an uncommon to rare resident (with local migration). The range of movement patterns showed by this species may also have reduced in tandem with its disappearance (Naoroij 2006). Note, however, there have been no tracking studies of this species to date.

Habitat: Indian Vultures were previously found in many cities, towns and villages across its range, as well as in a wide range of agricultural habitats and wooded areas. It nests primarily on cliffs and suitable ruined buildings; the belief that it will also nest in trees (del Hoyo *et al.* 1994) may be mistaken, referring to the similar Slender-billed Vulture (which certainly nests in trees) before the taxonomy was clarified distinguishing the two species.

Ecology: This species feeds almost entirely on carrion, and often associates with White-rumped Vulture when scavenging at rubbish dumps and slaughterhouses. *Gyps* vultures in India play a key role in the wider landscape as providers of ecosystem services, and were previously heavily relied upon to help dispose of animal (especially cattle) and human remains. Indian Vultures soar in search of carrion, often with other vulture species, and are highly gregarious at carcasses. The species can benefit from supplementary food provided at vulture restaurants. They nest in small to large colonies at cliff-nesting sites and smaller colonies when nesting in trees. When the latter is preferred as a nest platform, large trees (7–15 m in height) are used (del Hoyo *et al.* 1994).

Major threats:

Unintentional poisoning (NSAIDs). The anti-inflammatory drug, diclofenac, used to treat domestic livestock, is the major cause of mortality (Oaks *et al.* 2004, Shultz *et al.* 2004). Mortality from this cause has continued in India well after the statutory ban on veterinary use of diclofenac (Cuthbert *et al.* 2016), though the prevalence and concentration of diclofenac in dead cattle has declined (Cuthbert *et al.* 2011, Cuthbert *et al.* 2014). Aceclofenac is a pro-drug of diclofenac that is in legal veterinary use, despite the fact that it is almost all rapidly metabolised to diclofenac in the bodies of treated cattle (Galligan *et al.* 2016).

NSAIDs other than diclofenac are also a threat. Ketoprofen, commonly used in India, has also recently been identified to be lethal to the species, and measurements of residue levels in ungulate carcasses in India indicates that concentrations are sufficient to cause vulture mortalities (Naidoo *et al.* 2009, Taggart *et al.* 2007). The recent co-occurrence of extensive visceral gout in dead wild vultures of related species with high levels of a third NSAID, nimesulide, in the liver and kidneys indicates that this drug is probably also causing vulture deaths (Cuthbert *et al.* 2016).

Secondary threats:

Unintentional poisoning (poison baits) affects vultures that consume carcasses deliberately laced with pesticides to kill feral dogs or wild carnivores.

Electrocution on or collision with energy infrastructure is likely to be a threat in many parts of the range, although there is currently little documented evidence for this.

Human disturbance. The cliff nesting sites make this species susceptible to disturbance including by rock-climbers, which limits potential breeding habitat in some areas.

3.11 Slender-billed Vulture *Gyps tenuirostris*

Red List Category: Critically Endangered (CR since 2002, species previously not recognised)

Population size: 1,500–3,750 individuals

Population trend: Large decrease since 1990s; may currently be stable

Range: South & SE Asia

Birds now referred to as this species were previously treated as a subspecies of Gyps indicus, a species formerly referred to as 'Long-billed Vulture'. 'Long-billed Vulture' has recently been split into two—the 'true' G. indicus, and G. tenuirostris, following Rasmussen and Parry (2001).

Distribution: The Slender-billed Vulture is found in India north of, and including, the Gangetic plain, west to at least Himachal Pradesh and Haryana, through to southern West Bengal, the plains of Assam, and through southern Nepal, with small numbers in north and central Bangladesh and Myanmar (BirdLife International 2017). A small breeding population was recently discovered in Cambodia and a total of 51 individuals have been recorded feeding at vulture restaurants (BirdLife International 2017). It

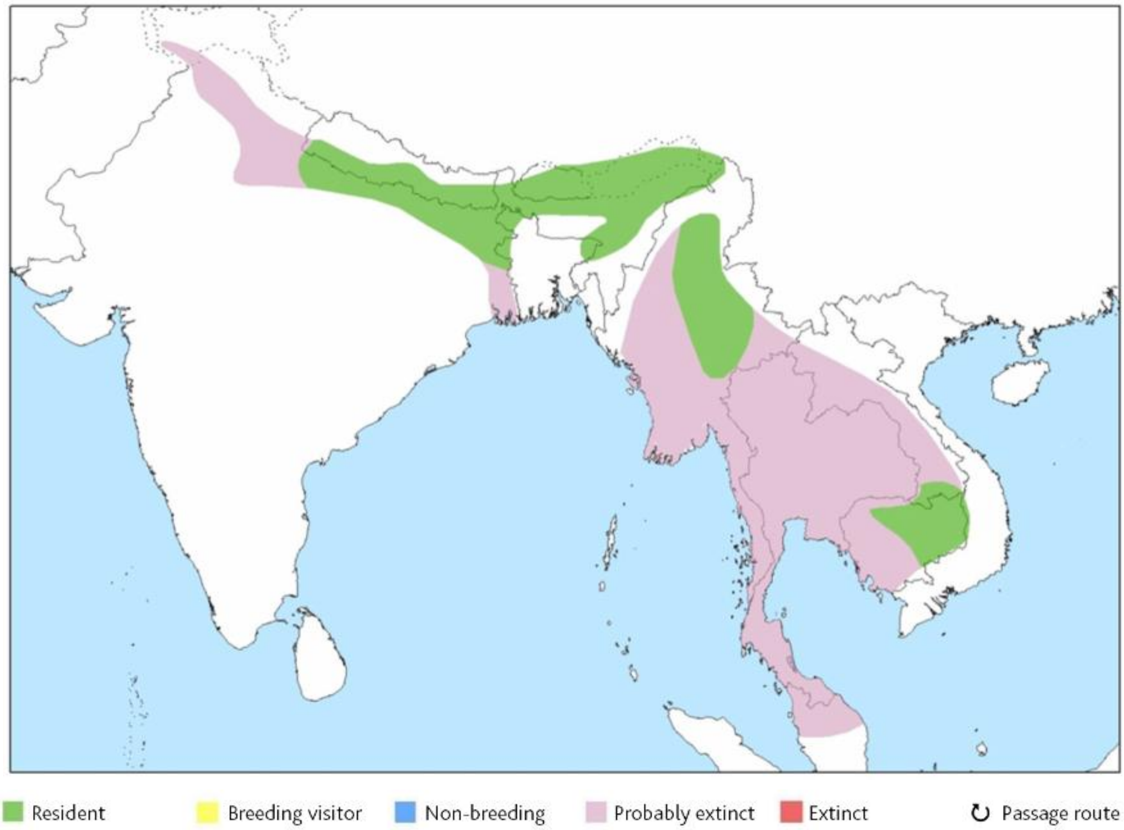

Figure 12. Distribution map of the Slender-billed Vulture *Gyps tenuirostris*.

formerly occurred more widely in South-east Asia, but it is now thought to be extinct in Thailand and Malaysia. Populations, especially in the eastern part of the range, are highly fragmented.

Population size and trend: The population is considered to be approximately 1,000–2,499 mature individuals, equating to 1,500–3,750 individuals (BirdLife International 2016a). An extensive road transect survey in 2015 revised the population estimate for India down to just over 1,000 individuals in India (Prakash et al. in review). There is little information on the Myanmar population, but the Cambodia figure based on coordinated vulture feeding site counts was 63 individuals in 2013, and 47 in 2015 (Sum and Loveridge 2016). Nepal has fewer than 50 (DNPWC 2015) and is unlikely to hold more than 15–20 individuals, and a single breeding pair was recorded in Bangladesh in 2015 (MoEF 2016). An extremely rapid decline of more than 95% in 10–15 years has been documented (Prakash *et al.* 2003), although the rate of decline in India has now slowed and the population there may now be stable (Prakash *et al.* 2012, Prakash *et al* in review). The species was formerly widespread in Nepal, but is now very rare there. The main populations remaining are in Assam (north-east India) and Cambodia.

Movements: The species is largely sedentary, however individuals can forage over large areas and there are some seasonal altitudinal movements (Ferguson-Lees and Christie 2001). It is categorised by Bildstein (2006) as an irruptive and local migrant. As with other *Gyps* vultures, immatures are likely to be more nomadic. Satellite tagged individuals are known to cross international borders between Laos, Cambodia and Vietnam (UNEP/CMS 2015). Naoroji (2006) reports that some southward winter movement exists, and in winter the species has been seen in India well south of the narrow range in the north where it is normally considered resident. The range of movement shown by this species may also have reduced in tandem with its disappearance (Naoroij 2006).

Habitat: Across the range, Slender-billed Vultures are found in dry open country and forested areas, although often rely on human habitation for nesting sites and carrion. In South-east Asia it is primarily a lowland species.

Ecology: The species feeds almost entirely on carrion, scavenging at rubbish dumps, slaughterhouses and carcasses of wild ungulates. They often soar with other vulture species to locate food and are highly gregarious at food sources. The species adapts well to supplementary food provided at vulture restaurants. Slender-billed Vultures are solitary nesters, primarily in trees. Nesting trees tend to be large, usually at a height of 7–25 m. Outside of the breeding season they use regular communal roost sites.

Major threats:

Unintentional poisoning (NSAIDs). The anti-inflammatory drug, diclofenac, used to treat domestic

livestock, is the major cause of mortality (Oaks *et al.* 2004, Shultz *et al.* 2004). The prevalence and concentration of diclofenac in dead cattle has declined since the ban on veterinary use of diclofenac but the drug is still widely used (Cuthbert *et al.* 2011, Cuthbert *et al.* 2014). Aceclofenac is a pro-drug of diclofenac that is in legal veterinary use, despite the fact that it is almost all rapidly metabolised to diclofenac in the bodies of treated cattle (Galligan *et al.* 2016).

NSAIDs other than diclofenac are also a threat. Ketoprofen, commonly used in India, has also recently been identified to be lethal to other *Gyps* species (Naidoo *et al.* 2009), and measurements of residue levels in ungulate carcasses in India indicates that concentrations are sufficient to cause vulture mortalities (Taggart *et al.* 2007). The recent co-occurrence of extensive visceral gout in dead wild vultures of related species with high levels of a third NSAID, nimesulide, in the liver and kidneys indicates that this drug is probably also causing vulture deaths (Cuthbert *et al.* 2016).

Decline of food availability (wild and domestic ungulate populations). The primary reason behind its decline in South-east Asia (Myanmar and countries to the east, where diclofenac is not used) is thought to be the demise of large ungulate populations and improvements in animal husbandry resulting in a lack of available carcasses for vultures (BirdLife International 2016a).

Unintentional poisoning (poison baits) at carcasses laced with pesticides to kill feral dogs (BirdLife International 2017) is a major threat in South-east Asia but also occurs in Assam (north-east India).

Secondary threats:

Habitat loss and degradation. The loss of trees (general forest loss and direct destruction of the nesting tree), used as nest sites, is a threat mainly in South-east Asia and China.

Electrocution on or collision with energy infrastructure is likely to be a threat in many parts of the range, although there is currently little documented evidence.

Intentional poisoning (belief-based use). Together with related persecution, this has been reported to affect this species in Cambodia.

3.12 Cape Vulture *Gyps coprotheres*

Alternative name: Cape Griffon

Red List Category: Endangered (VU in 1994, EN in 2015)

Population size: 4,700 pairs (9,400 mature individuals)

Population trend: Stable or increasing

Range: Africa

Distribution: The Cape Vulture occurs mainly in South Africa with small populations in Lesotho, Botswana and Mozambique. It formerly bred in Swaziland, Zimbabwe and Namibia, and a small number of roost sites are still used in these countries.

Population size and trend: In 2006, the total population was estimated at 8,000–10,000 individuals (BirdLife International 2016a), roughly equivalent to 5,300–6,700 mature individuals. The global population estimate was revised in 2013 with an estimate of 4,700 pairs or 9,400 mature individuals (Taylor *et al.* 2015). Piper *et al.* (1999) reported continued declines in the population in the late 1990s. However, there have been recent population increases (Benson 2015).

Movements: The species is considered an irruptive and local migrant by Bildstein (2006). Recent satellite tracking projects have shown that individuals can cover large distances. Phipps *et al.* (2013b) reported average home ranges of 121,655 km^2 for five adults and 492,300 km^2 for four immature birds satellite tagged in South Africa. Bamford *et al.* (2007) showed similar results for juveniles in Namibia, but significantly smaller ranges for adults (21,320km^2). The tagged vultures travelled more than 1,000km from the capture site and long distance cross-border movements were not unusual with a total of five countries (Namibia, Botswana, Zimbabwe, Lesotho and South Africa) entered by different vultures. A Cape Vulture satellite tracked in 2014 was recorded moving more than 1,000km between South Africa, Botswana, Zimbabwe and Mozambique (K. Hoogstad pers. comm. in Coor-

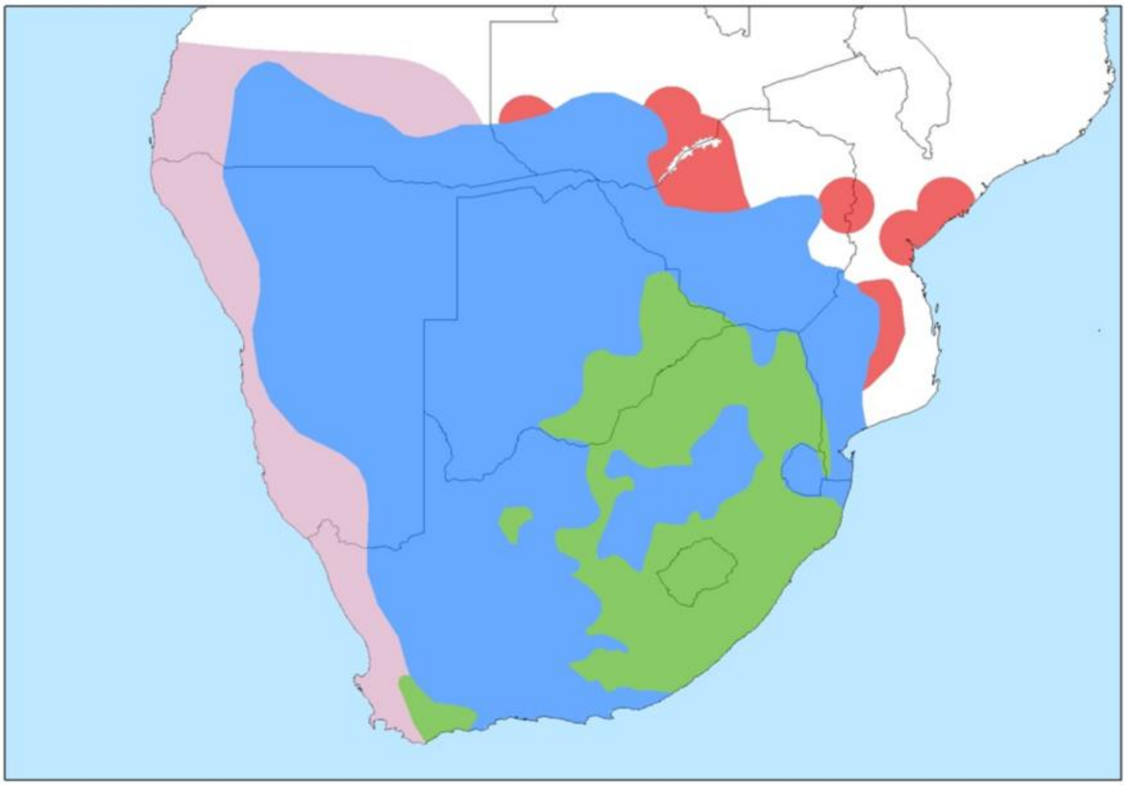

Figure 13. Distribution map of the Cape Vulture *Gyps coprotheres*.

dinating Unit of the Raptors MOU 2015). Small numbers of Cape Vultures have been released in Namibia with satellite tags and have made cross-border movements into Angola (Diekmann and Strachan 2006), while others have reached Zambia (A. Botha pers. comm.).

Habitat: Savanna and open grassland, usually near mountains; the most significant breeding sites are located in the savanna biome while smaller colonies are found in the Ukuhlamba-Drakensberg and along the south-east coastal regions of South Africa. Uses cliffs for nesting and roosting (Mundy *et al.* 1992, Del Hoyo *et al.* 1994). Trees are also used as nesting and roosting sites but the extent of this remains unclear.

Ecology: It is a carrion feeder specialising on larger carcasses, mainly soft muscle and organ tissue. Cape Vultures are highly gregarious, often soaring in groups using conspecifics to help locate food. They are colonial nesters.

Major threats:

Unintentional poisoning (poison baits). The practice of the placement of poisoned baits targeting mammalian carnivores that kill these birds when they feed on the baits themselves or the animals that were killed by them is known to be the most significant threat that affects this species across its range (Boshoff and Anderson 2006). Considered to be the primary reason for the decline of the species and its current extinction as a breeding species in Namibia (Diekmann and Strachan 2006).

Electrocution on or collision with energy infrastructure. In South Africa, a large number of fatalities have been associated with powerline collisions and electrocutions and more than 1000 Cape Vultures have been killed in this manner in South Africa since 1996 (EWT Mortalities Database). With extensive plans for the development of wind energy installations in South Africa and Lesotho currently in process, many of which will take place within the breeding range of the Cape Vulture, there are concerns that this may further increase the impact of energy infrastructure on this species in future (Pfeiffer and Ralston-Paton 2016).

Intentional poisoning (belief-based use). Especially for muthi (so-called traditional medicine in southern Africa), Cape Vultures are among those caught and consumed for purported medicinal and psychological benefits (McKean and Botha 2007). It is estimated that 160 vultures are sold annually and that there are 59,000 vulture-part consumed in eastern South Africa each year, involving an estimated 1,250 hunters, traders and healers. At recent harvest levels, the populations of Cape Vultures in the Eastern Cape, KwaZulu-Natal and Lesotho could become locally extinct within 44–53 years.

Secondary threats:

Human disturbance. A range of human activities in proximity to known breeding colonies may have an impact on breeding success and may cause collapse of previously successful colonies (Borello and Borello 2002).

These include recreational and tourism related activities such as mountaineering, climbing and recreational aviation such as paragliding.

Intentional poisonoing (sentinel poisoning). Almost all sentinel poisoning incidents in southern Africa have occurred outside of the breeding range of this species, so there have been few recorded mortalities from this practice among Cape Vultures to date. However, as the trend in elephant poaching, and the sentinel poisoning associated with it, seems to be expanding and increasing in southern Africa, and South Africa in particular, this is likely to change.

Decline of food availability. Boshoff and Anderson (2006) ranked a lack of carrion, (particularly during chick rearing) as a significant threat to the species, but acknowledge there was no substantial research to back up this hypothesis.

Habitat loss and degradation. Schultz (2007) indicated the foraging ability in certain parts of the species' range may be severely impeded by bush encroachment and thickening which affects the birds' ability to detect food on the ground.

Climate change. Cape Vulture breeding areas at higher elevations may be lost due to increases in temperatures (Simmons 2007).

3.13 Rüppell's Vulture *Gyps rueppelli*

Alternative name: Rüppell's Griffon

Red List Category: Critically Endangered (LC in 1994, NT in 2007, EN in 2012, CR in 2015)

Population size: 22,000 individuals

Population trend: Decreasing

Range: Africa

Distribution: Rüppell's Vultures occur throughout the Sahel region of Africa from Senegal, Gambia and Mali in the west to Sudan, South Sudan and Ethiopia in the East. Their range also extends south of the Sahel belt through the savanna regions of East Africa in Kenya, Tanzania and they are reported to occur in northern Mozambique. For occurrence in the Iberian Peninsula, see movements below.

Population size and trend: Formerly abundant, the species has experienced extremely rapid declines in much of its range, particularly West Africa. Although the population was estimated at 22,000 individuals in the early 1990s (Mundy et al. 1992), based on recent rapid declines projected at 97% (94–99%) over the last three generations (Ogada *et al.* 2016) it is now certainly much lower.

Movements: The species is considered an irruptive and local migrant by Bildstein (2006). Daily foraging movements of up to 150–200 km have been recorded (Ferguson-Lees and Christie 2001) and in West Africa they regularly disperse several hundred kilometres north and south in response to seasonal rains (del Hoyo *et al.* 1994). Recent satellite tracking studies have shown that the species can cover huge areas. Ogada (2014) found that the home range size of a satellite tagged adult was 55,144 km^2, while that of an immature bird was 174,680 km^2. Kendall (pers. comm.) has found the average home range of this species to be 100,000 km^2 with individuals moving between Kenya, Tanzania as far south as Ruaha National Park as well as South Sudan and Ethiopia. In the last 15 years, the species has been recorded far away from its breeding colonies, reaching the Iberian Peninsula and north-eastern regions of South Africa (Kemp and Kemp 1998, Ferguson-Lees and Christie 2001, De Juana 2006). It has been suggested that the movement of Rüppell's Vulture across the Strait of Gibraltar into Europe in the company of migrant Griffon Vultures may be a regular, annual and considerably under-recorded phenomenon (Gutiérrez 2003, De Juana 2006, Ramírez *et al.* 2011), and this is therefore mapped as a regular, non-breeding population.

Habitat: Rüppell's Vultures frequent open areas of Acacia woodland, grassland and montane regions within a broad range of elevations.

Ecology: A highly gregarious species that congregates at carrion, soaring in flocks and locating food by sight, following conspecifics, other vulture species, or other scavenging raptor species such as Bateleur *Terathopius*

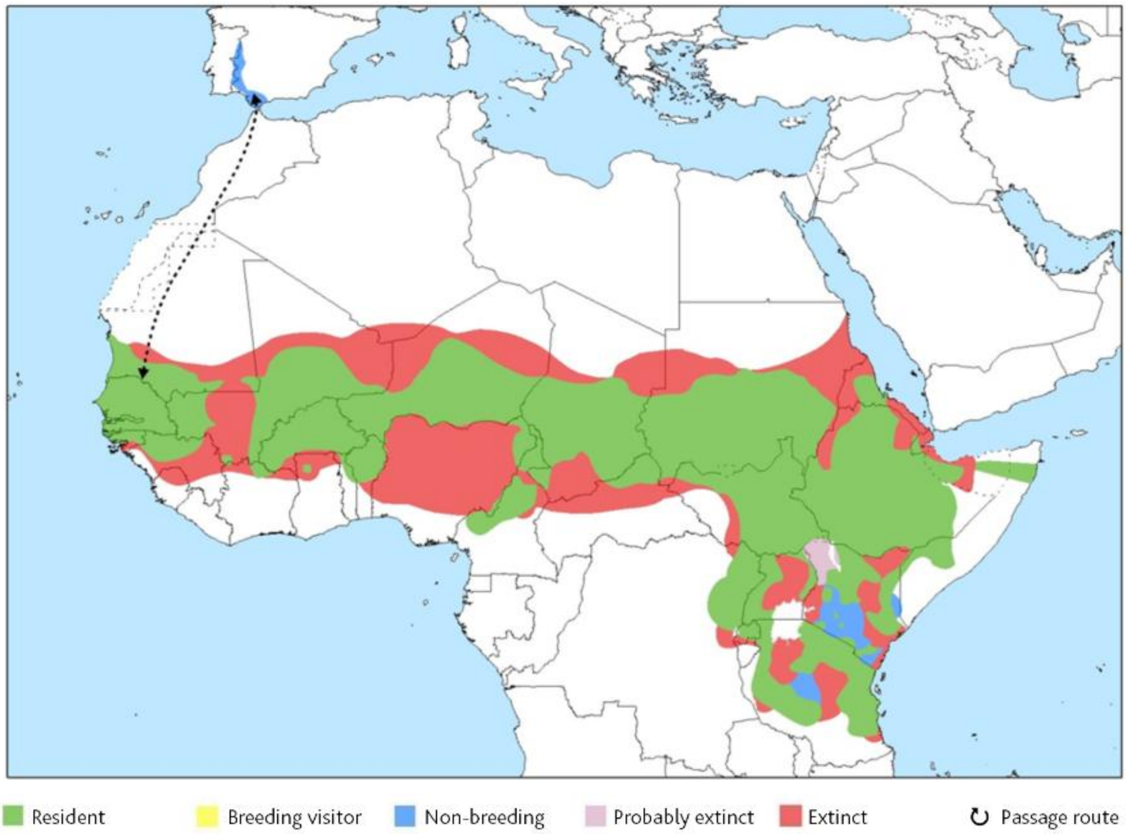

Figure 14. Distribution map of the Rüppell's Vulture *Gyps rueppelli*.

ecaudatus and Tawny Eagle *Aquila rapax*. The species feeds on carrion and bone fragments of larger carcasses, mainly soft muscle and organ tissue, rarely coming down to small carrion. It follows other vultures and migrant game or stock herds to locate much of its food (Del Hoyo *et al.* 1994). The species breeds on cliff faces and escarpments at a broad range of elevations, in colonies of 10 to (at least formerly) 1,000 pairs, building a platform of sticks on rock ledges; tree nesting occurs occasionally, at least in West and Central Africa (Rondeau *et al.* 2006). Monitoring conducted at the Kwenia colony in Kenya indicates that breeding in East Africa may be triggered by rainfall and geared to producing fledged young at the end of the dry season (July–October) when carrion is most abundant (Virani *et al.* 2012).

Major threats:

Unintentional poisoning (poison baits) is a major threat, especially in East Africa (Ogada and Keesing 2010, Otieno *et al.* 2010, Kendall and Virani 2012), as for other species.

Intentional poisoning (belief-based use) is the other major threat, especially in West and Central Africa (Rondeau and Thiollay 2004, Nikolaus 2006, Buij *et al.* 2015).

Secondary threats:

Decline of food availability (declining wild ungulate populations) is a threat at least in East Africa (Western *et al.* 2009).

Human disturbance can include nest harvesting as well as other forms of disruption of breeding (Rondeau and Thiollay 2004, Bamford *et al.* 2009).

3.14 Griffon Vulture *Gyps fulvus*

Alternative name: Eurasian Griffon

Red List Category: Least Concern (since 1988, last update in 2015)

Population size: Estimated at 80,000–120,000 individuals

Population trend: Increasing

Range: Europe, Asia, Africa

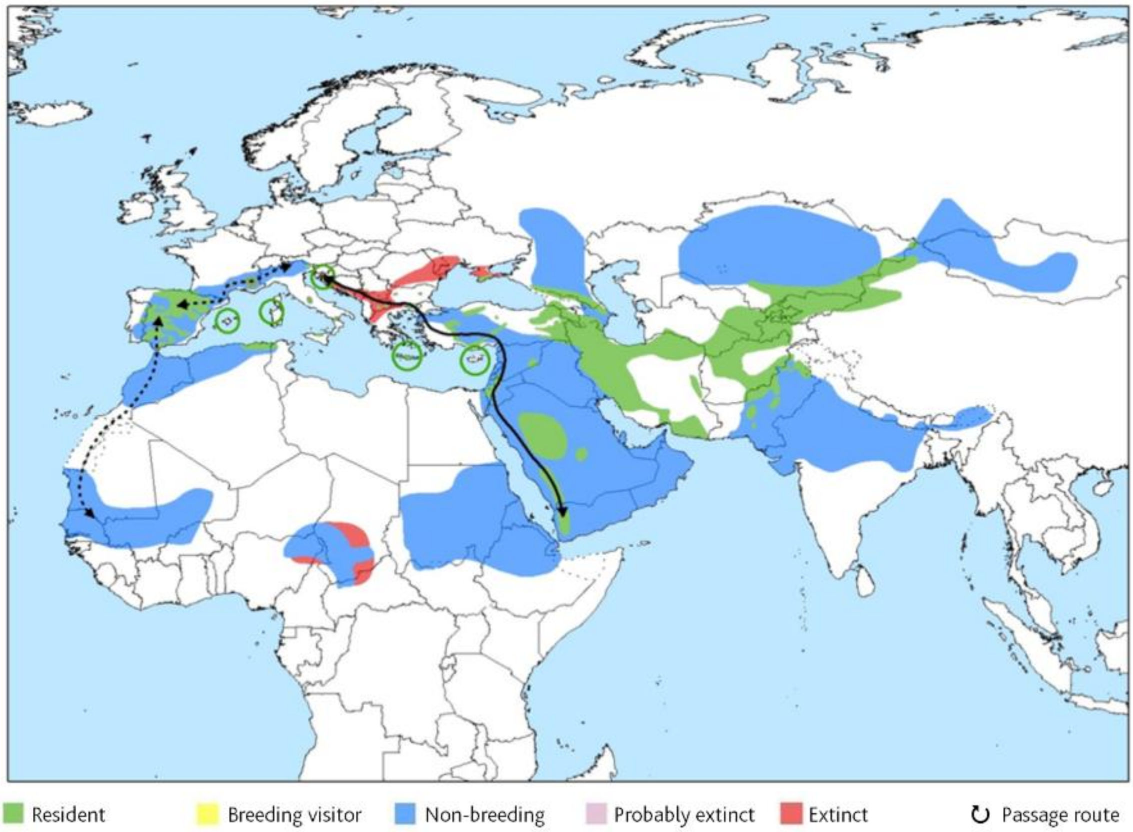

Figure 15: Distribution map of the Griffon Vulture *Gyps fulvus*.

Distribution: The Griffon Vulture has a large breeding range, extending over Europe, the Middle East and at least formerly North Africa; some migrate to spend the non-breeding season further south in Africa, passing through the latter region. It occurs from India west to Portugal and Spain, including some island populations in the Mediterranean (Sardinia, Crete, Cyprus and recently established in Mallorca) as well as the Kvarner Archipelago in Croatia. The range also includes Turkey, the Crimean Peninsula and the Caucasus (Katzner *et al.* 2004), and to the Middle East and into Central Asia. In North Africa, it is probably extinct as a breeding species, even though it occurs in large numbers during migration in Morocco. The species has been successfully reintroduced to France, Italy and central Bulgaria.

Population size and trend: The European population is estimated at 32,400-34,400 pairs (BirdLife International 2017). Spain alone holds an estimated 25,000 pairs. The population in Europe is significantly increasing (around 200% in the last 12 years), mainly owing to implementation of conservation measures, notably campaigns to minimise poisoning and provide safe food at vulture restaurants. Its range has also expanded thanks to reintroduction projects in France, Italy and the Balkans (Deinet *et al.* 2013).

Movements: Some birds are migratory, overwintering in Africa, although many others are resident or nomadic (del Hoyo *et al.* 1994). Breeding adults are largely sedentary, but most juveniles are migratory or nomadic. Donázar (1993) found that 30% of juvenile Griffon Vultures in

Spain migrate for long distances in late winter and spring. Susi (2000) reported that almost 100% of Croatian juveniles migrate. There are concentrations of migrating birds in some specific locations, e.g. Gibraltar and Suez (Bijlsma 1987); Terrasse (2006) found that large numbers move through the eastern Pyrenees in spring northward into France and other countries in western Europe. In south-western Europe, some French birds join the autumn migration of Spanish birds to northern Spain and western Africa (Terrasse 2006); these birds return to France in late winter and early spring, often accompanied by Spanish birds. In recent years, more Griffon Vultures have been seen in central and northern Europe (including Belgium, Estonia, Finland, Germany, Latvia and the Netherlands). This may be linked to the large population increase in Spain and France.

Habitat: The species roosts and nests on large cliffs and soars over surrounding open countryside in search of food. It avoids woodlands. The landscape should support the formation of thermals (Mebs and Schmidt 2006) as large vultures prefer to save energy by gliding and soaring over active flight. Generally, it occurs from sea level up to an elevation of 1,500 m and occasionally as high as 2,500 m (Slotta-Bachmayr *et al.* 2006).

Ecology: The species needs cliffs for nesting; the nest is usually built on a rocky outcrop, with sheltered ledges or small caves preferred (del Hoyo *et al.* 1994). Griffon Vulture nests in colonies of up to 100 pairs on large cliffs, walls of ravines, and precipices. It feeds almost exclusively on carrion of medium-sized and large domestic and wild animals, often in large numbers, although there are a few records in Spain of birds approaching injured or weak sheep or cattle.

Major threats:

Unintentional poisoning (poison baits) is the most significant threat to Griffon Vultures. Birds are normally killed when feeding from poisoned carcasses set for mammalian predators (Snow and Perrins 1998, Ferguson-Lees and Christie 2001) as a result of human predator conflicts.

Electrocution on energy infrastructure is a threat affecting the species in its entire range of distribution. It is one of the raptor species commonly found on lists of electrocuted birds, especially in countries with an abundant population. In Spain (Ferrer 1993, Palacios and Garcia-Bacquero 2003), in Portugal (Infante *et al.* 2005) and in the Middle East (Israel), electrocution is also identified as a serious threat to the species (Prinsen *et al.* 2012).

Collision with energy infrastructure is considered a highly important threat, especially caused by wind energy development (Strix 2012), but also from electricity cables.

Decline of food availability (domestic ungulate populations). In parts of Asia and eastern Europe, a reduction in available food supplies has resulted from changes in livestock management practices (Ferguson-Lees and Christie 2001, Orta *et al.* 2015).

Secondary threats:

Unintentional poisoning (NSAIDs). Veterinary NSAIDs pose a threat to this species. One case of suspected poisoning of a Griffon Vulture caused by flunixin, an NSAID, was recorded in 2012 in Spain (Zorrilla *et al.* 2015). Diclofenac, a similar NSAID, has caused severe declines in *Gyps* vulture species across Asia and, following its approval for veterinary use in Spain, could potentially cause significant effects on populations of Griffon Vultures there too (Green *et al.* 2016).

Unintentional poisoning (lead). Several instances of lead poisoning have been recorded in the Iberian Peninsula (Mateo 1997, Carneiro 2015), where it was also proven that the source of the lead poisoning was ammunition used in hunting.

Human persecution (without poison) was a serious threat to the species throughout the 19th and 20th centuries in much of Europe, North Africa and the Middle East and was one of the main reasons for population decline. Now it appears to be more relevant to the eastern Europe and Central Asia and possibly the Middle East.

Habitat degradation and **Human disturbance** are additional, more localised, threats.

3.15 Cinereous Vulture *Aegypius monachus*

Alternative name: (Eurasian) Black Vulture, Monk Vulture

Red List Category: Near Threatened (since 2004)

Population size: 15,600–21,000 individuals

Population trend: Stable to slighty increasing

Range: Europe, Asia

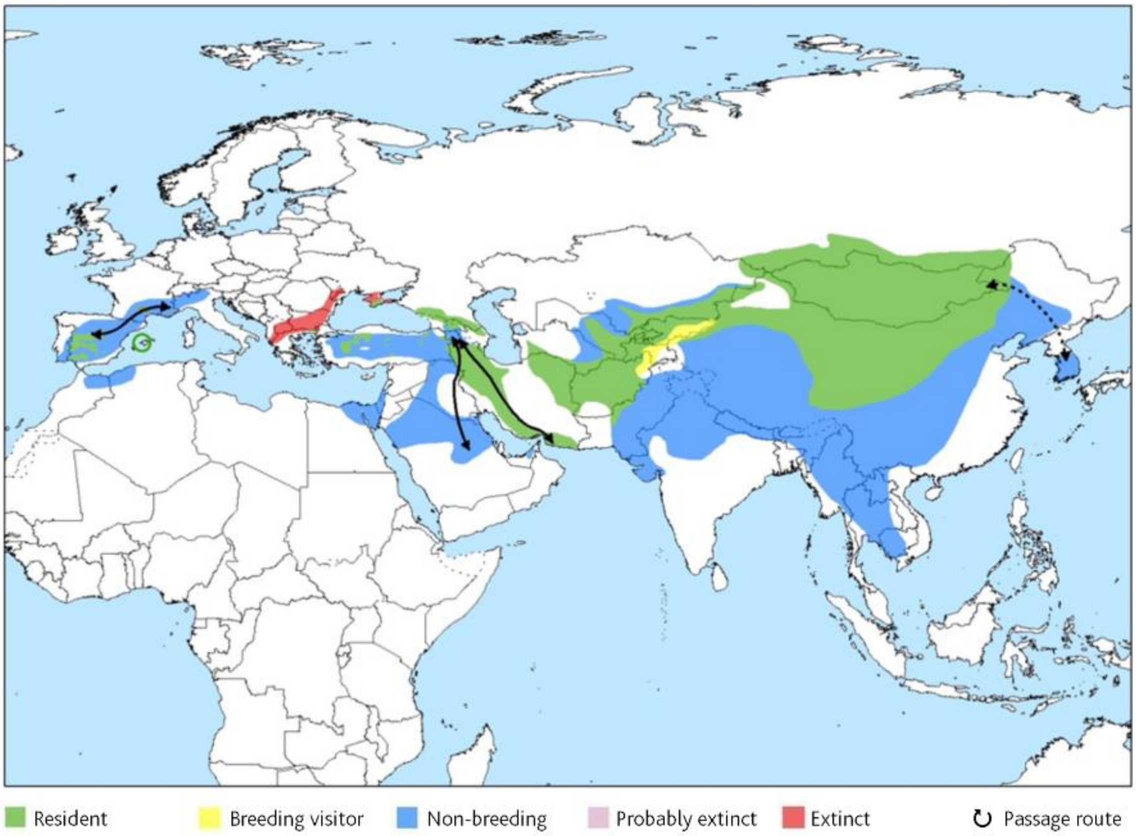

Figure 16: Distribution map of the Cinereous Vulture *Aegypius monachus*.

Distribution: This species breeds in Spain, Greece, Turkey, Armenia, Azerbaijan, Georgia, Ukraine, Russia, Uzbekistan, Kazakhstan, Tajikistan, Turkmenistan, Kyrgyzstan, Iran, Afghanistan, northern Pakistan (BirdLife International 2017), Mongolia and mainland China, with a reintroduced population in France (Heredia 1996, Heredia *et al.* 1997, BirdLife international 2017). The wintering range includes additional states to the south of the breeding range, in Saudi Arabia, Iran, northern India, Nepal, Bhutan, Bangladesh, DPR Korea and Republic of Korea (North and South Korea, respectively). It appears to be very rare and of irregular occurrence in Africa (e.g. Egypt: Goodman and Meininger 1989), with no reliable records in Sudan (Nikolaus 1987) but several observations in West Africa (Borrow and Demey 2014, A. Camiña pers. comm.).

Population size and trend: The most recent global population estimate for Cinereous Vulture is 7,800–10,500 pairs, which equals to 15,600–21,000 mature individuals. This consists of 2,300–2,500 pairs in Europe (BirdLife International 2004) and 5,500–8,000 pairs in Asia. Although quantified information is not available, the trend across Asia is believed to be an ongoing moderate decline. The latest population count for wintering Cinereous Vultures in the South Korea was 2,532 individuals in 2012 (Cultural Heritage Administration 2012). In Europe, the species occurs in Spain (2,068 breeding pairs in 2012–15 and increasing), Portugal (up to 18 pairs) and France (31 pairs in 2016). In Greece, the population is located at a single colony (21–35 breeding pairs, slowly increasing). Recently collected data from Europe, Central Asia and the Middle East suggest a population estimate of 9,657–

12,306 breeding pairs, with a stable or increasing population trend in Europe and probably declining in Asia.

Movements: The species is a partial migrant (Bildstein 2006); while it is sedentary in some areas, many individuals winter south of the breeding range, and there is also a good deal of nomadism. Gavashelishvili and McGrady (2006) recorded long range movements by a bird that fledged in Georgia, travelled south to Saudi Arabia, and then headed north into Russia. Many adults and juveniles in Mongolia apparently migrate in autumn to wintering areas in the Republic of Korea (South Korea) (Batbayar 2004, Batbayar *et al.* 2006), while birds from central Asia migrate to the Indian subcontinent, southern China, Russian Far East, and the Republic of Korea (Batbayar 2006). In Europe, the adults are mostly sedentary, while the juvenile birds disperse over larger areas. In Spain, the movements of the juveniles are mostly limited to the western part of the Iberian Peninsula and in the surroundings of the breeding colonies (Moreno-Opo 2009). Reports of Cinereous Vultures as regular winter visitors to Africa (Egypt and Sudan) appear to be unfounded, at least at the present time, although very small numbers have been recorded (less than annually) in Egypt.

Habitat: The species prefers arid hilly and montane habitat, including wooded areas and semi-desert, areas above treeline, and agricultural habitats with patches of forest. Birds spend much time soaring overhead in search of food. They perch more often on trees than on cliff faces or on the ground. Although not numerous, in places of abundant food they may congregate in large flocks (Flint 1984).

Ecology: The species inhabits forested areas in hills and mountains at 300–1,400 m in Spain, but occurs at higher altitudes in Asia, where it also occupies scrub and arid and semi-arid alpine steppe and grasslands up to 4,500 m (Thiollay 1994). It forages over many kinds of open terrain, bare mountains, steppe and open grasslands. Nests are built in trees or on rocks (the latter extremely rarely in Europe but more frequently in parts of Asia), often aggregated in very loose colonies or nuclei. Its diet consists mainly of carrion from medium-sized or large mammal carcasses, although snakes and insects have been recorded as food items. Live prey is rarely taken. In Mongolia, at least, the species is reliant on livestock numbers for successful nesting (Batbayar *et al.* 2006).

Major threats:

Unintentional poisoning (poison baits). Birds are killed by feeding on carcasses deliberately laced with pesticides to kill feral dogs or wild carnivores across the species' range. This seems to be on the increase in areas such as Mongolia (Batbayar 2005).

Electrocution on or collision with energy infrastructure. Dixon *et al.* (2013) recorded Cinereous Vultures among the species killed on power lines during a study in Mongolia. Although little substantive data concerning mortalities of this species are known, it is unlikely that such mortalities are under-recorded.

Decline of food availability (wild and domestic ungulate populations) in Asia and eastern Europe. Numbers of livestock have substantially reduced in areas of the former Soviet Union, due to changed agricultural practices and urbanisation. McGrady *et al.* (2007) link declines in the species in Georgia and Armenia to the cancellation of subsidies for sheep herding and the resultant reduction in availability of food. Lee *et al.* (2006) also state that the species is dependent on supplementary feeding in South Korea due to the lack of available food in the environment.

Secondary threats:

Habitat degradation and **Human disturbance**.

Direct persecution. Batbayar (2005) report an increase in the deliberate persecution of this species in Mongolia and the trapping or shooting of birds in China for their feathers.

Unintentional poisoning (NSAIDs). Overwintering birds in northern India could be exposed to veterinary NSAIDs such as diclofenac which could severely impact this increasing population (BirdLife International 2017).

Climate change Reduced breeding success has been documented as low and fluctuating temperatures have resulted in failure of eggs to hatch (Batbayar 2005); this could possibly be attributed to climate change.

Intentional poisoning (belief-based use) occurs in South-east Asia in particular.

Note: *More details regarding the species' biology, threats and conservation effort is available in the 'Flyway Species Action for the Conservation of the Cinereous Vulture' (Annex 5).*

3.16 Lappet-faced Vulture *Torgos tracheliotos*

Red List Category: Endangered (LC in 1988, VU in 2000, EN in 2015)

Population size: 8,500 individuals

Population trend: Decreasing

Range: Africa, Middle East

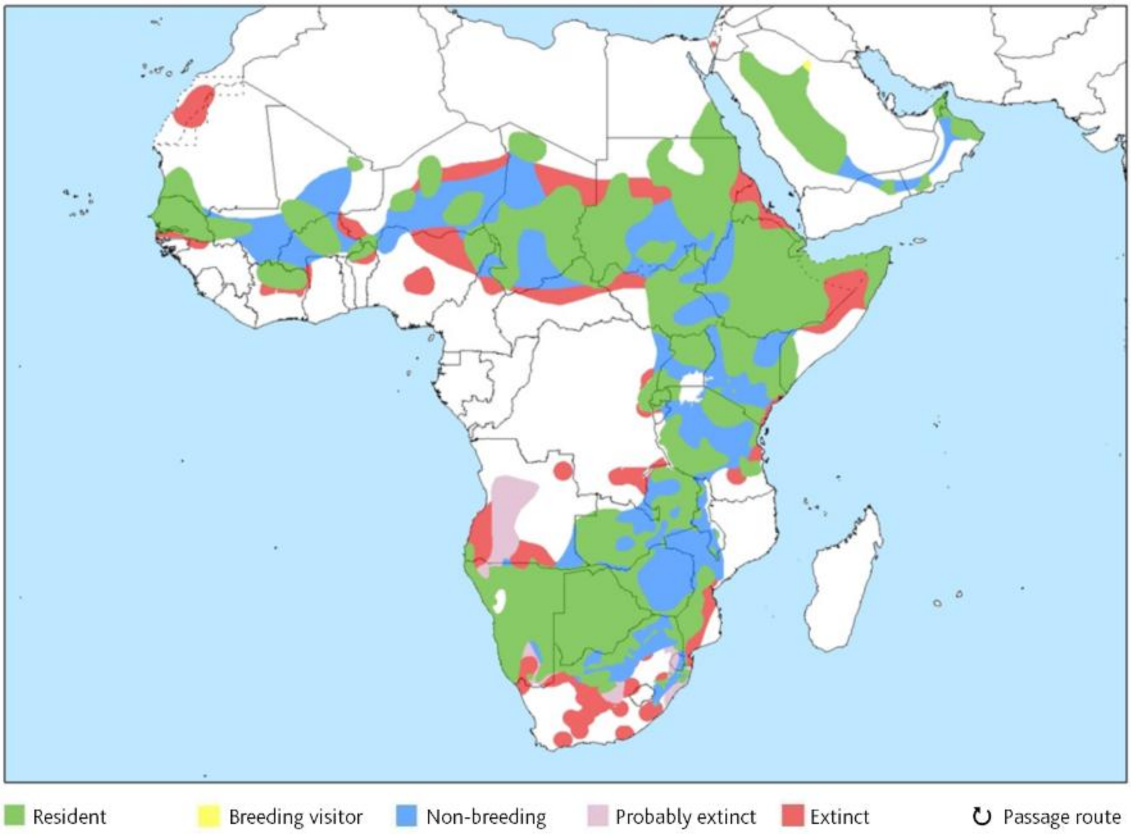

Figure 17: Distribution map of the Lappet-faced Vulture *Torgos tracheliotos*.

Distribution: The species has a wide distribution across Africa, from the west, across the Sahel into East Africa and further south. Compared to many other African vulture species, it has a rather fragmented distribution. There is a small breeding population in the Arabian Peninsula (Oman, Saudi Arabia, United Arab Emirates and Yemen). It has been extinct in Algeria and Tunisia since the 1930s, and now only small populations remain in southern Egypt and Mauritania (Mundy *et al.* 1992). It may be extinct in Djibouti (E. Buechley pers. comm.). The last records from Morocco concerned two birds in 1972 (Shimelis *et al.* 2005). It is considered likely to be extinct in Western Sahara, as it has not been recorded there since 1955 (Shimelis *et al.* 2005). In Nigeria, there has been a major decline since the late 1970s and it may now have been extirpated (Brown 1986, Shimelis *et al.* 2005). It probably previously bred in Jordan (Evans and Al-Mashaqbah 1996), and is considered extinct in Israel, where three birds remained until 1994 (Shimelis *et al.* 2005). Vagrants are occasionally recorded from Algeria, Burundi, Libya, Morocco and Togo (BirdLife International 2017).

Population size and trend: The African population has been estimated to be at least 8,000 individuals (Mundy 1992), and around 600 pairs in the Arabian Peninsula (Jennings 2010). This gives a total population of at least 9,200 individuals. This may prove to be an overestimate given current trends for this species (80% projected population declines in Africa over three generations: Ogada *et al.* 2015b), as for other African vultures, as well as apparently severe declines in the Middle East (M. Shobrak pers. comm.).

Movements: Lappet-faced Vultures are regarded as a partial migrant that makes significant movements in response to rainfall (Bildstein 2006). Tagged birds had an average home range size of 22,000 km² and moved between Kenya and Tanzania (Coordinating Unit of the Raptors MOU 2015). Murn and Botha (ibid.) satellite-tagged an individual which moved more than 200 km from the capture site in South Africa and travelled into Mozambique. Two immature individuals satellite tagged in Saudi Arabia (Shobrak 2014) had a mean home range size of 283,380 km2 and moved about 400 km before returning in the autumn. Vagrants have been reported in Morocco, southern Libya, Jordan and Spain (Ferguson-Lees and Christie 2001).

Habitat: The species inhabits dry savanna, arid plains, deserts and open mountain slopes (Shimelis *et al.* 2005), up to 3,500 m (BirdLife International 2017). In Ethiopia, it is also found at the edge of forests, having been recorded at Bonga forest and forest in Bale Mountains National Park in 2007, as well as the Afro-alpine habitats of the national park in 2005 (BirdLife International 2017).

Ecology: Lappet-faced Vultures range widely when foraging and whilst they take a broad range of carrion, they are also known to hunt, probably taking a variety of small reptiles, fish, birds and mammals (Mundy *et al.* 1992). Although usually a more solitary species, up to 50 birds may gather with other vultures at larger carcasses. Lappet -faced Vultures usually build solitary nests often in *Acacia* but also in *Balanites*, *Terminalia* and *Maerua* (Shimelis *et al.* 2005, Shobrak 2011). They do not usually breed until at least six years of age and fledge on average 0.4 young/pair/year (Mundy *et al.* 1992). Timing of breeding can vary significantly across the species' range, for example in Mozambique, egg-laying occurs from late April until mid-August, with a peak in May and June (Parker 2005). A nest found in Oman contained a small chick in early March, and was thought to have fledged in mid-June (Wernery 2009).

Major threats:

Unintentional poisoning (poison baits) at carcasses deliberately laced with pesticides to kill feral dogs or wild carnivores, especially in eastern and southern Africa (Komen 2009, Otieno *et al.* 2010, Groom *et al.* 2013, Kendall and Virani 2012).

Human disturbance. This is particularly significant at nests on the Arabian Peninsula where low tree densities result in people establishing dwellings under or near trees used by this species for breeding, causing them to abandon nesting sites (Shimelis *et al.* 2005, Shobrak 2011). The same probably applies in areas of sparse tree cover elsewhere within the species' range. In large protected areas containing elephants, nesting trees have also been pushed over and destroyed by these animals (Murn and Botha 2017).

Intentional poisoning (belief-based use). During an incident of sentinel poisoning in the Gonarezhou National Park in Zimbabwe, most of the 15 Lappet-faced Vultures killed had the bills removed, presumably for belief-based use (Groom *et al.* 2013). The species has been recorded in trade in West and Central African markets with 858–1,284 reported over six years in West Africa (Buij et al. 2016); see also Rondeau and Thiollay (2004) and McKean *et al.* (2013).

Intentional poisoning (sentinel poisoning). Especially in southern Africa (Ogada *et al.* 2015), this is the deliberate poisoning of the carcasses of large mammals such as elephant and buffalo after being poached to reduce vulture numbers in areas where poachers are active due to large numbers of birds getting killed in this manner. Lappet-faced Vultures, like most other species occurring in areas where this practise is prevalent, are susceptible to this threat. The 15 birds killed in Zimbabwe in an incident of sentinel poisoning (above) were subsequently used in belief-based practices. Simmons (1995) also reported an incident of deliberate poisoning in Namibia that killed 86 individuals, but it is not clear whether this was an incident of sentinel poisoning.

Secondary threats:

Decline of food availability (wild ungulate populations). Rondeau and Thiollay (2004) suggest that reduced availability of food due to declining game populations caused by habitat destruction from human settlement and agriculture as well as overhunting may have contributed to the decline in the population of this species in West Africa. Civil war in Mozambique also caused dramatic declines in wild game populations in that country and continued over-exploitation of game through poaching, make the recovery of Lappet-faced Vulture populations here a challenge (Parker 2005).

Electrocution on or collision with energy infrastructure, particularly power poles. Shimelis *et al.* (2005) highlight the threat to Lappet-faced Vultures from electrocutions and collisions from powerlines, reporting 49 individuals known to have been killed between 1996 and 2003.

4 Threats

In this section, the threats to vultures are described in narrative form, and a summary of their overall impact is presented in Table 3.

Not every factor that kills a vulture is a threat to the entire population. However, no threats or causes of mortality are ignored in this Vulture MsAP, but some are considered local or of limited impact, with evidence suggesting that they cause individual mortality rather than population-level declines. Where this is believed to be the case, it is explained, and the focus is maintained on the major, non-natural factors of mortality that limit or cause population declines.

The most significant threats per region were identified from feedback provided via the Questionnaires and Regional Workshops (Figure 18). Data are insufficient to identify threats and their severity for every country, but in most cases the severity of a threat is comparable in all countries across a given sub-region. This allows readers to select species which occur in any given country (Section 3; Annex 2), to identify the threats which impact on each species (Table 3; Annex 3), and then to be presented with the most appropriate actions to conserve the species within a country or region (Section 7).

Conservation actions generally focus on addressing one or more threats and/or their root causes. In this way, the information in Sections 3 and 4 of the Vulture MsAP links to and determines the Objectives and Results, which, along with the detailed Actions to achieve them, are set out in Section 7.

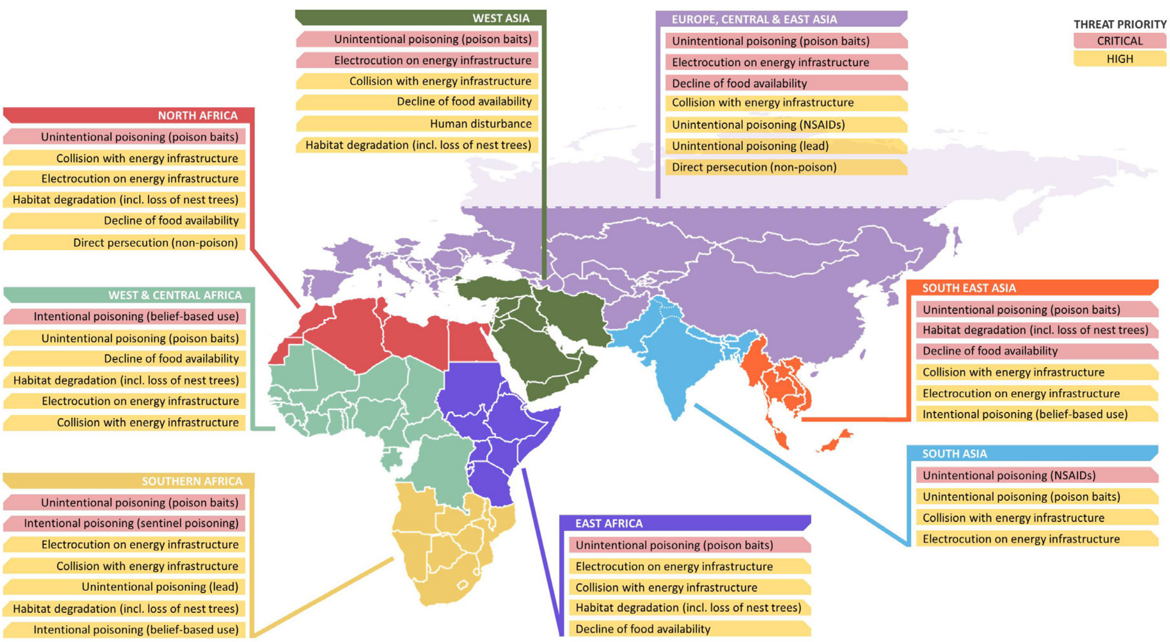

Figure 18. Map indicating priority threats for the Vulture MsAP range. The Russian Federation is a Range State, but vultures are restricted to the North Caucasus and Altai-Sayan regions (the latter being near the borders of Mongolia and Kazakhstan); more northerly parts of the Federation are not shown.

4.1 Poisoning

Poisoning, in its various forms, is by far the most significant threat that impacts the vulture species that are the focus of this Action Plan. In the context of vultures there are two broad types of poisoning: unintentional (secondary) poisoning, where vultures are not the intended target; and targeted poisoning, where vultures are intentionally killed.

The use of poisons to kill wildlife intentionally has a long history worldwide. The main types of poisoning that affect migratory birds, including vultures, are covered in the CMS *Guidelines to Prevent the Risk of Poisoning to Migratory Birds* (2015). Both natural plant and animal based toxins and synthetic pesticides have been used to kill wildlife, a method that is silent, cheap, easy and relatively effective (Ogada 2014). Many classes of pesticides have been used to poison wildlife, including organochlorines, organophosphates, carbamates and pyrethroids.

Populations of scavengers have been decimated by feeding on poisoned carcasses (Virani *et al.* 2011, Ogada *et al.* 2012 and Botha *et al.* 2012). Vultures, for which the primary food source is meat, soft tissue and organs from naturally occurring carcasses, are obviously at risk. All the vulture species that are covered by this Vulture MsAP are affected to varying degrees by unintentional (secondary) and intentional poisoning. Both South Asia and Africa have seen precipitous declines in vulture populations over the last 30 years due to poisoning. This has directly contributed to eight species currently being listed as Critically Endangered.

In South Asia, unintentional poisoning by veterinary NSAIDs has caused catastrophic declines to vultures. The effects of poisoning with NSAIDs, and particularly diclofenac, has been quantified using a variety of approaches and shown to be the main impact on *Gyps* vulture populations in India, Pakistan and Nepal; it has caused the largest population declines over the shortest timeframe of any known group of birds in history. Certain NSAIDs that are known to be highly toxic to vultures are becoming available elsewhere and are a significant cause for concern.

4.1.1 Unintentional (secondary) poisoning

Unintentional poisoning occurs when vultures consume poisoned baits set out for other species or when they consume carcasses of animals that have died from poisoning. Pollution of the environment by a range of chemicals due to spills, dumping of chemical waste and other substances that can affect their food or water source can also have an unintended impact on vultures.

Human-wildlife conflict

Farmers who experience frequent crop-raiding by elephants, buffalo and other herbivores and herders who lose livestock falling prey to predators, will occasionally resort to poisoning those animals in an effort to deal with the problem. Synthetic pesticides are widely used as the poison of choice for killing these 'problem' animals such as lions, tigers, leopards, hyenas and jackal. The use of pesticides in poison baits is illegal in the vast majority of countries but implementation and enforcement of regulations is often weak. Consequently, poisoning has become the most widely used means of killing particular wildlife species. Poisoning using baited carcasses is indiscriminate and can affect a wide range of non-target species. In fact it often does not affect the target individual or species, but instead kills a multitude of unintended species, including vultures.

In Europe, poison seems rarely used to kill vultures deliberately; they are normally secondary victims of poison used against wild predators (usually carnivorous mammals: wolves and foxes) impacting on human activities (mainly livestock farming and hunting). This practice is illegal in all European countries, but is still carried out in places by local people who consider it to be a quick way to resolve conflicts with these predators. The main driver for such intensive use of poison is the concern of livestock breeders regarding predators, and the protection by hunters of small game animals. Its widespread use has, as in Africa, been facilitated by poor implementation and poor enforcement of legislation and the ready availability of legal and illegal poisonous substances on the market. Poisoning of wildlife in Europe reached its peak in 1940–1950s, when it was legally used by the authorities as a tool to control wild predators. In this period, many vulture populations vanished from their original distribution ranges in Europe. These were dark decades for wildlife and especially for vulture species in the Mediterranean region. In some areas (e.g. Greece) this problem has transformed into human-human conflict, which has even deeper roots (Skartsi *et al.* 2014).

In Spain alone (the country holding about 90% of Europe's vultures), it is estimated that about 9,000 wildlife incidents involving the use of poison baits are detected annually. In 1992–2013, about 185,000 animals were found poisoned, from which 34% were birds of prey. In Spain, most of the cases involving use of poison baits to kill wildlife are related to hunting activities. During 1990–2007, a total of 211 poisoning incidents were registered, killing 294 **Egyptian Vultures** in Spain (Hernández et al. 2009).

Problem animal control

Vulture populations that are more associated with human settlements may also be susceptible to unintentional poisoning where toxic substances are used to control problem animals such as feral dogs. Poisons used include strychnine and warfarin and, in Ethiopia at least, have resulted in the deaths of two species of vulture (Abebe 2013). Although data on unintentional poisonings in urban environments are difficult to acquire, it is likely that poisoning of feral dogs and other pest species (e.g. ro-

dents) may have a significant effect in Africa. In Europe and Asia, this threat is potentially most relevant to **Egyptian** and **Cinereous Vultures**.

Mass poisoning events have recently become a serious concern in Assam, north-east India (S. Ranade pers. comm.). In 2014 alone, 179 vultures were killed in seven separate incidents. Targets have typically been feral dogs which may kill livestock, spread disease including rabies, or have other negative impacts on people. Livestock owners may respond by attempting to kill the dogs with poisoned baits, on which vultures may also feed. Such poisoning events have probably been occurring for a long time (in Assam and elsewhere), but may have increased in frequency as vultures have declined, mammalian scavengers (especially feral dogs) have increased, and expanding human populations have reached wilder areas.

In Cambodia, unintentional poisoning is the biggest threat to vultures (Loveridge et al. in review). Fifteen recorded vulture poisoning events between January 2005 and 2016 resulted in the known deaths of nine **Red-headed Vultures**, 32 **White-rumped Vultures** and ten **Slender-billed Vultures**, including a single poisoned cow carcass leading to the deaths of 2, 11 and 3 individuals of these species, respectively (Sum and Loveridge 2016, Loveridge et al. in review). Poisons are used for a variety of reasons including hunting, pest control and crime (killing guard dogs to allow burglary), but in several cases the exact reasons are unclear.

NSAIDs and other veterinary medicines

Unintentional poisoning of *Gyps* vultures in Asia due to the ingestion of NSAIDs has caused rapid and severe declines in three formerly common and widespread species (**Indian**, **Slender-billed** and **White-rumped Vultures**), with serious consequences for the ecosystem and knock-on economic, sanitary, human health and cultural effects. The main factor causing the declines has been shown to be the veterinary use of a common NSAID, diclofenac. Diclofenac was used extensively for domestic livestock and any animals that then died within two days of treatment had highly toxic levels in the tissues that could cause kidney failure and death to any vulture feeding on the carcass (Oaks *et al.* 2004, Shultz *et al.* 2004, Green et *al.* 2004, 2006, Swan *et al.* 2006). Many *Gyps* vulture species worldwide rely on carrion from dead domestic ungulates as their traditional wild ungulate food sources have disappeared (Pain *et al.* 2003). This was the case over much of South Asia; after ingestion of livestock carcasses treated with diclofenac just prior to death, vultures die as a result of visceral gout that is caused by kidney failure. Typically, a vulture succumbs within two days of exposure to diclofenac.

South Asian Governments responded relatively quickly by banning the veterinary formulations and use of diclofenac in 2006 in the cases on India, Nepal and Pakistan, and 2010 in Bangladesh. Iran also took this step in 2015. Diclofenac, however, remains in widespread illegal veterinary use (mainly of human formulations) even after the statutory bans although its concentration and prevalence in dead cattle available to vultures declined markedly (Cuthbert *et al.* 2011, 2014, 2016).

There is evidence that other NSAIDs in legal veterinary use are also toxic to vultures, as well as possibly to other scavenging birds, with just one safe alternative, meloxicam, identified so far (Swarup *et al.* 2007). The clearest case concerns aceclofenac, which is a pro-drug of diclofenac, most of which is converted to diclofenac in treated cattle soon after it is administered (Galligan *et al.* 2016). Hence, aceclofenac is expected to be as toxic to *Gyps* vultures as diclofenac is. Ketoprofen was identified as lethal to *Gyps* vulture species in 2009 (Naidoo et al. 2010), and residues of this drug are found in ungulate carcasses in India at sufficient concentrations to cause mortality in vultures (Taggart *et al.* 2007). Neither drug has yet been withdrawn from veterinary use in Asian vulture Range States, though the Government of Bangladesh has recently banned the veterinary use of ketoprofen in Vulture Safe Zones in the country (Bowden *et al.* 2016). Other NSAIDs thought to be toxic to vultures include nimesulide (Cuthbert *et al.* 2016), carprofen (Cuthbert *et al.* 2007), and flunixin (Zorrilla *et al.* 2014). Wild **White-rumped Vultures** were recently found dead in India with high levels of nimesulide associated with extensive visceral gout, suggesting that this drug is damaging or destructive to the kidneys in *Gyps* vultures in a similar way to diclofenac (Cuthbert *et al.* 2016). Evidence suggests that a wild **Griffon Vulture** found dead in Spain may have been killed through ingestion of flunixin (Zorrilla *et al.* 2014), supporting concern raised by Cuthbert *et al.* (2007) that this drug may be toxic to vultures.

The availability of new NSAIDs is increasing (Khan 2013) and most are untested as regards their toxicity to vultures. In surveys of pharmacies in 11 Indian states in 2007–2010, NSAIDs containing 12 active compounds were on sale for veterinary use on livestock (Cuthbert et al. 2011). These were aceclofenac, analgin (also known as metamizole), diclofenac, flunixin meglumine, ibuprofen, ketoprofen, mefenamic acid, meloxicam, nimesulide, paracetamol (also known as acetaminophen), phenyl butazone and piroxicam (Bowden *et al.* 2016). Of these, only diclofenac (toxic), ketoprofen (toxic) and meloxicam (non-toxic) have been subjected to experimental safety testing on captive *Gyps* vultures. The only reliable NSAID safety testing method available at present is in vivo testing on captive vultures. All four *Gyps* species treated experimentally with diclofenac so far (**White-rumped**, **Griffon**, **Cape** and **White-backed**) have been found to die from kidney failure within a few days of administration of a dose of the drug below the Maximum Likely Exposure (MLE) level from carrion derived from domesticated ungulates. The use of any *Gyps* species in experiments to test NSAID safety to *Gyps* vultures in general is probably valid. However, diclofenac is of low toxicity to several other bird

species tested including Pied Crow (*Corvus albus*), Turkey Vulture (*Cathartes aura*), domestic chicken (Gallus *domesticus*) and American Kestrel (*Falco sparverius*) (Hutchinson *et al.* 2014); therefore, testing NSAIDs on surrogate species that are not *Gyps* vultures is invalid if the objective is to test for toxicity to *Gyps* vultures (Cuthbert *et al.* 2006). Given that most species of *Gyps* vultures are globally threatened or near-threatened, it has become difficult to obtain licensing approval for potentially lethal safety testing experiments on captive *Gyps* vultures. In vitro testing on vulture cell cultures might be a feasible alternative, but the mechanisms underlying toxicity are complicated. Diclofenac is both toxic to the vulture's kidneys and only metabolised slowly after absorption (Hutchinson *et al.* 2014). A further problem is that immortal cell cultures are not currently available for vultures. Hence, *in vitro* safety testing is not practical at present and would take considerable time and resources to develop.

Lack of engagement from the pharmaceutical sector and governments has to date been another constraint for NSAID safety testing. Since publication of the discovery of the toxicity of veterinary diclofenac to vultures in 2004, results of safety tests of NSAIDs on *Gyps* vultures have been published for only two compounds: meloxicam and ketoprofen. Both tests were funded by a conservation charity rather than by pharmaceutical companies or government agencies. CMS Resolution 11.15 calls for safety testing of NSAIDs to determine whether their veterinary use poses a low risk to vultures and for approval of NSAIDs for veterinary use to be conditional on their safety to vultures. No NSAID safety test results have been published since CMS Resolution 11.15, but the Government of India has commissioned safety tests on at least two compounds, which are likely to begin in 2017.

In 2007, diclofenac was found to be on sale at a veterinary practice in Tanzania (BirdLife International 2016a), and more recently an increase in its availability has been noted in Ghana (J. Deikumah pers. comm.). It was also reported that in Tanzania, a Brazilian manufacturer has been aggressively marketing the drug for veterinary purposes (BirdLife International 2017) and exporting it to 15 African countries (BirdLife International 2016a). Three of the African endemic vultures are of the *Gyps* genus and are likely to be susceptible to diclofenac poisoning (and possibly other NSAIDs) – although further research on all African species is required, also taking into account differences in carcass disposal systems in most African countries (compared to Asia) which may affect the likely exposure of vultures to this threat. Anecdotal information unearthed during the Middle East Regional Workshop revealed that diclofenac is readily available as a veterinary drug in the United Arab Emirates and apparently used to treat camels and some other domestic livestock.

Diclofenac has been approved for veterinary use in several European countries. It is manufactured by an Italian company (FATRO), where its use was authorised in 1993. Since 2009, it has been exported and approved in Estonia, the Czech Republic, Latvia and Turkey. Despite the overwhelming evidence of the threat posed by this drug to vultures in Asia and real concerns about the impact that it may have on European vulture populations, the drug was also authorised for veterinary use in Spain in 2013. It is now becoming widely available on the EU market. Government regulatory authorities have concluded that very few ungulate carcasses containing diclofenac will be eaten by vultures, because of existing sanitary regulations. However, simulations using a combined demographic-toxicological model indicate that numbers of ungulate carcasses contaminated with diclofenac assumed by the government authorities could potentially cause significant effects on populations of Griffon Vultures in Spain (Green *et al.* 2016). The discovery of residues of the NSAID flunixin in the carcass of a wild Griffon Vulture found dead in Spain with visceral gout (Zorrilla *et al.* 2014) demonstrates that current sanitary regulation of veterinary NSAIDs in Spain is not fully effective. If flunixin can reach a wild vulture, it seems probable that diclofenac will also do so.

It is also important to consider the risk of poisoning from other NSAIDs. The recent co-occurrence of extensive visceral gout in dead wild vultures of related species with high levels of the NSAIDs flunixin and nimesulide in the liver and kidneys indicates that these drugs are probably also causing vulture deaths (Zorrilla *et al.* 2014, Cuthbert *et al.* 2016). Numerous other NSAIDs of unknown toxicity to vultures are used to treat livestock throughout Asia, Europe and Africa. Many are detected in livestock carcasses available to vultures in South Asia (Taggart *et al.* 2009).

Lead poisoning

The impacts of lead poisoning through the ingestion of spent lead ammunition used by hunters and wildlife managers to kill game is well known for a wide range of bird species (Watson *et al.* 2009, Delahay and Spray 2015), contributing to population declines as well as creating extensive avoidable deaths and sickness amongst waterbirds and scavengers. However, although there are few studies on Old World vultures, substantial work has been carried out on the impact of lead poisoning on the recovery of the California Condor *Gymnogyps californianus*: this threat is considered the most significant in terms of the species' successful reintroduction in the wild, with a number of released birds dying after feeding from carrion containing lead fragments and residues (Finkelstein et al. 2012). In addition, many free ranging, released California Condors suffer repeatedly from lead poisoning caused by ingestion of fragments of lead bullets from the discarded viscera of hunter-killed deer and survive only because they are recaptured and given remedial treatments. Without this expensive ongoing action, population simulations indicate that the re-introduced wild populations would rapidly decline to extinction (Green *et al.* 2008). Elevated

Blood Lead Levels (BLL) have recently been found in **White-backed** and **Cape Vultures** in South Africa, Namibia and Botswana (Kenny *et al.* 2015, Naidoo *et al.* 2017). In areas where game-hunting is a significant activity the ingestion of lead fragments by vultures could have both lethal and sub-lethal effects. Naidoo *et al.* (2017) suggest that elevated BLL could have a detrimental impact on breeding productivity, especially important for slow-reproducing species, and with these effects being compounded in small and rapidly declining populations.

In critical cases, lead poisoning in vultures and other scavengers can result in death, but it can often results in sub-lethal level poisoning that can impose a number of secondary effects (such as reduced mobility or increased risk of collision). However, more research is required to assess and determine the impact of these secondary effects, which could be serious. Lead poisoning may be the most significant threat to **Bearded Vultures** in Europe (Margalida *et al.* 2008). There is also evidence of negative effects of accidental lead intoxication to **Cinereous** and **Egyptian Vultures** in captivity (Pikula *et al.* 2013), as well as in wild **Egyptian Vultures** (Bounas *et al.* 2016).

Bioaccumulation

Whilst direct mortality from poisoning is highly visible and newsworthy, all species of African-Eurasian vultures are long lived and at a high trophic level (high up the food chain), which increases their vulnerability to bioaccumulation. Whilst most attention has been given to the lethal impacts of toxins on vultures, bioaccumulation may have sub-lethal but significant negative effects on reproductive success, immune response and behaviour. However, there is no robust evidence for such effects at present so more research is needed.

4.1.2 Intentional poisoning targeted at vultures

Belief-based use and the bushmeat trade

Pesticides are increasingly used to acquire wild animals or their body parts for consumption and commercial trade. Where vultures are concerned, a major driver of this trade is referred to here as belief-based use, in which wildlife parts and derivatives are used in attempts to treat a range of physical and mental diseases, or to bring good fortune. Vultures are sold alongside other species of birds, mammals, reptiles and other taxa at markets specialising in supplying belief-based users. Williams *et al.* (2014) include six vulture species out of a group of 19 conservation priority bird species that were recorded most frequently in markets in 25 African countries surveyed. The term 'traditional medicine' is sometimes used, although no evidence of medicinal benefits is known; other terms (some used in specific sub-regions) include juju, muthi and fetish. The trade associated with belief-based use has existed for many years in some areas (especially parts of West, Central and southern Africa) and is accepted as cultural practice. However, not all of the uses for vultures have such a history: for example, those uses which supposedly increase a user's chances of winning in recently introduced national lotteries and sport betting practices. With the rapid growth of human populations and more effective bird-harvesting methods (through highly toxic poisons) the negative impact on vulture populations is becoming more apparent.

The other main driver of this trade is bushmeat. Many species are sold for belief-based uses alongside those sold for their meat in the same markets, or may be sold for either purpose. This suggests that belief-based use and the bushmeat trade are probably integrated and to some extent interdependent (Saidu and Buij 2013, Williams et *al.* 2014, Buij *et al.* 2016). In China, there is certainly some persecution of vultures for direct meat consumption, but this also extends to belief-based use and is considered a significant threat (MaMing *et al.* 2017). These practices are not well documented, and may be unusual in East Africa, but poisoning incidents have been recorded from Tanzania, where vulture carcasses without heads have been discovered, following a pattern of mutilation frequently seen for belief-based use.

Although belief-based use of vultures is known from Range States outside of Africa, this threat seems to be especially prevalent on this continent having been recorded particularly in West Africa and to a lesser, but still significant extent in southern Africa, and with indications of increasing incidence in East Africa (Figure 19).

Across West and Central Africa the **Hooded Vulture** is one of the most heavily affected species, with an estimated 5,850–8,772 individuals traded over a six-year period in West Africa alone (Buij *et al.* 2016). In Nigeria, a survey of medicinal traders found this to be the most commonly traded species of vulture, accounting for 90% of all vulture parts traded (Saidu and Buij 2013). **Hooded Vultures** are also killed for belief-based uses in South Africa but not as commonly as other species (McKean *et al.* 2013), perhaps simply because of the relatively low population in the country compared to other species.

White-backed Vultures are regularly traded in West Africa, with an estimated 924–1,386 individuals traded over a six-year period, which most likely represents a significant proportion of the regional population (Buij *et al.* 2016). The decline and possible extirpation of **White-backed Vulture** in Nigeria has been attributed to the trade in body parts for traditional juju practices (BirdLife International 2017). In South Africa, White-**backed Vulture** is one of the most prevalent vulture species in trade, according to a survey of traditional healers and traders (McKean *et al.* 2013). As a result of this and environmental pressures, it is predicted that the population in Zululand (District Municipality of KwaZulu-Natal, South Africa) could become locally extinct in 26 years (from 2007), unless harvest rates have been underestimated, in which case local extinction could have been be 10–11 years away (McKean and Botha 2007).

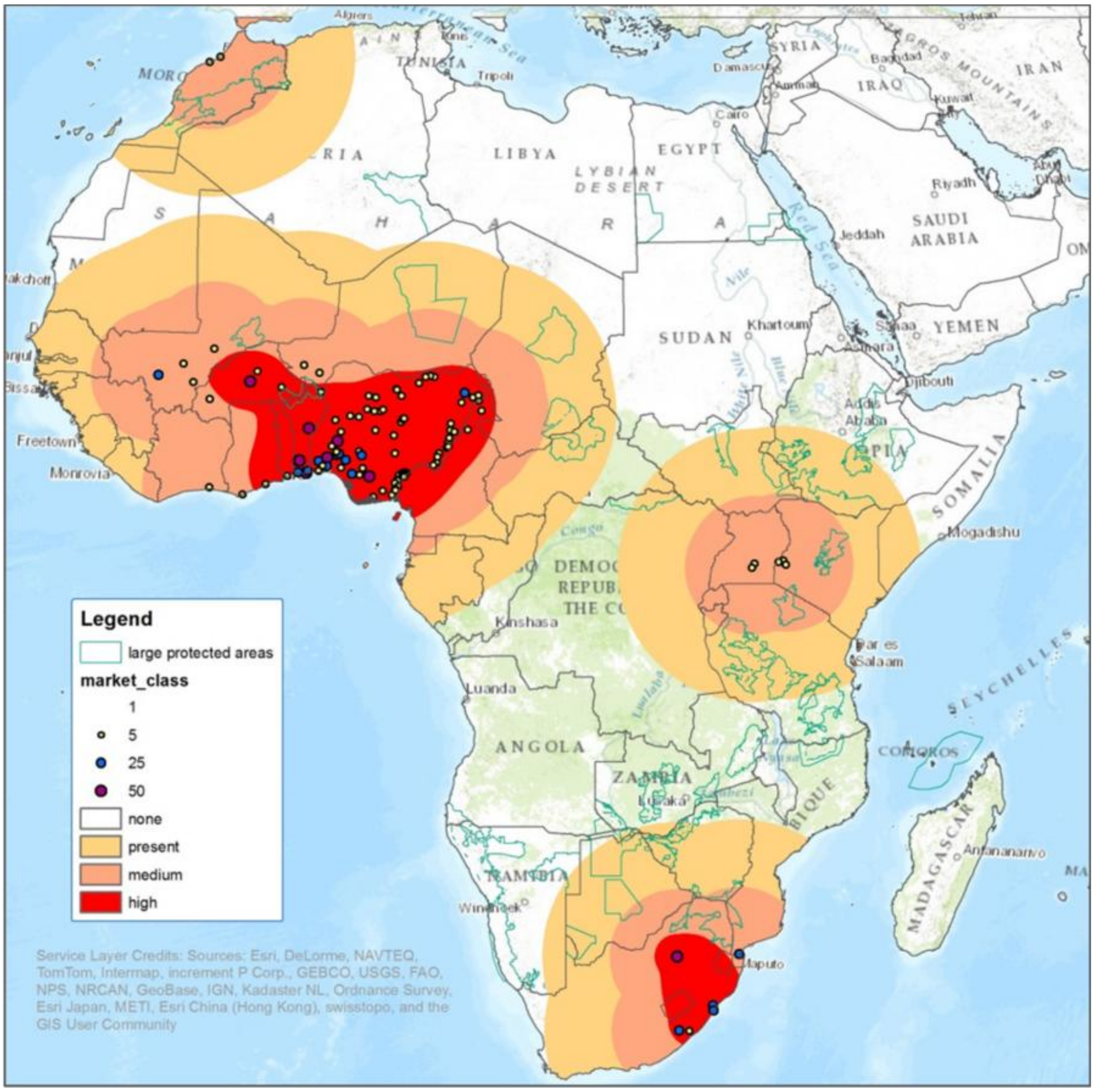

Figure 19. Map of Africa showing areas where belief-based use of vultures and their body parts appears to be most prevalent and impacting on vulture populations; based on locations of 125 'traditional medicine' markets surveyed and classed according to their size and availability of vulture products (unpublished map courtesy of HabitatInfo/African Raptor Databank; for methods and additional information see http://www.habitatinfo.com/african_vulture_maps/).

McKean and Botha (2007) also predicted that with current harvesting levels, **Cape Vulture** populations in the Eastern Cape, KwaZulu-Natal and Lesotho could become locally extinct within 44 to 53 years. However, should the numbers of **White-backed Vultures** continue to decline, a larger proportion of the current harvesting pressure is likely to fall on the **Cape Vulture**. In this instance, the **Cape Vulture** populations in Lesotho, KwaZulu-Natal and the Eastern Cape could be exhausted within 12 years.

The less numerous **Rüppell's Vulture** has been heavily exploited for trade in West Africa (Nikolaus 2006) and the estimated numbers traded of 1,128–1,692 individuals over a six-year period represents a significant proportion of the regional population (Buij *et al.* 2016). **Lappet-faced Vultures** have also been traded in substantial numbers in West and Central African markets, with a known offtake per year of 143–214 individuals (Buij *et al.* 2016); considering the relatively small population size and fragmented distribution this must be exerting serious pressures on regional populations. The species has also been recorded being used for belief-based use in small numbers in South Africa (McKean *et al.* 2013). **White-headed Vultures** have also been recorded being traded in small numbers in West and Central Africa (Buij *et al.* 2016), which, given the small population size, is likely to be significant. In South Africa, this species is killed for belief-based use (BirdLife International 2017). In Zambia, **White-headed Vultures** are known to be poisoned for use in witchcraft (Roxburgh and McDougall 2012).

In Mongolia, there is a recent growing demand for **Cinereous Vulture** feathers associated with contemporary religious practices (Batbayar 2005). Belief-based

persecution of **Bearded Vultures** has been recorded in Nepal, where the birds are believed to have medicinal value and are associated with prosperity (Acharya *et al.* 2010).

Belief-based use of vultures (and their body parts) for 'traditional medicine' in South Asia is localised and not considered to be responsible for observed nationwide declines. In South-east Asia, some persecution may take place to supply this trade but under current conditions this does not appear to be sufficient to constitute a significant threat. Belief-based use is known in Cambodia, but appears to be exceptional and this threat was treated as 'low priority' in the national vulture action plan (Sum and Loveridge 2016).

Sentinel poisoning

The recent increase in poaching of elephants has resulted in an increase in mass poisoning of vultures. Vultures are deliberately poisoned by poachers who may deploy large quantities of toxic pesticides on elephant carcasses because circling vultures signal potential illicit activities to those who are combatting poaching (Ogada 2014, Ogada *et al.* 2015, Richards *et al.* 2017) – vultures are killed because they play the role of sentinels. Between 2012 and 2014, Ogada *et al.* (2016) recorded 11 poaching-related incidents in seven (largely southern) African countries, in which 155 elephants and 2,044 vultures were killed. In at least two incidents, the harvesting of vulture body parts (seemingly for belief-based use) may have provided an additional motive. Vulture mortality associated with ivory poaching has increased more rapidly than that associated with other types of poisoning, accounting for one third of all vulture poisonings recorded in Africa since 1970. To date, all of the known cases of sentinel poisoning that have caused vulture mortalities have occurred predominantly in southern Africa, but the potential for this practice to occur widely in East Africa and parts of West Africa where elephant poaching is prevalent should not be underestimated (Figure 20.).

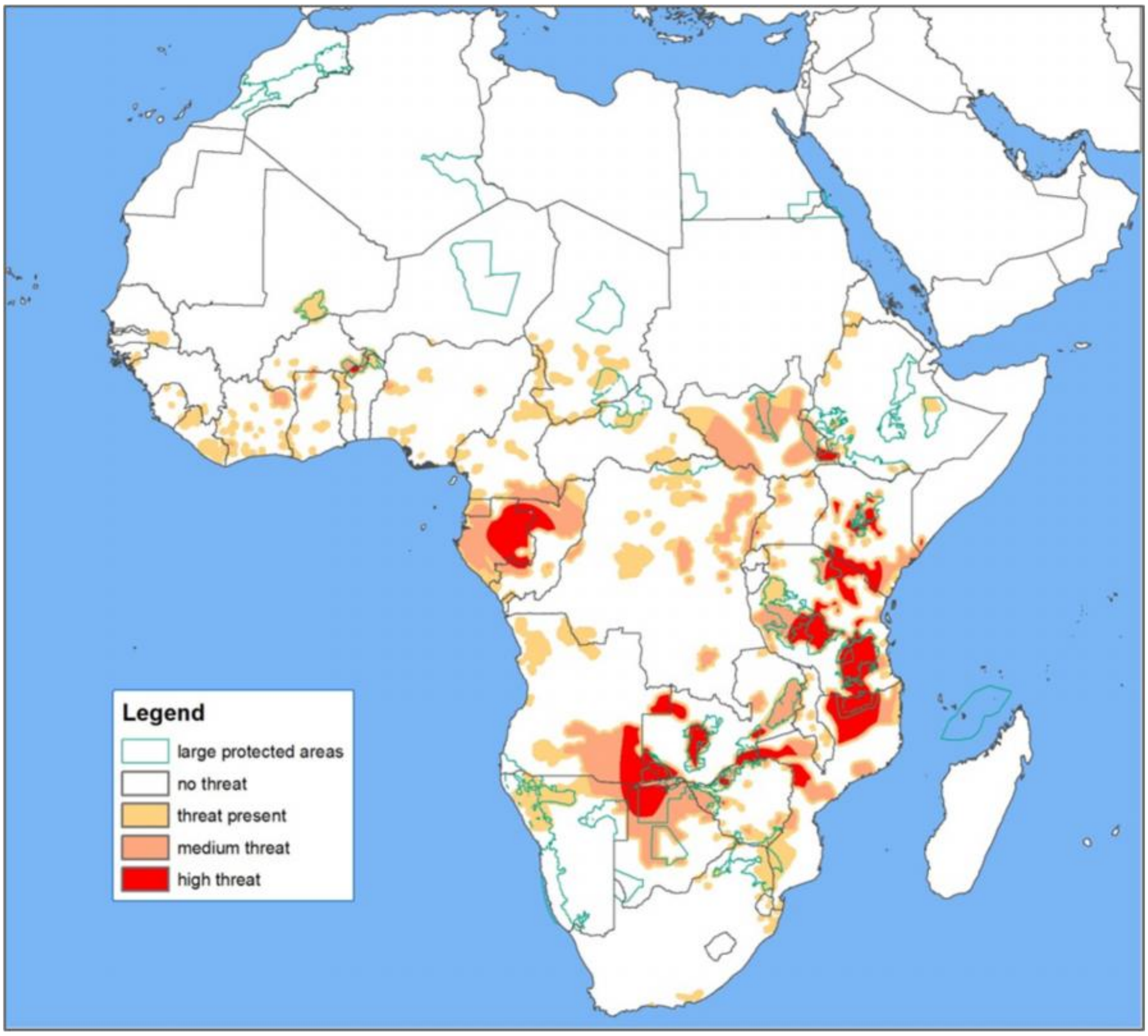

Figure 20. Map of Africa showing potential severity of the threat of sentinel poisoning, based on known incidents, areas subject to poaching pressure on large mammals such as elephants, and vulture distribution in Africa (unpublished map courtesy of HabitatInfo/African Raptor Databank; for methods and additional information see http://www.habitatinfo.com/african_vulture_maps/).

The scale of deaths at a single carcass can be significant, regularly exceeding 100 individuals. For example, at least 144 **White-backed Vultures** were killed after feeding on an elephant carcass in Gonarezhou National Park, Zimbabwe, in 2012 (Groom *et al.* 2013); over 500 vultures were found dead in Bwabwata National Park, Namibia, in 2013 after feeding on a single poisoned elephant carcass (Ogada *et al.* 2016). This phenomenon has also recently been recorded in South Africa, where two incidents resulted in deaths totalling 154 **White-backed Vultures** after feeding from poisoned elephant carcasses in the Kruger National Park (Murn and Botha 2017).

4.2 Mortality caused by power grid infrastructure

4.2.1 Electrocution

Bird mortality by electrocution on power poles is a global problem that has become more prevalent in recent years as energy demand increases, resulting in infrastructure growth often in previously undeveloped areas. Electrocution associated with powerlines occurs when a bird comes into contact with two wires, one of which is live, or when it perches on a conductive pylon (for example, a metal structure) and comes into simultaneous contact with a live wire. Large species such as vultures, eagles and storks are particularly vulnerable. Electrocution risk can be very significant at old, badly designed and insulated poles and poorly sited power lines. Effective planning, design and mitigating measures can dramatically reduce the impact of energy infrastructure on avian populations (BirdLife International 2017).

Electrocution from powerlines is one of the key threats to **Cape Vultures** in South Africa (van Rooyen 2000, Boshoff and Anderson 2006) with data suggesting that this cause of mortality makes a significant contribution to low juvenile and immature survival rates. Despite this, in certain situations vultures might derive some benefit from the presence of power lines in relation to increased nesting, roosting sites and nursery areas (Phipps *et al.* 2013a), which may allow them to expand their range, especially if suitable mitigation measures can be taken to lessen the risk of electrocution. Shimelis (2005) highlights the threat of electrocution and collisions from powerlines for the **Lappet-faced Vulture** with 49 individuals killed in South Africa between 1996 and 2003.

Certain power lines can have disproportionate impacts. Since construction in the 1950s, one approximately 30 km line from Port Sudan to the Red Sea coast was estimated to have electrocuted many hundreds and perhaps thousands of **Egyptian Vultures**; it was replaced in 2014 with a fully insulated bird-safe distribution line running parallel to the previous one. In Morocco, a 24 km powerline in the south-west is reported to have killed a significant number of raptors including threatened species, but no vultures to date (Godino *et al.* 2016). The impact of electrocution on vultures in the rest of Africa is poorly known, but there are many areas where this threat could have a substantial impacts (Figure 21).

Electrocution along power lines is among the main causes of vulture decline in Europe, significantly affecting the **Egyptian Vulture** population in the Canary Islands (Donazár *et al.* 2002) and the **Griffon Vulture** population in Israel (Leshem *et al.* 1985). In a recent study on the movement of 60 adult **Griffon Vultures** equipped with 90 gr GPS/GPRS-GSM telemetry devices the main mortality cause was electrocution by power lines and collisions in wind farms (J. A. Donázar pers. comm.).

Feedback and discussions during the Asian and Middle East Regional Workshops indicate that the threat posed by electrocution on power grids to vultures and other soaring birds is not extensively monitored within these regions and the impacts could therefore be underestimated. Harness *et al.* (2013) confirmed that power lines in Rajasthan, India, were responsible for bird electrocutions, but found no vultures among those species killed. Existing studies are, however, extremely limited, but the threats from similar infrastructure elsewhere well enough known, that this risk must be taken seriously in view of the increasing density of power grids.

4.2.2 Collisions

Each year millions of birds die worldwide as a result of collisions with above ground power lines. The impact on populations is likely to increase as energy infrastructure continues to grow, especially in developing countries. As for electrocution, the risks can be significant in old, poorly sited power lines. Under the current commitments to reduce carbon emissions, Parties to the United Nations Framework Convention on Climate Change (UNFCCC) are increasing their investments in renewable energy, particularly large wind farms. However, any renewable energy installations (e.g. solar and geothermal generation facilities) will inevitably lead to an expansion of the powerline distribution network which will likely increase the risk of collisions for vultures in certain areas. Despite their acute vision, vultures' field of view and normal head position when foraging can make them unaware of obstructions in their direction of travel, and they may be particularly vulnerable to collisions with infrastructure such as wind turbines and powerlines (Martin *et al.* 2012). The proliferation of renewable energy initiatives can therefore be detrimental to vultures if the location of turbines and associated infrastructure are in areas favoured by these birds (Jenkins *et al.* 2010).

Whilst energy infrastructure will affect vultures across the Vulture MsAP range, much of what we know about these impacts comes from southern Africa. For **Cape Vultures** in the Magaliesberg, a large number of fatalities are associated with powerline collisions, and this is probably one of the main factors that have caused declines of the species in South Africa (BirdLife International 2017). An estimated minimum number of 80 vultures (**Cape** and

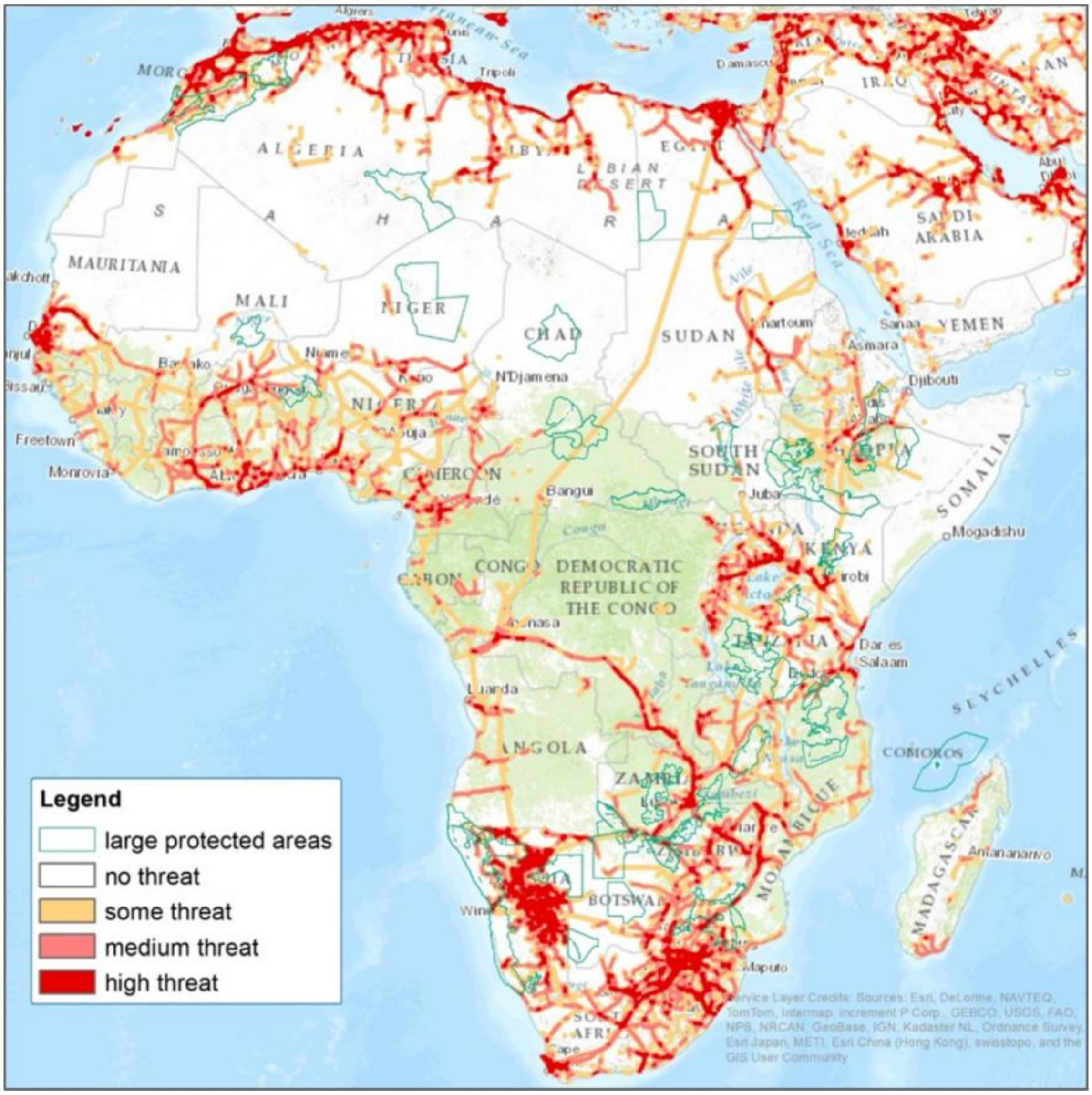

Figure 21. Map of Africa showing powerline networks that could have an impact on vultures by means of electrocution (unpublished map courtesy of HabitatInfo/African Raptor Databank; for methods and additional information see http://www.habitatinfo.com/african_vulture_maps/).

White-backed Vultures) are killed annually by collision with powerlines in Eastern Cape Province (Boshoff *et al.* 2011). Shimelis (2005) highlights the threat of collisions with and electrocution by powerlines for the **Lappet-faced Vulture** with 49 individuals killed in South Africa between 1996 and 2003.

A controversial wind farm development in Maluti-Drakensberg, Lesotho, an important site for **Cape Vultures**, was given approval in 2014 (Anonymous 2014), and is likely to result in significant vulture mortality if substantial mitigation measures are not implemented. Even relatively small scale wind energy developments in the Lesotho Highlands pose a threat to local vulture populations (Rushworth and Krüger 2014), and could lead to local extinctions. There are currently extensive plans for the increase of generation capacity, including wind turbines, and the expansion of the existing powerline network in East, Central and West Africa (https://www.usaid.gov/powerafrica) to respond to increasing demand for electricity in these areas. The map (Figure 22) indicates areas in Africa suitable for the development of windfarms and its associated energy infrastructure, and reflects the enormous potential scope of the threat of collision across the continent.

Collision with wind turbines is by far the highest cause of mortality for the **Griffon Vultures** in Spain (Carrete *et al.* 2012). For example, more than 5,600 **Griffon Vultures** have been killed at wind farms in five Spanish regions between 1996 and 2016 (Andalucía, País Vasco, Aragón, Navarra, Valencia) compared to 1,526 poisoned in the whole of Spain between 1992 and 2013 (Cano *et al.* 2016). Collisions with wind turbines are also significant threats for the **Egyptian Vulture**, with local populations in Spain (the main stronghold of the species in Europe) de-

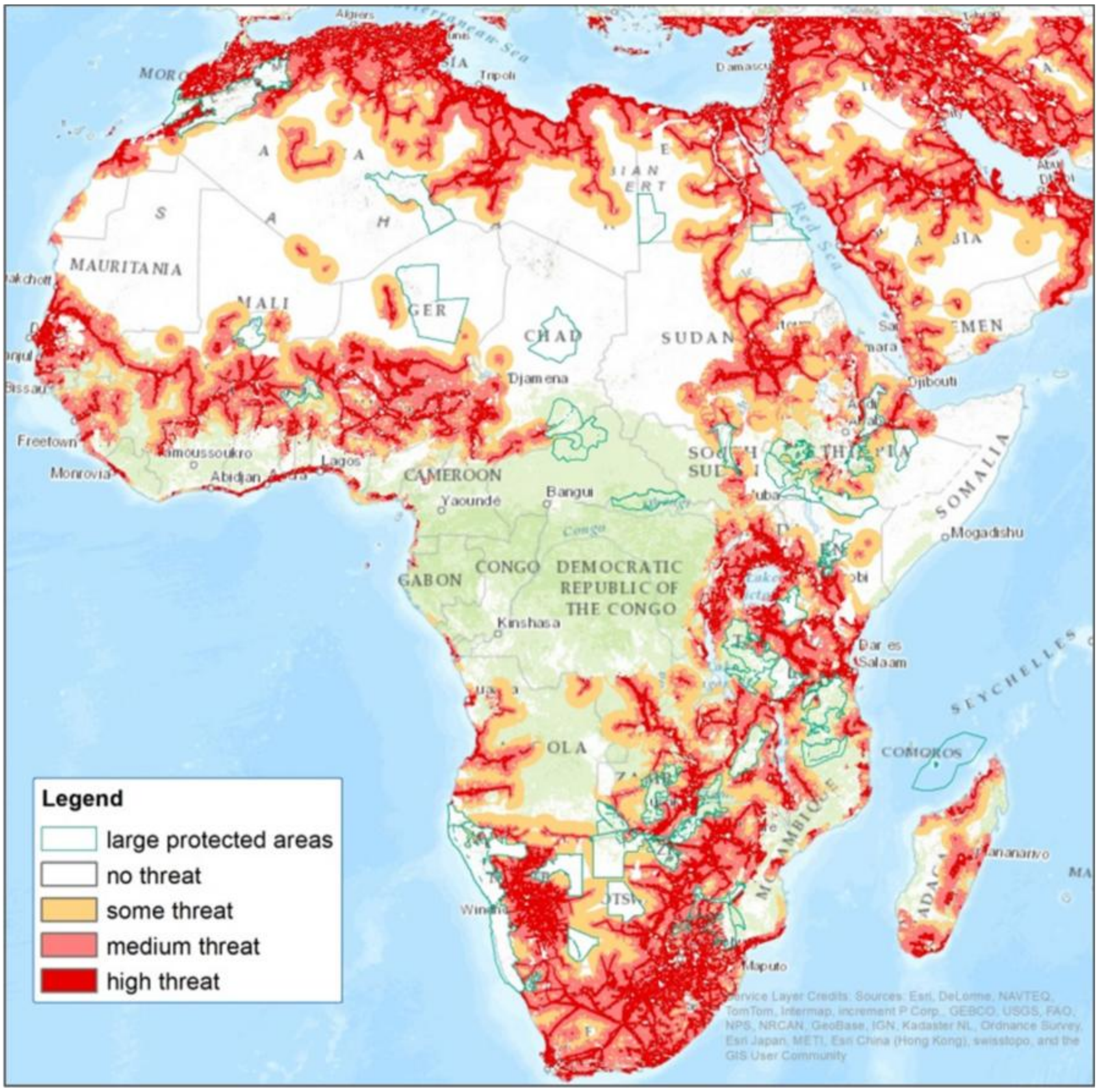

Figure 22. Map of Africa showing areas apparently suitable for the development of wind energy installations, taking into account wind speeds and distance from existing electricity grids and cities, that could potentially pose a threat of collision for vultures and other soaring birds (unpublished map courtesy of HabitatInfo/African Raptor Databank; for methods and additional information see http://www.habitatinfo.com/african_vulture_maps/).

clining through a combination of mortality derived from collisions and poisoning (Carrete *et al.* 2009, Sanz-Aguilar *et al.* 2015).

Very little scientific information is available about this threat in Asia and the Middle East. Kumar *et al.* (2012) monitored bird mortality for one year at a wind farm in Gujarat, India, confirming that collisions of birds with turbines occur, although no vultures were recorded in the study. Collision with wires has been reported to be a threat to Cinereous Vultures wintering in South Korea. Although these studies are so far extremely limited, information from elsewhere shows that the threats of collision must be taken seriously in view of the increasing density of power grids.

4.3 Decline of food availability

As obligate scavengers feeding on carcasses of various sizes, vultures are susceptible to declines in the availability of carcasses, especially of ungulates. Four main factors could reduce food (carcass) availability for vultures. First, a reduction in the numbers of dead livestock could result from carcasses being buried or burned, or dumping sites for carcasses being closed entirely. These measures could be prompted by concerns over smell or risks to public health to reduce the number of rotting carcasses. Second, competition for food with feral dogs and other scavengers: an example of this is the increase in feral dog populations in India (Cunningham *et al.* 2001, Markandya *et al.* 2008) followingthe decline in vultures due to poisoning by NSAIDs. Third, reduced wild ungulate populations diminish food availability for vultures where these are

more important than livestock. And, fourth is the impact of improved animal husbandry which results in fewer carcasses being available for vultures to feed on (Mundy *et al.* 1992).

The extent and impact of this threat varies considerably within the Vulture MsAP range. It is considered significant in Africa and South-east Asia and relevant in Europe, but not a significant threat in South Asia. Declines in large mammal populations have been recorded across Africa since the 1970s (59%) with the largest declines in West Africa (85% decline in protected areas: Craigie *et al.* 2010). In East Africa, Western *et al.* (2009) show that wildlife populations in National Parks and other protected areas have declined at similar rates to the wider countryside. BirdLife International (2017) cites declining ungulate populations as a threat for five of the African endemic vultures.

In contrast, livestock populations in Africa have more than doubled since the 1960s, and vultures will feed on livestock carcasses if local practices allow them to be available to scavengers. However, use of domestic ungulate carcasses for food by humans, changes in animal butchering practices, improvements in livestock management and sanitation at slaughterhouses may offset the increased numbers of livestock as a potential food source for vultures, either partly or completely. Hence, although not fully established, declines in abundance of wild ungulates are likely to have impacted vulture populations, especially where the ungulate declines have been most severe, such as in West Africa. Improved sanitation is likely to have impacted **Hooded Vultures** more than other African species due their strong association with human settlements in at least part of their range (Thiollay 2006, Ogada and Buij 2011). **Hooded Vultures** at five slaughterhouses visited in northern Cameroon were competing for scraps with domestic dogs.

Based on expert opinion, Boshoff and Anderson (2006) ranked a lack of carrion as a significant threat to the **Cape Vulture**, although they acknowledged that there was no substantial research to back up this hypothesis. The increasing use of supplementary feeding sites (vulture restaurants) by a population of **Cape Vultures** in the Magaliesberg Mountains may suggest a level of reliance on such artificial food sources due to declining natural food (Wolter *et al.* 2007). Provision of food at vulture restaurants also has the potential to guarantee poison-free food and to modify the birds' behaviour, encouraging them to forage only in safe areas and thereby minimising their movements in areas where poisoned baits may be used.

One of the main reasons for the decrease, including in certain cases to extinction, of several vulture species in Europe has been a significant reduction in food resources (Donázar *et al.* 2009, Ogada *et al.* 2012). A lack of 'natural' food resulted from the introduction of restrictive veterinary sanitary regulations (due to Bovine Spongiform Encephalopathy, Regulation CE 1774/2002) in most European countries, leading to a decline in the extensive keeping of domestic animals, and sometimes a reduction or even extinction of wild mammals (ungulates and lagomorphs). The application of this sanitary legislation, by greatly restricting the use of animal by-products not intended for human consumption, deprived bird populations of the resources they depended on to survive. It has been estimated that in some parts of Spain, 80% of animal carcasses originating from farms are being removed for industrial disposal; in the case of cows this figure reaches 100% (Donázar 2009, Margalida 2010).

By contrast, in some other parts of Spain, vultures have persisted or increased partly because of food management and legal protection (Donázar *et al.* 2009). In the Middle East, more stringent sanitary measures at rubbish dumps, which provide an important source of food for **Egyptian Vultures** could potentially reduce the amount of available food from this source for this species and other scavenging birds. In eastern Europe, the **Egyptian Vulture** seems dependent upon small scale farming practices, in contrast with the land management intensification under the EU Common Agricultural Policy (Oppel *et al.* 2017) elsewhere in the region.

The loss of traditional mobile livestock management practices (pastoral nomadism) is among the variety of anthropogenic factors that threatens vulture populations (Marinković and Karadzić 1999, Mateo-Tomás 2013). Traditional mobile pastoral practices can and do provide safe food for vultures.

Different methods of supplementary feeding for vultures have been developed, aiming to rescue and restore endangered populations suffering food shortages or to manage their populations (Ewen *et al.* 2015, Fielding *et al.* 2014). Ewen *et al.* (2015) emphasise the need for a better evaluation of positive and negative effects before implementing supplementary feeding and for a method to determine whether this type of artificial feeding is necessary among other alternative actions for conservation. It was evidenced that food shortage threatening **Egyptian Vultures** in the Balkans was not related to the negative trend of the population (Dobrev *et al.* 2015), and that supplementary feeding did not increase productivity or survival (Oppel *et al.* 2016). In southern Africa, where supplementary feeding sites have been used since the 1970s, tracking studies have illustrated that these sites do not significantly influence the foraging movements of **Cape Vultures** (Kane *et al.* 2016), while supplementary feeding in the vicinity of **Cape Vulture** breeding colonies during the nest-building stage can increase the number of breeding pairs and ultimately the number of offspring (Schabo *et al.* 2016).

Evidence does not suggest that food shortage accounts for the vulture population crash across the Indian sub-

continent. However, this does appear to be a threat in other parts of Asia, most notably South-east Asia. Across the Indian sub-continent, there is evidence that food availability for vultures has remained high. A study in India (V. Prakash pers. comm.) combining vulture survey data with information from bone and hide collectors about carcass dumps and cattle mortality suggested that enough meat was available to sustain a vulture population far in excess (around 20 times) of the actual number present. Other factors appeared to be the cause of the low population.

In South-east Asia, where large areas of suitable habitat for vultures still remain, food shortage in the latter part of the 20th century has almost certainly played a major part in vulture declines (Pain *et al.* 2003): wild ungulate populations crashed in the region due primarily to uncontrolled hunting and habitat loss (Srikosamatara and Suteethorn 1995, Duckworth *et al.* 1999, IUCN 2000) and this has been accompanied by a reduction in the number of free-ranging livestock and improvements in animal husbandry.

4.4 Habitat loss, degradation and fragmentation

The impact of habitat change on vulture populations is complex although it is often cited as a contributing factor to vulture declines. This may concern large scale modification affecting food supply (considered above) or other ecological factors. Both cliff and tree-nesting vultures have specific breeding site requirements, which are easily affected by human activities such as: quarrying; construction of tourist or leisure facilities near breeding cliffs; widening of roads and highways; logging, other forms of deforestation and clearance of large trees in agricultural areas.

Habitat loss and degradation are suspected to have contributed to the dramatic declines of vultures (**Hooded**, **Rüppell's**, **White-backed**, **White-headed** and **Lappet-faced**) outside protected areas in West Africa (Thiollay 2006, Ogada and Buij 2011), with the root cause being the rapid increase in the human population and loss of suitable habitat as a result of settlement expansion. Thiollay (2006) highlights the complexity of habitat degradation with dramatic changes in natural resource management changing large tracts of woodland to shrub land, increased desertification and the decline in large game outside of protected areas. All of these factors must have an impact on vulture populations, albeit not quantified. In East Africa, specifically in and around the Masai Mara National Reserve, Virani *et al.* (2011) showed that declines in large vultures (**Rüppell's**, **White-backed**, **White-headed** and **Lappet-faced**) were linked to changes in land use and tenure systems (grazed, buffer zones, reserve) with declines largest outside the reserve area. Virani *et al.* (2011) also acknowledge that the magnitude of the declines couldn't be explained wholly by land use change and that poisoning was a more significant threat. Schultz (2007) suggests that bush encroachment in northern Namibia, exacerbated by increasing carbon dioxide levels worldwide, reduced foraging success in both **Cape** and **White-backed Vultures**. This coincided with a long-term decline in the **Cape Vulture** population in that country. Land use changes in southern Africa are varied and include degradation by intensive agriculture, cultivation, urbanisation, roads, dams, mines, desertification, afforestation and expansion of alien vegetation. Further quantitative research is needed to determine which of these factors are most important for the **Cape Vulture**, or indeed any of the African vulture species.

In South-east Asia, there is too little information about nesting sites for vultures to infer that they are under threat. There should be no shortage of nesting sites in intact habitat (T. Clements pers. comm.), but known nesting trees of vultures have been cut along the Sesan River, Cambodia, after which new nests were not observed; this suggests that selective logging may force vultures to relocate and impact vulture nesting success (Sum and Loveridge 2016).

4.5 Disturbance from human activities

A wide range of human activities can cause disturbance, such as construction of infrastructure, agriculture, aviation, mining, blasting and quarrying; some examples documented in the literature are presented below.

Generally, **White-backed Vultures** are vulnerable to nest harvesting or disturbance by humans, especially outside protected areas (Bamford *et al.* 2009) perhaps more so than other species because of their preference for nesting in trees. Komen (1985) considers human disturbance at breeding colonies of **Cape Vulture** a significant problem. It has been documented that **Rüppell's Vulture** suffer from disturbance, especially from climbers. For example in Mali, the Hombori and Dyounde massifs are dotted with at least 47 climbing routes, on which expeditions take place every year, mainly during the species' breeding season. However, the precise impact of these activities is not known (Rondeau and Thiollay 2004). Benson (1985), indicates that climbing also impacts nesting **Cape Vultures** in South Africa.

Lappet-faced Vultures are especially sensitive to nest disturbance (Steyn 1982). The impact may be growing with expansion of human settlements (for example in Ethiopia: BirdLife International 2016a) and the increasing recreational use of off-road vehicles which is reported in Africa (Mundy *et al.* 1992) and Saudi Arabia (Shimelis *et al.* 2005). Also in Saudi Arabia, suitable large nesting trees may be subject to the most intense human disturbance as shepherds also use the same large trees for shelter for themselves and their livestock (Shobrak 2011).

Aviation may cause disturbance, which may be a significant problem for already rare species. The South African

Air Force maintains a policy of keeping a flight-restricted 2 km buffer from **Cape Vulture** colonies to avoid disturbance, but as far as is known such measures are not widespread elsewhere. Recreational aviation has also been recorded causing disturbance to vultures.

In South Asia, there is anecdotal evidence of disturbance at cliff nesting sites of vultures caused by quarrying activities. Nesting sites of **White-rumped Vultures** are threatened by logging at some sites in Nepal (H. Baral pers. comm.). However, in India, most of the nesting habitat, both within and outside protected areas is not currently threatened or affected by disturbance. There have been reports of birds being chased away from or prevented from nesting on buildings or monuments of historical significance in parts of South Asia, but no further details are known.

In Spain, cork harvesting it is considered to be one of the main causes of disturbance to the **Cinereous Vulture** during the breeding season, because this activity is carried out in June and July when chicks are being reared (Margalida *et al.* 2010). Pairs in an area of a colony exposed to intrusive anthropogenic activity had 20% lower breeding success than those in the same colony that were not exposed to these disturbances (Margalida *et al.* 2010).

4.6 Disease

Infectious diseases were considered as a possible explanation for the South Asian vulture declines, before diclofenac was found to be the cause. Analyses revealed no evidence of avian influenza or West Nile virus in **White-rumped Vultures** found dead in Pakistan, nor were viruses isolated from the kidney, spleen, lung and intestine of these birds (Oaks *et al.* 2004). Assessments of herpes and other viruses have produced no indication that any are associated with serious pathology (L. Oaks in Anonymous 2004). Avian malarial parasites have been found in vultures in India (Poharkar *et al.* 2009), but such parasites are widespread and the finding did not imply that these parasites were pathogenic to the vultures (Ishtiaq 2009). No information on the prevalence of disease in wild vultures in other parts of Asia is known. However, introduction of or exposure to new pathogens, such as poultry disease (e.g. influenza), is a potential risk to vultures throughout their ranges.

It has been suggested that **Hooded Vultures** in West Africa may be threatened by avian influenza, from which they appear to suffer some mortality and which they may acquire from feeding on discarded dead poultry (Ducatez *et al.* 2007).

In Europe, a threat assessment for **Egyptian Vultures** in the Balkans produced 182 samples from 49 individuals from Bulgaria and Greece. A wide range of microorganisms was tested for, all known as potential pathogens for vultures, but none of the sampled individuals were found to be infected; only very low concentrations of Newcastle Disease were detected in most samples and, in some, low concentrations of Avian adenovirus and Avian circovirus were detected. This indicates contact with these viruses (which are probably very common), but without symptoms (Andevski and Zorrilla Delgado 2015).

4.7 Climate change

Climate change affects birds in different ways, altering distribution, abundance, behaviour, genetic composition, and timing of events like migration or breeding. Direct effects of climate change such as changes in temperature and rainfall patterns can also impact birds due to increased pressure from competitors, predators, parasites, diseases and disturbances (e.g. fires or storms).

Very little research has been published to illustrate the impact of climate change on vultures. It is, however, speculated that the species breeding at higher altitudes (**Bearded** and **Cape Vulture**) in southern Africa may experience range contractions due to increased temperatures (Simmons and Jenkins 2007). There are concerns that **Cape Vulture** breeding colonies in the north of the species' range are at greater risk from the effects of climate change than those in the south and that areas currently containing the bulk of the breeding population may become unsuitable for breeding (Phipps *et al.* 2017). The overall impact of climate change can be more severe when it occurs with other major threats such as habitat loss and reduction in available food sources. Additional research on the impact of climate change on vultures throughout the Vulture MsAP range is necessary.

4.8 Other threats

A range of additional threats affect vulture populations throughout Africa and Eurasia, but these are often species -specific, with more localised effects than those discussed above. However, particularly at breeding sites, these can have locally significant impacts on productivity, the importance of which is likely to increase if vultures continue to decline and populations become more fragmented.

Drowning. Historically **Cape Vultures** were susceptible to drowning with records of at least 120 individuals (21 incidents) being killed in small farm reservoirs in southern Africa between the early 1970s and late 1990s (Anderson *et al.* 1999). Modifications to many reservoirs have now been made (Boshoff *et al.* 2009) and it is not clear if this remains a significant threat. A significant number of satellite-tagged juvenile **Egyptian Vultures** from eastern Europe have been lost in the Mediterranean Sea, presumed drowned, during their first migration (Oppel *et al.* 2015).

Illegal killing, taking and trade in various forms not covered above can be directly targeted at vultures. In some cases, this can be purely because of a dislike of or superstition against vultures and may involve poison,

shooting or capture. In South-east Asia, vultures are sometimes caught and held as pets or display animals. This is certainly known in Cambodia, but appears to be exceptional and this threat was treated as 'low priority' in the national vulture action plan (Sum and Loveridge 2016). There are also cases of nest robberies (**Griffon** and **Egyptian Vultures**) in eastern Europe by egg collectors (Bulgarian Society for the Protection of Birds 2014).

Sport hunters may occasionally shoot at vultures as novel targets. In parts of central Asia vultures are known to be hunted for trophies and taxidermy.

Other collisions (in addition to those with energy infrastructure)

- Before vulture numbers were significantly reduced in South Asia, collisions with aircraft were considered a serious concern. The number of fatalities caused directly by these crashes may not have affected population levels, but shooting and poisoning to reduce vulture numbers near airfields, although unquantified, could have had a negative impact in the 1970s and 1980s.
- *Trains* (northern India) kill numbers of vultures and are a cause of mortality at least on a local scale.
- *Kite strings* (north-west India) also kill and injure locally significant numbers of vultures annually during kite festivals.
- *Motor vehicles* can kill vultures in areas where individuals feed on dead animals along the roads (e.g. **Egyptian Vultures** in Sudan: Birdlife International 2017).

Table 3. Threats affecting each species of vulture, and their overall severity.

Threats	Species and Level of Threat*														
	Bearded Vulture	Egyptian Vulture	Red-headed Vulture	White-headed Vulture	Hooded Vulture	Himalayan Griffon	White-rumped Vulture	White-backed Vulture	Indian Vulture	Slender-billed Vulture	Cape Vulture	Rüppell's Vulture	Griffon Vulture	Cinereous Vulture	Lappet-faced Vulture
Unintentional poisoning															
Human-animal conflict	Red	Red	Yellow	Red	Red	Green	Yellow	Red	Yellow	Yellow	Red	Red	Red	Red	Red
Problem animal control	Red	Red	Blue	Grey	Red	Blue	Blue	Grey	Blue	Blue	Grey	Grey	Yellow	Yellow	Grey
Lead from ammunition	Yellow	Green	Green	Blue	Blue	Green	Blue	Blue	White	Blue	Blue	Blue	Green	Green	Green
Veterinary Drugs (NSAIDs, tranquilisation, livestock dips and euthanasia)	Yellow	Green	Red	Grey	Grey	Red	Red	Grey	Red	Red	Grey	Grey	Yellow	Yellow	Grey
Industrial pollution	Grey	Grey	Grey	Grey	Grey	Grey	Grey	Grey	Grey	Grey	Grey	Grey	Grey	Grey	Grey
Intentional poisoning targeted at vultures															
Belief-based use and bushmeat	Green	Red	White	Red	Red	White	White	Red	White	White	Red	Red	Blue	Red	Red
Sentinel Poisoning	Yellow	Yellow	White	Red	Red	White	White	Red	White	White	Red	Red	White	Green	Red
Direct Persecution	Yellow	Yellow	Grey	Grey	Yellow	Green	Blue	Grey	Grey	Blue	Grey	Grey	Yellow	Yellow	Grey
Electrocution															
Powerline poles	Yellow	Red	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Red	Yellow	Yellow
Collisions with infrastructure															
Powerlines	Yellow	Red	Yellow	Yellow	Yellow	Yellow	Yellow	Blue	Yellow	Yellow	Yellow	Green	Red	Yellow	Yellow
Wind turbines	Yellow	Red	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Blue	Red	Yellow	Blue
Communication Towers	Green	Yellow	Yellow	Yellow	Yellow	Grey	Grey	Green	Grey	Grey	Yellow	Yellow	Yellow	Yellow	Yellow

Threats	Species and Level of Threat*														
	Bearded Vulture	Egyptian Vulture	Red-headed Vulture	White-headed Vulture	Hooded Vulture	Himalayan Griffon	White-rumped Vulture	White-backed Vulture	Indian Vulture	Slender-billed Vulture	Cape Vulture	Rüppell's Vulture	Griffon Vulture	Cinereous Vulture	Lappet-faced Vulture
Decline of food availability															
Reduced availability of livestock carcasses															
Decline of wild ungulates															
Changes in carcass disposal															
Improved sanitation (Abattoirs)															
Change in cultural practices															
Change in foraging patterns due to different spatial availability of food															
Habitat loss															
Loss of trees and cliffs															
Bush encroachment/ reforestation															
Human settlement expansion within historical foraging range															
Degradation of rangelands															
Disturbance from human activities															
Recreation															
Construction of infrastructure															
Agricultural/Forestry															
Research & Monitoring															
Aviation															
Mining & Blasting															
Diseases															
Diseases															
Climate change															
Climate Change															
Other threats															
Drowning															
Illegal Killing, Taking & Trade															
Sport Hunting															

Threats	Species and Level of Threat*														
	Bearded Vulture	Egyptian Vulture	Red-headed Vulture	White-headed Vulture	Hooded Vulture	Himalayan Griffon	White-rumped Vulture	White-backed Vulture	Indian Vulture	Slender-billed Vulture	Cape Vulture	Rüppell's Vulture	Griffon Vulture	Cinereous Vulture	Lappet-faced Vulture
Other collisions															
Vehicles	Unknown	Unknown	Unknown	Unknown	Unknown	Unknown	Unknown	Unknown	Unknown	Unknown	Unknown	Unknown	Unknown	Unknown	Unknown
Aircraft	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	Low	Not applicable	Not applicable	Not applicable
Kite strings	Not applicable	Low	Not applicable	Not applicable	Not applicable	Medium	High	Not applicable	Low	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable
Indirect threat - missing or ineffective policies, laws and enforcement															
Lack of appropriate legislation	Medium	Low	Medium	Low	Medium	Medium	Critical	Medium	Critical	Critical	Low	Medium	Medium	Critical	Medium
Lack of or limitations to enforcement	High	High	High	High	High	High	High	High	High	High	High	High	High	High	High

Threats are colour-coded as follows:

Critical	High	Medium	Low	Unknown	Not applicable

Ranking of threats is based on scope, severity and irreversibility – data gathered via questionnaires and at the Regional Workshops.

5 Stakeholders and potential collaborators

A very wide range of stakeholders are involved with or can potentially influence vulture conservation actions (Table 4), mainly as a result of the birds' extensive distribution across Africa and Eurasia, their high ecological significance making them relevant across many sectors, and the range of threats that they face. With so many Range States, space does not permit a catalogue of stakeholders for each country. However, the main categories of stakeholders have been identified. Based on generic descriptions of these and commonalities between countries, it should be possible to identify most if not all relevant stakeholders in any given Range State.

In particular, many conservation and non-conservation stakeholders, that may be directly concerned with vultures, nevertheless have priorities that are affected by the same threats as those suffered by vultures. An example is health authorities dealing with belief-based use of vultures by people for various reasons which is at best medically ineffective and at worst potentially lethal if the body parts used were obtained from poisoned birds. Another is big cat or elephant conservationists dealing with poisoning and/or poaching which also kills many vultures.

Vulture conservationists cannot solve many of the threats on their own, so it is vital that they engage with the many other stakeholders identified here with the aim of developing strategic alliances to achieve shared goals.

Table 4. Stakeholders in vulture conservation, including activity types and threats most relevant to each.

Stakeholder	Activity type addressed				Threat (and associated Vulture MSAP Objective) addressed[1]												
	Research & Monitoring	Direct Conservation Action	Policy & Legislation	Education & Awareness	1 Poisoning (human wildlife conflict)	1 Poisoning (problem animal control)	2 Poisoning (NSAIDs)	3 Poisoning (lead)	4 Belief-based use and bushmeat	5 Sentinel poisoning	6 Electrocution (energy infrastructure)	7 Collision with energy infrastructure	8 Decline of food availability	9 Habitat loss & degradation	10 Direct persecution and disturbance	11 Cross-cutting actions	12 Promotion and implementation
CMS (including Raptors MOU, Preventing Poisoning Working Group and Energy Task Force), African-Eurasian Migratory Landbirds Working Group			X		x	X	X	X	X	X	X	X	X	X	X	X	X
Convention on Biological Diversity (CBD)			X		X	X	X	X	X	X	X	X	X	X	X	X	X
CITES			X						X	X						X	
UNCCD	X		X										X	X		X	
UNFCCC			X								X	X				X	

Stakeholder	Activity type addressed				Threat (and associated Vulture MSAP Objective) addressed[1]												
	Research & Monitoring	Direct Conservation Action	Policy & Legislation	Education & Awareness	1 Poisoning (human wildlife conflict)	1 Poisoning (problem animal control)	2 Poisoning (NSAIDs)	3 Poisoning (lead)	4 Belief-based use and bushmeat	5 Sentinel poisoning	6 Electrocution (energy infrastructure)	7 Collision with energy infrastructure	8 Decline of food availability	9 Habitat loss & degradation	10 Direct persecution and disturbance	11 Cross-cutting actions	12 Promotion and implementation
Rotterdam and Stockholm Conventions (relating to importation of hazardous chemicals, and persistent organic pollutants)			X		X	X	X	X	X	X						X	
IUCN SSC Vulture Specialist Group	X	X	X	X	X	X	X	X	X	X	X		X	X	X	X	X
International Conservation NGOs e.g. IUCN, WWF, WCS, Peregrine Fund, AWF, EWT, BirdLife International, SAVE	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
National Conservation NGOs, e.g. BirdLife Partner NGOs, others especially large mammal conservation and rangeland management	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Conservation breeding institutions	X	X	X	X												X	
Research institutions, universities and academics	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Regional and sub-regional economic commissions, e.g. EAC, SADC, IGAD, ECOWAS, AMCEN, African Union			X		X	X	X		X	X	X		X	X	X	X	X
Donors, Banks and Supporters (World Bank, USAID, ADF, etc.)	X	X	X	X	X	X	X		X	X	X	X	X	X	X	X	X
Private Sector e.g. (agro)chemical, pharmaceutical, energy, agriculture, tourism, mining, abattoirs		X	X	X	X	X	X		X	X	X	X	X	X	X	X	X
Government (national and local) ministries or authorities: wildlife	X	X	X	X	X	X	X		X	X	X	X	X	X	X	X	X
Government (national and local) ministries or authorities: agriculture			X		X	X										X	
Government (national and local) ministries or authorities: livestock and veterinary services/animal health			X			X	X						X	X		X	
Government (national and local) ministries or authorities: health			X		X	X		X	X							X	
Government (national and local) ministries or authorities: tourism			X	X										X	X	X	
Government (national and local) ministries or authorities: energy			X					X			X	X				X	

Stakeholder	Activity type addressed				Threat (and associated Vulture MSAP Objective) addressed[1]												
	Research & Monitoring	Direct Conservation Action	Policy & Legislation	Education & Awareness	1 Poisoning (human wildlife conflict)	1 Poisoning (problem animal control)	2 Poisoning (NSAIDs)	3 Poisoning (lead)	4 Belief-based use and bushmeat	5 Sentinel poisoning	6 Electrocution (energy infrastructure)	7 Collision with energy infrastructure	8 Decline of food availability	9 Habitat loss & degradation	10 Direct persecution and disturbance	11 Cross-cutting actions	12 Promotion and implementation
Other national authorities, e.g. heads of state, embassies			X	X	X	X	X		X	X	X		X	X	X	X	X
Customs and Border controls			X						X								
Local government: urban authorities, local municipalities or districts		X	X		X	X	X		X	X	X	X	X	X	X	X	X
Local communities: grassroots groups and individuals		X		X	X	X			X	X	X		X	X	X	X	X
Judiciary and law enforcement agencies			X		X	X	X		X	X						X	
Religious leaders		X		X					X	X						X	X
Traditional healers/medicine practitioners		X		X			X		X	X						X	X
Pastoral communities		X	X	X	X	X							X	X		X	X
Media				X	X	X		X	X	X	X		X	X	X	X	X
Celebrities				X	X	X	X		X	X	X		X	X	X	X	X
Military		X	X		X	X	X	X	X	X	X		X	X	X	X	X
Hunters		X	X	X				X	X	X						X	X

[1] Except Objectives 11 and 12 which are not primarily focussed on specific threats.

6 Policies, legislation and action plans relevant for management

A number of international conventions and other intergovernmental policy frameworks exist that provide a platform for tackling the main threats to vulture populations as set out in Section 4: For example, poisoning, mortality caused by power grid infrastructure, decline of food availability, habitat loss, degradation and fragmentation and human disturbance. Yet these conventions, with the exception of work through the Convention on the Conservation of Migratory Species of Wild Animals (CMS) and its associated agreements and task forces on poisoning, energy and the illegal killing, taking and trade in migratory birds, provide little or no reference to vultures, including in the national plans of Parties (e.g. the Convention on Biological Diversity and the International Union for the Conservation of Nature). This section briefly outlines the responsibilities that selected international processes and relevant conventions place on countries, before looking in more detail at the frameworks (and often substantial gaps) that exist in international policies to deal with two of the greatest threats to vultures, i.e. poisoning (through its different pathways) and impacts from power grid infrastructure (with specific reference to wind energy infrastructure collision risk, transmission line electrocution and collision risk, both from existing and planned developments).

A country-by-country or region-by-region analysis of policy and legislation is beyond the scope of this Vulture MsAP, although Range States are encouraged to undertake such reviews. However, a summary of country involvement in international processes and relevant forums is presented at the end of this section (Table 5).

6.1 Multilateral Environmental Processes and Agreements

6.1.1 United Nations Sustainable Development Goals (SDGs)

The *United Nations Sustainable Development Goals* were adopted in September 2015 by 193 Member States of the United Nations General Assembly as part of the wider global development framework, *Transforming our World: the 2030 Agenda for Sustainable Development*. The 2030 Agenda adopts sustainable development as the organising principle for global cooperation through the 17 Goals. These Goals reflect the Agenda's five key themes of: people, planet, prosperity, peace, and partnerships. The 17 goals are further refined into 169 targets. SDG 14 and SDG 15 are derived directly from the Aichi Targets of the Convention on Biological Diversity (see section 6.1.3 below), but it is the cross cutting nature of the SDGs that provides the opportunity to engage across sectors and to highlight the role that vultures play in the broader environment and how their conservation can contribute to the achievement of wider aims such as improvements in human health and development.

The SDGs are, however, not legal rules. There is an emphasis on 'national ownership' of the goals: to be as effective as possible, they need to be translated into nationally owned sustainable development strategies and integrated national financing frameworks. This process is only just underway in many countries, if at all.

6.1.2 United Nations Environment Assembly (UNEA)

The *United Nations Environment Assembly* is regarded globally as the highest-level decision-making body on the environment. All 193 United Nations Member States are members of UNEA, which develops resolutions and makes global calls for action to address critical environmental challenges.

UNEA has already begun to recognise and highlight a number of the poisoning issues surrounding wildlife. With the continued decline in species due to poisoning, there is a great urgency to add political momentum to this issue, if the critical problems of poison baits, toxic NSAIDs and the continued use of lead ammunition (despite almost all other industrial and consumer products being now mandated as lead-free) are to be tackled. UNEA has already adopted resolutions that have relevance to these issues (see below), but a resolution that addresses poisoning more explicitly may be important in accelerating political action:

- UNEA Resolution 2/7 Sound management of chemicals and waste, which recognises "the sig-

nificant risks to human health and the environment arising from releases of lead and cadmium into the environment".

- UNEA Resolution 2/14 Illegal trade in wildlife and wildlife products, which is of direct relevance to the issue of poisoning, as poisoning is often used in poaching. The Resolution '*Further requests* the Executive Director, within the mandate of the United Nations Environment Programme, to work with other relevant intergovernmental and non-governmental international organizations to identify and compile the current status of knowledge on crimes that have serious impacts on environment including illegal trade and trafficking in wildlife and its products, in particular, in terms of their environmental impacts, and to identify inter-linkages between these crimes and to report thereon to the United Nations Environment Assembly at its next session;"
- The vulture crisis was highlighted at UNEA's second session (UNEA2) in May 2016 by a side-event *Healthy Vultures, Healthy People*.

A UNEA Resolution directly addressing the issue of wildlife poisoning would help to build on the important work of CMS and create greater political awareness of this issue, both as it affects vulture populations specifically and other species more broadly. Such an approach would enable better integration of relevant environmental and human health dimensions and highlight how Member States and UN agencies can work towards eliminating the poisoning of wildlife.

6.1.3 Convention on Biological Diversity and the Aichi Targets

In 2010, *the Convention on Biological Diversity (CBD)* adopted the 20 Aichi Biodiversity Targets as part of the Strategic Plan for Biodiversity 2011–2020, where they are framed under five strategic goals to be translated into action through National Biodiversity Strategies and Action Plans (NBSAPs), with the objective of halting biodiversity loss and enhancing the benefits it provides to people. While necessarily broad, these targets cover areas of specific relevance to the existence and conservation of vultures, notably Targets 8 and 12 (CBD Secretariat, undated), which adopt International Union for the Conservation of Nature (IUCN) classifications as their metric. Indeed Target 12 explicitly states: "Though some extinctions are the result of natural processes, human actions have greatly increased current extinction rates. Reducing the threat of human-induced extinction requires action to address the direct and indirect drivers of change [...]. However, imminent extinctions of known threatened species can in many cases be prevented by protecting important habitats (such as Alliance for Zero Extinction sites) or by addressing the specific direct causes of the decline of these species (such as overexploitation, invasive alien species, pollution and disease)".

Specific reference to vultures in NBSAPs is, however, unusual (though, for example, Myanmar's final draft of their National Biodiversity Action Plan [Republic of the Union of Myanmar 2015] includes the following wording: "Regulate use of organochlorines and ban the veterinary use of diclofenac and other non-steroidal anti-inflammatory drugs known to kill vultures") but the CBD is increasingly promoting mainstreaming of biodiversity into economic sectors such as agriculture. The Cancun Declaration (Parties to the Convention on Biological Diversity 2016) from CBD COP13 in December 2016 specifically calls for:

- Prevention of agricultural pollution, and the efficient, safe and sustainable use of agrochemicals, fertilizers and other agricultural inputs.
- Promotion of the use of biodiversity in agricultural systems to control or reduce pests and diseases.

CBD also requires that Parties apply thorough assessment procedures, Strategic Environmental Assessments (SEAs) and Environmental Impact Assessments (EIAs) when it comes to the planning of activities with an impact on biodiversity (Secretariat of the Convention on Biological Diversity, Netherlands Commission for Environmental Assessment 2006). This is crucial in respect of the planning of energy installations and specifically renewable energy and associated transmission grids, and is discussed in Section 3.

6.1.4 Convention on Migratory Species

The Convention on the Conservation of Migratory Species of Wild Animals (CMS) provides a number of mechanisms, for example, Memoranda of Understanding (MOUs), Resolutions, Task Forces and Guidelines that have the most direct relevance to vulture conservation. These can be summarised as follows:

The MOU on the Conservation of Migratory Birds of Prey in Africa and Eurasia (Raptors MOU), concluded in October 2008, has an Action Plan which contains activities with specific references to poisoning and power lines and their impact on birds of prey. The Action Plan mentions the following activities that are of relevance in relation to power lines and are quoted below in full:

- 1.4 Review relevant legislation and take steps where possible to make sure that it requires all new power lines to be designed to avoid bird of prey electrocution.
- 2.3 Conduct risk analysis at important sites (including those listed in Table 3) [of Annex 3 of the Raptors MOU] to identify and address actual or potential causes of significant incidental mortality from human causes (including fire, laying poisons, pesticide use, power lines, wind turbines).
- 2.4 Conduct Strategic Environmental Assessments of planned significant infrastructure devel-

opments within major flyways to identify key risk areas.

- 3.2 Where feasible, take necessary actions to ensure that existing power lines that pose the greatest risk to birds of prey are modified to avoid bird of prey electrocution.

A range of other CMS Resolutions and Guidelines are highly relevant to vulture conservation, in particular:

- Resolution 11.14 on the Programme of Work for Migratory Birds and Flyways, which provided the mandate to develop the Vulture MsAP.
- Resolution 11.15 on Preventing Poisoning of Migratory Birds (Convention on Migratory Species 2014a): see Section 2.
- Resolution 11.16 on The Prevention of Illegal Killing, Taking and Trade of Migratory Species (Convention on Migratory Species 2014b): see Section 2.1.
- AEWA Conservation Guidelines No. 14 (2014): *Guidelines on How to Avoid or Mitigate Impact of Electricity Power Grids on Migratory Birds in the African-Eurasian Region*; see Section 3.3 (Prinsen et al. 2012).
- CMS, AEWA, International Renewable Energy Agency and Birdlife International (2014): *Renewable Energy Technologies and Migratory Species: Guidelines for sustainable deployment*. See Section 3.3 (van der Winden et al. 2014).
- Resolution 11.17 on Landbirds - African-Eurasian Migratory Landbirds Action Plan (AEMLAP) (Convention on Migratory Species 2014).
- The Abuja Declaration on Sustainable Land Use for People and Biodiversity including Migratory Birds in West Africa (Convention on Migratory Species 2016) proposes solutions to the unsustainable land use problem whose implementation could benefit vulture conservation.

A UNDP/GEF funded Migratory Soaring Birds flyway project has been in place since 2009 and is implemented by BirdLife International. This project aimed at conserving migratory soaring birds includes addressing the problems of electrocution by, and collision with power generation and transmission infrastructure, as well as poisoning.

6.1.5 United Nations Convention to Combat Desertification

Established in 1994, UNCCD is the sole legally binding international agreement linking environment and development to sustainable land management. The Convention addresses in particular the arid, semi-arid and dry sub-humid areas, known as the drylands, where some of the most vulnerable ecosystems and peoples can be found. UNCCD is relevant to the conservation of vultures by helping to address the threats of habitat loss, degradation and fragmentation (Section 4.4), through promotion of the adoption and scaling up of sustainable land management practices in rangelands.

Such actions can be supported particularly through the Land Degradation Neutrality (LDN) concept. LDN was first tabled at the United Nations Conference on Sustainable Development in 2012 (Rio+20) under the name 'zero net land degradation', with the aim of managing land more sustainably thus reducing the rate of degradation and increasing the rate of restoration of degraded land. An intergovernmental working group was later established during the 11th Conference of Parties to UNCCD in 2013, with the mandate to develop concrete options for implementation and monitoring of LDN. A draft resolution on African-Eurasian Landbirds to CMS COP12 proposes development and agreement of a plan for adoption at CMS COP13 (in 2020) on the integration of biodiversity requirements, as indicated by wild birds, into the LDN delivery at national level, with a focus on West and potentially also North-west Africa. It is suggested that this process takes into account the needs of vultures as well as landbirds.

6.1.6 Convention on the International Trade of Endangered Species of Wild Fauna and Flora

The Convention on the International Trade of Endangered Species of Wild Fauna and Flora (CITES) regulates the international trade in wild animals and plants, alive or dead and including body parts, to ensure that this practice does not threaten their survival. This legally-binding agreement provides a framework under which its Parties adopt their own implementation legislation at national level. The species covered by CITES are listed in Appendices, according to the degree of protection they need. Appendix I includes species threatened with extinction; trade in specimens of these species is permitted only in exceptional circumstances. Appendix II includes species not necessarily threatened with extinction, but in which trade must be controlled in order to avoid utilisation incompatible with their survival. African-Eurasian vultures are covered by Appendix II, under a 'catch-all' heading that includes nearly all raptors (a few species, but no African-Eurasian vultures, are listed on Appendix I).

Trade, particularly in body parts for belief-based use, is a critical threat to vultures in parts of their African range, and so an assessment is underway to inform a potential future proposal to transfer (at least) African vulture species from CITES Appendix II to Appendix I.

6.2 Poisoning and chemical use

6.2.1 Overarching agreements

Two international conventions exist that have relevance to the problems of vulture poisoning from chemical use. However, there is no systematic requirement for chemical or pharmaceutical companies to conduct pre-authorisation research and testing of products to assure that they do not have unintended consequences for non-target pest control, or cause wider damage to the envi-

ronment.

The *Rotterdam Convention* entered into force in 2004 and in January 2017 it had 156 Parties. The objectives of the Rotterdam Convention on the Prior Informed Consent Procedure for Certain Hazardous Chemicals and Pesticides in International Trade are:

- To promote shared responsibility and cooperative efforts among Parties in the international trade of certain hazardous chemicals in order to protect human health and the environment from potential harm; and,
- To contribute to the environmentally sound use of those hazardous chemicals, by facilitating information exchange about their characteristics, by providing for a national decision making process on their import and export and by disseminating these decisions to Parties.

The Convention regulates the international trade of certain chemicals and currently regulates 43 products, including 32 pesticides. It applies to banned or severely restricted chemicals, and to severely hazardous pesticide formulations.

Annex II of the CMS Resolution 11.15 on Preventing Poisoning of Migratory Birds outlines key legislative recommendations developed by the CMS Preventing Poisoning Working Group (2013) in Tunis, Tunisia, for the Rotterdam Convention as follows:

i. Substitute (remove and replace) insecticides with a high risk to birds with safe alternatives, and inclusion of criteria in the Rotterdam Convention to reduce risks of imports toxic to birds, promotion of Integrated Pest Management, and identification of areas of significant risk of poisoning of migratory birds and mitigation of impacts through working with stakeholders.

However, the Rotterdam Convention does not apply inter alia to pharmaceuticals, including human and veterinary drugs, and thus does not apply to the need to promote wildlife/vulture-friendly testing on NSAIDs.

The Stockholm Convention on Persistent Organic Pollutants is an international environmental treaty, signed in 2001 and effective from May 2004, that aims to eliminate or restrict the production and use of persistent organic pollutants (POPs).

The policy framework afforded by the Strategic Approach to International Chemicals Management (SAICM), adopted in 2006 in Dubai as an initiative under UNEP, has significant relevance to this issue. SAICM is distinguished by its comprehensive scope as a framework recognising that the essential economic role of chemicals and their contribution to improved living standards needs to be balanced with recognition of potential costs. These include the potential adverse impacts of chemicals on the environment and human health. The diversity and potential severity of such impacts makes sound chemicals management a key cross-cutting issue for sustainable development. The framework specifically references UNEA resolution 1/5 (see Section 6.1.3.) and the International Conference on Chemicals Management (ICCM) resolution IV. The framework is supported by the World Health Organisation and highlights, *inter alia*, actions on issues which need global or coordinated action.

6.2.2 Rodenticides

The CMS Preventing Poisoning Working Group recommendation (2013) incorporated in Annex II of CMS Resolution 11.15 on Preventing Poisoning of Migratory Birds urges Parties to:

Restrict/ban the use of second-generation anticoagulant rodenticides in open field agriculture (excluding best practice use for invasive species management); use best practice for the treatment of rodent irruptions minimising use of second-generation anticoagulants; and stop permanent baiting, with preventive rodent measures used instead.

6.2.3 NSAIDs and other veterinary medicines

The CMS Guidelines to prevent the risk of poisoning of migratory birds, adopted by CMS Parties at COP11 in 2014 through Resolution 11.15 on Preventing Poisoning of Migratory Birds contains clear recommendations in relation to the issue of diclofenac, as set out in Annex II, clauses 3.1.and 3.2:

3.1. Prohibit the use of veterinary diclofenac for the treatment of livestock and substitute with readily available safe alternatives, such as meloxicam.
3.2. Introduce mandatory safety-testing of NSAIDs that pose a risk to scavenging birds, '...including multi-species testing with burden of proof on applicant; VICH/OECD to evaluate and provide guidance on wider risks of veterinary pharmaceuticals to scavenging birds.

The Resolution goes on to state:

- Safety testing of all veterinary NSAIDs that could be used to treat animals that may become food for scavenger bird species should be introduced as mandatory.
- This includes safety testing of substances that are currently on the market as well new substances.
- Mandatory safety testing of risks to these species will reduce the likelihood of exposure to substances that are highly toxic to birds.

Safety testing of new and existing NSAIDs for veterinary treatment of cattle should be revised to include multiple species testing by the applicant. Currently however, no specific policy instrument exists to ensure that the devel-

opment of future NSAIDs, nor the retrospective assessment of existing products, is wildlife friendly. General guidance only references the broader environment, but there is a need to develop vulture-relevant safety parameters in parallel with existing human parameters, e.g. withdrawal times for various edible tissues and edible products, to assess carcass safety.

The regulatory approvals for diclofenac given by governments in South Asia were a result of a process error, arising from the fact that the assessments relied on acute, single species testing (Enick and Moore 2007). In Europe, much concern has been raised about the licensing of veterinary diclofenac. The drug does not have a central marketing approval for veterinary use from the European Medicines Agency (EMA); it may be authorised independently in each Member State. Despite the toxicity tests needed, it is clear that environmental risks, in particular the risk to necrophagous species, were not fully considered in at least Spain and Italy.

In response to pressure, in August 2014, the European Commission opened a public consultation and asked the EMA Committee for Medicinal Products for Veterinary Use (CVMP) to issue advice as to whether or not veterinary medicines containing diclofenac present a risk for vultures and other necrophagous birds in Europe. In December 2014, the CVMP issued the advice that veterinary diclofenac does represent a real risk to European vultures. They therefore suggested that a number of risk management measures should be taken to avoid the poisoning of vultures, including more regulation, veterinary controls, better labelling and information and/or a ban of the drug. However the CVMP fell short of recommending one or more of the possible solutions listed as they did not have sufficient information or remit to evaluate their effectiveness, although they recognised that only a complete ban would reduce the risks to zero.

The Delhi Declaration, signed by the four key South Asian governments in May 2012, emphasises that the top priority for conserving the Critically Endangered South Asian vultures is the effective removal of diclofenac from veterinary practice. It goes further in committing to address the issues relating to other NSAIDs that are known to be harmful and advocating routine testing of all NSAIDs before they become licensed for veterinary use. The signatory governments were Bangladesh, India, Nepal and Pakistan; a Regional Steering Committee was established which has met more than annually since then, and has also created dedicated national vulture recovery committees in each of these countries, to oversee its implementation.

6.2.4 Lead poisoning

The African-Eurasian Migratory Waterbird Agreement (AEWA) has played a key role in tackling lead poisoning of waterbirds since the 1990s. While overall progress has been slow, significant work by the CMS Preventing Poisoning Working Group has brought together the evidence on lead poisoning leading to Resolution 11.15 - Preventing Poisoning of Migratory Birds, including substantive guidelines which propose the need to phase out of lead ammunition across all habitats.

Annex II of CMS Resolution 11.15 emphasises the need to:

> *Phase out the use of lead ammunition across all habitats (wetland and terrestrial) with non-toxic alternatives within the next three years with Parties reporting to Conference of the Parties (CoP12) in 2017, working with stakeholders on implementation; promotion of leadership from ammunition users on safe alternatives, and remediation of lead polluted sites where appropriate.*

Building on CMS Resolution 11.15, in 2016, the IUCN World Conservation Congress adopted Resolution 82 calling for action from the IUCN Director General and Commissions as well as governments and all the IUCN member organisations to work towards the phasing out of lead ammunition. Importantly, the motion brought together hunting, wildlife management and conservation stakeholders and resulted in an almost entirely consensus text (voted for by 92% of 134 governments and 94% of 621 NGOs), illustrative of the progress that had been made. The motion encourages governments to phase out, where feasible, lead shot used for hunting over wetlands and lead ammunition used for hunting in areas where scavengers are at particular risk from the use of lead ammunition, based on scientific evidence, and the replacement of it with suitable alternatives.

6.3 Mortality caused by power grid infrastructure

Almost all countries have legislation that brings the construction of power lines and new energy installations under regimes including Environmental Impact Assessments (EIAs), which should take into account existing habitat and wildlife conservation legislation, including for birds. Specific mention of the problems of avian electrocutions or collisions is rare.

SEAs and EIAs are mandatory in most countries, are required by many donor organisations and are recommended actions under the principal biodiversity conventions. But despite this their effectiveness is often limited and sometimes such requirements are ignored. A common constraint on both EIAs and SEAs is the adequacy of reliable baseline information on the biodiversity importance of sites (such as a site's importance along a flyway for migratory species). Environmental Statements submitted by developers seeking consent for their proposals sometimes fail to consider impacts on ecological functions and processes, impacts beyond site boundaries and cumulative impacts. Furthermore, even when EIAs have been carried out effectively and have identified nec-

essary mitigation and compensation measures, such actions may be ineffectively implemented and long term management and monitoring is often inadequate. Such problems may be exacerbated by limited capacities and resources within governmental organisations to manage and review EIAs and for non-governmental conservation organisations and other stakeholders to scrutinise and contribute to them.

CBD and CMS recognise environmental impact assessment as an important tool to ensure that development is planned and implemented taking biodiversity considerations into account. CBD requires parties to apply impact assessment to projects, programmes, plans and policies with a potential negative impact on biodiversity. CBD strongly supports and requires that Parties apply thorough assessment procedures (SEA and EIA) if it comes to the planning of activities with an impact on biodiversity; see CBD COP Decision VIII/28 (March 2006) and Secretariat of the Convention on Biological Diversity, Netherlands Commission for Environmental Assessment (2006).

6.3.1 Renewable energy (primarily wind energy)

Wind energy is an important source of energy that can significantly cut greenhouse gas emissions, yet such renewable energy technology deployments can have a range of potentially significant impacts on soaring birds of prey, including vultures. Specifically, wind farm developments have the potential to cause fatalities and injury.

More urgent emphasis must be placed on the development of alternative technology to replace current wind turbines that pose a threat to vultures and other soaring birds. Designs such as bladeless turbines that produce energy equally or more efficiently, compared to current wind turbine technology, should be a priority for research and development.

Currently, the most effective way to detect and avoid severe environmental impacts of wind energy developments is to perform Strategic Environmental Assessments (SEAs) at large spatial scales. SEAs enable strategic planning and siting of wind energy developments in areas with least environmental and social impact whilst maintaining economic benefits.

The SEA is a means by which environmental considerations are incorporated into policies, plans and programmes in order to achieve the best possible outcome for all stakeholders. This is particularly effective with respect to power line routing and grouping, as appropriate corridors for lines can be identified proactively, well before reaching the individual project stage. The EIA process allows for the assessment of impacts at the project level. Although project-based and fairly late in the planning process, this still provides an essential mechanism for minimising the collision and electrocution risk for birds.

Wind farm developments need to consider:

- Environmental impacts and in particular avifaunal specialist studies need to be carried out;
- Threatened bird species (and other bird species considered to be of conservation importance for various reasons) and/or the impact on habitat where regional populations of birds and/or their habitat will <u>not</u> be negatively impacted on;
- The placement of turbines/blades so that they are <u>not</u> located on major migration routes and especially migration bottlenecks where large numbers of birds are highly concentrated, inside protected areas (nature reserves, national parks, Ramsar sites) and Important Bird and Biodiversity Areas (IBAs), inside buffer zones (the range of which is determined by the relevant species) around IBAs, nature reserves, national parks and Ramsar sites, in habitats where wind farms are known to pose high collision risks to birds (mountain ridges and cliff breeding and roosting sites would be examples of such critical locations);
- A greater emphasis on the development of alternative technology, such as bladeless turbines, is needed and should be actively promoted to prevent or reduce the known negative impact of current wind turbine designs on vultures and other soaring birds.

EIAs and avifaunal specialist studies undertaken for all proposed wind farm developments should include the effects of the associated infrastructure such as power lines and roads on birds.

6.3.2 Transmission lines

The most significant intervention to reduce the risk of electrocution from energy infrastructure is proper planning and routing of networks and the use of infrastructure designs that minimise the risk. This applies to existing and planned networks and is the most effective means to reduce mortality caused by electrocution over the long term. Where appropriate, re-routing or retrofitting of existing networks should also be implemented.

Electrocution

Mitigation for electrocution is far more straightforward than that for the risk of collision. Since the problem is a physical one, whereby a bird bridges certain clearances on a pole structure, large birds of prey such as vultures and storks, particularly in habitats where perches and nest sites are limited, are at most risk. Most incidences occur during the breeding season and in the immediate subsequent months when young birds are most affected. The solution is relatively straightforward, and involves ensuring that a bird cannot touch the relevant components simultaneously.

Specific mitigation measures may include:

- Erecting power poles that are specifically designed to be ‘bird-safe’;
- Add-on mitigation or retrofitting;

- Insulation; and,
- Perch management techniques.

Collision

As for electrocution, the most significant intervention to reduce the risk of collisions with energy infrastructure is proper planning and routing of networks and the use of infrastructure designs that minimise the risk of this threat. This applies to existing and future networks and is the most effective in the long term. Where appropriate, re-routing of existing networks should be implemented.

Once infrastructure exists, line modification in various forms is the most widely used approach. Line modification can take several forms, which can be broadly divided into those measures that make power lines present less of an 'obstacle' for birds to collide with, those that keep birds away from the power line, and those that make the power line more visible.

Several options exist to minimize collision risk. Wind energy and power line technologies vary in size and design which presents different types of threats to birds and other biodiversity. There are tailored mitigation measures developed to address these, based on the mitigation hierarchy such as installing nests on power lines or shut down on demand for wind turbines. The success of mitigation measures is largely dependent on the adequacy of baselines and monitoring approaches. Monitoring of collisions should consider the fact that birds that are injured subsequent to colliding with conductor lines can sometimes wander some distance away from the point of impact once grounded, and monitoring should include widening the search pattern for such birds along lines to improve the chances of locating them. Some mitigation measures may only be specific to a type of landscape feature or species. The effectiveness of a mitigation measures may also depend on the level of environmental protection a government provides in the form of legislative framework and transparency of information.

6.3.3 Guidelines

A number of guidelines address the issues surrounding new energy developments, transmission risk of electrocution (mainly from older installations) and transmission line collision risk (both existing, planned and cumulative):

- AEWA Conservation Guidelines No. 11 (2008): *Guidelines on how to avoid, minimise or mitigate impact of infrastructural developments and related disturbance affecting waterbirds* (Tucker and Treweek 2008).
- AEWA Conservation Guidelines No. 14 (2012): *Guidelines on How to Avoid or Mitigate Impact of Electricity Power Grids on Migratory Birds in the African-Eurasian Region* (Prinsen *et al.* 2012);
- CMS, AEWA, International Renewable Energy Agency and Birdlife International (2014): *Renewable Energy Technologies and Migratory Species: Guidelines for sustainable deployment* (van der Winden *et al.* 2014);
- BirdLife International (2016b): *Mitigating the effects of Wind Farms and Power Lines.*

There are also a number of regional agreements, guidelines and initiatives such as:

- The Convention on the Conservation of European Wildlife and Natural Habitats or Bern Convention. In 2003 the Bern Convention published the report *Protecting Birds from Powerlines: a practical guide on the risks to birds from electricity transmission facilities and how to minimise any such adverse effects* (BirdLife International and NABU 2003);
- In 2010, The Bern Convention published *Implementation of Recommendation No 110/2004 on minimising adverse effects of above ground electricity transmission facilities (power lines) on birds* (Council of Europe 2010). This contained a total of 14 reports from Bern Convention Parties on how they have dealt with the recommendations as requested in 2004;
- EU Directives: The EU has a number of legislative instruments to deal with migratory birds and power lines. At the species level it concerns the Birds Directive (79/409/EEC) and the Habitats Directives (92/43/EEC) with its articles on preventive measures and assessments of plans and projects in the light of the aims of both Directives;
- EU has agreed on a number of Directives dealing with EIA and SEA procedures and when and how to implement these; these are also directly relevant for power line construction. The EIA Directive includes a specific obligation for overhead electric power lines of 220 KV (or more) and longer than 15 kilometres. Both EU assessment procedures ask for special attention if power line construction would affect Natura 2000 sites and areas of special conservation concern (SPAs);
- The Budapest Declaration, adopted in 2011 after a special European Conference on power lines and bird mortality. This Declaration refers to the Resolutions as adopted by the Bern Convention (2004) and CMS (2002) and, for the EU Member States, to the regulations within the framework of the EU Bird Directive. It also highlights the need to strictly apply the SEA and EIA procedures during planning of new power lines. The Declaration also calls on all interested parties to undertake all possible actions which can help to minimise the effect of power lines on bird mortality;
- Renewable Grid Initiative: Through the RGI *European Grid Declaration*, 24 inaugural signatories (including TSOs, NGOs and citizen groups) committed to supporting grid expansion to integrate renewables in line with nature conservation objectives;
- BirdLife South Africa / Endangered Wildlife Trust:

best practice guidelines for avian monitoring and impact mitigation at proposed wind energy development sites in southern Africa.

6.4 Conservation (captive) breeding and re-introduction

IUCN, through the Species Survival Commission (SSC), has published guidelines to assist in determining when ex situ management may contribute to species recovery. The most recent guidance (IUCN/SSC 2014) proposes a five-step decision-making process:

1. Conduct a review of the species' status;
2. Define the role(s) that *ex situ* management might play;
3. Assess the precise nature of the *ex situ* population and how it can contribute to the proposed initiative;
4. Determine resources and expertise required, and appraise the feasibility and risks; and
5. Make an informed, transparent decision based on the above.

Further IUCN guidance is available on reintroductions and other conservation translocations (IUCN/SSC 2013), which often go hand-in-hand with conservation breeding or related forms of *ex situ* management. Several programmes have achieved the successful reintroduction of vultures to parts of Europe from which they had been extirpated, for example **Bearded**, **Griffon** and **Cinereous Vultures**. The source of birds for reintroduction may be from conservation breeding (captive breeding) networks or wildlife rehabilitation centres from stronghold countries, although reintroduction may also be achieved by other methods such as using clutches from unsuccessful breeding pairs in the wild. The SAVE consortium is engaged in the conservation breeding of three species of *Gyps* vultures in South Asia following the declines of vulture populations due to poisoning by diclofenac and other NSAIDs.

Conservation breeding and reintroduction can play a significant role in the conservation of vulture species as long as IUCN criteria and guidelines are met. However, this type of intervention is typically seen as a last resort, considered when all other measures to maintain viable vulture populations in the wild have been exhausted. Reintroduction of vultures into their historical range should only be considered when the threats that led to their demise have been effectively addressed. If this practice is accompanied by supplementary feeding, it is important to ensure that carcasses provided for this purpose are subject to safety screening to reduce the risk of exposure to NSAIDs and other potentially harmful substances.

Table 5. Country involvement in international processes and forums. All Vulture MsAP Range States are parties to UNCCD and UNFCCC .

Country	CBD	CMS	Raptors MOU	CITES	African Convention (ACCNNR)	Rotterdam Convention	African Union	AMCEN	All vultures legally protected	IUCN state membership	AMU member (North Africa)	ECCAS member (Central Africa)	ECOWAS member (West Africa)	SADC member (southern Africa)	EAC member (East Africa)	Delhi Declaration	ASEAN member
Afghanistan	✓	✓	X	✓	X	✓	X	X	✓	✓	X	X	X	X	X	X	X
Albania	✓	✓	X	✓	X	✓	X	X	✓	X	X	X	X	X	X	X	X
Algeria	✓	✓	X	✓	✓	X	✓	✓	X	✓	✓	X	X	X	X	X	X
Andorra	✓	X	X	✓	X	✓	X	X	✓	X	X	X	X	X	X	X	X
Angola	✓	✓	✓	✓	✓	✓	✓	✓	X	✓	X	✓	X	✓	X	X	X
Armenia	✓	✓	✓	✓	X	✓	X	X	✓	X	X	X	X	X	X	X	X

Country	CBD	CMS	Raptors MOU	CITES	African Convention (ACCNNR)	Rotterdam Convention	African Union	AMCEN	All vultures legally protected	IUCN state membership	AMU member (North Africa)	ECCAS member (Central Africa)	ECOWAS member (West Africa)	SADC member (southern Africa)	EAC member (East Africa)	Delhi Declaration	ASEAN member
Austria	✓	✓	✗	✓	✗	✓	✗	✗	✓	✗	✗	✗	✗	✗	✗	✗	✗
Azerbaijan	✓	✓	✗	✓	✗	✗	✗	✗	✓	✗	✗	✗	✗	✗	✗	✗	✗
Bahrain	✓	✓	✗	✓	✗	✓	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗
Bangladesh	✓	✓	✗	✓	✗	✗	✗	✗	✓	✓	✗	✗	✗	✗	✗	✗	✗
Belarus	✓	✓	✗	✓	✗	✗	✗	✗	✓	✗	✗	✗	✗	✗	✗	✗	✗
Belgium	✓	✓	✓	✓	✗	✓	✗	✗	✓	✓	✗	✗	✗	✗	✗	✗	✗
Benin	✓	✓	✗	✓	✓	✓	✓	✓	✗	✓	✗	✗	✓	✗	✗	✓	✗
Bhutan	✓	✗	✗	✓	✗	✗	✗	✗	✗	✓	✗	✗	✗	✗	✗	✗	✗
Bosnia & Herze-govina	✓	✗	✗	✓	✗	✓	✗	✗	✓	✗	✗	✗	✗	✗	✗	✗	✗
Botswana	✓	✗	✗	✓	✓	✓	✓	✓	✓	✓	✗	✗	✗	✓	✗	✗	✗
Brunei Darus-salam	✓	✗	✗	✓	✗	✗	✗	✗	✗	✓	✗	✗	✗	✗	✗	✗	✓
Bulgaria	✓	✓	✗	✓	✗	✓	✗	✗	✓	✗	✗	✗	✗	✗	✗	✗	✗
Burkina Faso	✓	✓	✗	✓	✓	✓	✓	✓	✓	✓	✗	✗	✓	✗	✗	✗	✗
Burundi	✓	✓	✓	✓	✓	✓	✓	✓	✗	✓	✗	✓	✗	✗	✓	✗	✗
Cabo Verde	✓	✓	✗	✓	✗	✓	✓	✓	✗	✓	✗	✗	✓	✗	✗	✗	✗
Cambodia	✓	✗	✗	✓	✗	✓	✗	✗	✓	✓	✗	✗	✗	✗	✗	✗	✓
Cameroon	✓	✓	✗	✓	✗	✓	✓	✓	✗	✓	✗	✓	✗	✗	✗	✗	✗
Central African Republic	✓	✗	✗	✓	✓	✗	✓	✓	✗	✓	✗	✓	✗	✗	✗	✗	✗
Chad	✓	✓	✓	✓	✓	✓	✓	✓	✗	✓	✗	✓	✗	✗	✗	✗	✗
China (People's Rep. of)	✓	✗	✗	✓	✗	✓	✗	✗	✓	✓	✗	✗	✗	✗	✗	✗	✗

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Congo (Dem. Rep. of the)	✓	✓	✓	✓	✓	✓	✓	✓	✗	✓	✗	✓	✗	✓	✗	✗	✗
Congo (Republic of)	✓	✓	✓	✓	✓	✓	✓	✓	✗	✓	✗	✓	✗	✗	✗	✗	✗
Croatia	✓	✓	✓	✓	✗	✓	✗	✗	✓	✗	✗	✗	✗	✗	✗	✗	✗
Cyprus	✓	✓	✗	✓	✗	✓	✗	✗	✓	✗	✗	✗	✗	✗	✗	✗	✗
Czech Republic	✓	✓	✓	✓	✗	✓	✗	✗	✓	✓	✗	✗	✗	✗	✗	✗	✗
Denmark	✓	✓	✓	✓	✗	✓	✗	✗	✓	✗	✗	✗	✗	✗	✗	✗	✗
Djibouti	✓	✓	✓	✓	✓	✓	✓	✓	✗	✓	✗	✗	✗	✗	✗	✗	✗
Egypt	✓	✓	✓	✓	✓	✗	✓	✓	✓	✓	✗	✗	✗	✗	✗	✗	✗
Equatorial Guinea	✓	✓	✓	✓	✓	✓	✓	✓	✗	✓	✗	✓	✗	✗	✗	✗	✗
Eritrea	✓	✓	✗	✓	✗	✓	✓	✓	✗	✓	✗	✗	✗	✗	✗	✗	✗
Estonia	✓	✓	✗	✓	✗	✓	✗	✗	✓	✓	✗	✗	✗	✗	✗	✗	✗
Ethiopia	✓	✓	✗	✓	✓	✓	✓	✓	✗	✓	✗	✗	✗	✗	✗	✗	✗
Finland	✓	✓	✓	✓	✗	✓	✗	✗	✓	✓	✗	✗	✗	✗	✗	✗	✗
France	✓	✓	✓	✓	✗	✓	✗	✗	✓	✗	✗	✗	✗	✗	✗	✗	✗
Gabon	✓	✓	✗	✓	✓	✓	✓	✓	✗	✓	✗	✓	✗	✗	✗	✗	✗
Gambia	✓	✓	✓	✓	✓	✓	✓	✓	✗	✓	✗	✗	✓	✗	✗	✗	✗
Georgia	✓	✓	✗	✓	✗	✓	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗
Germany	✓	✓	✓	✓	✗	✓	✗	✗	✓	✓	✗	✗	✗	✗	✗	✗	✗
Ghana	✓	✓	✓	✓	✓	✓	✓	✓	✗	✓	✗	✗	✓	✗	✗	✗	✗
Greece	✓	✓	✗	✓	✗	✓	✗	✗	✓	✗	✗	✗	✗	✗	✗	✗	✗

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Guinea	✓	✓	✓	✓	✓	✓	✓	✓	✗	✓	✗	✗	✓	✗	✗	✗	✗
Guinea-Bissau	✓	✓	✗	✓	✓	✓	✓	✓	✗	✓	✗	✗	✓	✗	✗	✗	✗
Hungary	✓	✓	✓	✓	✗	✓	✗	✗	✓	✗	✗	✗	✗	✗	✗	✗	✗
India	✓	✓	✓	✓	✗	✓	✗	✗	✓	✓	✗	✗	✗	✗	✗	✓	✗
Iran (Islamic Rep. of)	✓	✓	✓	✓	✗	✓	✗	✗	✓	✓	✗	✗	✗	✗	✗	✗	✗
Iraq	✓	✓	✗	✓	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗
Ireland	✓	✓	✗	✓	✗	✓	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗
Israel	✓	✓	✓	✓	✗	✓	✗	✗	✓	✗	✗	✗	✗	✗	✗	✗	✗
Italy	✓	✓	✓	✓	✗	✓	✗	✗	✓	✗	✗	✗	✗	✗	✗	✗	✗
Ivory Coast	✓	✓	✗	✓	✓	✓	✓	✓	✗	✓	✗	✗	✓	✗	✗	✗	✗
Japan	✓	✗	✗	✓	✗	✓	✗	✗	✗	✓	✗	✗	✗	✗	✗	✗	✗
Jordan	✓	✓	✗	✓	✗	✓	✗	✗	✓	✗	✗	✗	✗	✗	✗	✗	✗
Kazakhstan	✓	✓	✗	✓	✗	✓	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗
Kenya	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✗	✗	✗	✗	✓	✗	✗
Korea (Dem. People's Rep.)	✗	✗	✗	✗	✗	✓	✗	✗	✗	✓	✗	✗	✗	✗	✗	✗	✗
Korea (Republic of)	✓	✗	✗	✓	✗	✓	✗	✗	✗	✓	✗	✗	✗	✗	✗	✗	✗
Kuwait	✓	✗	✗	✓	✗	✓	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗
Kyrgyzstan	✓	✓	✗	✓	✗	✓	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗
Lao PDR	✓	✗	✗	✓	✗	✓	✗	✗	✗	✓	✗	✗	✗	✗	✗	✗	✓
Latvia	✓	✓	✗	✓	✗	✓	✗	✗	✓	✗	✗	✗	✗	✗	✗	✗	✗

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Lebanon	✓	✓	✓	✓	✗	✓	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗
Lesotho	✓	✗	✗	✓	✓	✓	✓	✓	✗	✓	✗	✗	✗	✓	✗	✗	✗
Liberia	✓	✓	✗	✓	✓	✓	✓	✓	✗	✓	✗	✗	✓	✗	✗	✗	✗
Libya	✓	✓	✓	✓	✓	✓	✓	✓	✗	✗	✓	✗	✗	✗	✗	✗	✗
Macedonia (The FYR of)	✓	✓	✗	✓	✗	✓	✗	✗	✓	✗	✗	✗	✗	✗	✗	✗	✗
Malawi	✓	✗	✗	✓	✓	✓	✓	✓	✗	✓	✗	✗	✗	✓	✗	✗	✗
Malaysia	✓	✗	✗	✓	✗	✓	✗	✗	✗	✓	✗	✗	✗	✗	✗	✗	✓
Mali	✓	✓	✓	✓	✓	✓	✓	✓	✗	✓	✗	✗	✓	✗	✗	✗	✗
Malta	✓	✓	✗	✓	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✓
Mauritania	✓	✓	✗	✓	✓	✓	✓	✓	✗	✓	✓	✗	✗	✗	✗	✗	✗
Moldova	✓	✓	✗	✓	✗	✓	✗	✗	✓	✗	✗	✗	✗	✗	✗	✗	✗
Mongolia	✓	✓	✓	✓	✗	✓	✗	✗	✗	✓	✗	✗	✗	✗	✗	✗	✗
Montenegro	✓	✓	✗	✓	✗	✓	✗	✗	✓	✗	✗	✗	✗	✗	✗	✗	✗
Morocco	✓	✓	✓	✓	✗	✓	✗	✓	✓	✓	✓	✗	✗	✗	✗	✗	✗
Mozambique	✓	✓	✗	✓	✓	✓	✓	✓	✗	✓	✗	✗	✗	✓	✗	✗	✗
Myanmar	✓	✗	✗	✓	✗	✗	✗	✗	✓	✓	✗	✗	✗	✗	✗	✗	✓
Namibia	✓	✗	✗	✓	✗	✓	✓	✓	✗	✓	✗	✗	✗	✓	✗	✗	✗
Nepal	✓	✗	✓	✓	✗	✓	✗	✗	✓	✓	✗	✗	✗	✗	✗	✓	✗
Netherlands	✓	✓	✓	✓	✗	✓	✗	✗	✓	✓	✗	✗	✗	✗	✗	✗	✗
Niger	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✗	✗	✓	✗	✗	✗	✗

Country	CBD	CMS	Raptors MOU	CITES	African Convention (ACCNNR)	Rotterdam Convention	African Union	AMCEN	All vultures legally protected	IUCN state membership	AMU member (North Africa)	ECCAS member (Central Africa)	ECOWAS member (West Africa)	SADC member (southern Africa)	EAC member (East Africa)	Delhi Declaration	ASEAN member
Nigeria	✓	✓	✗	✓	✓	✓	✓	✓	✓	✓	✗	✗	✓	✗	✗	✗	✗
Oman	✓	✗	✗	✓	✗	✓	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗
Pakistan	✓	✓	✓	✓	✗	✓	✗	✗	✓	✓	✗	✗	✗	✗	✗	✓	✗
Philippines	✓	✓	✗	✓	✗	✓	✗	✗	✓	✗	✗	✗	✗	✗	✗	✗	✗
Poland	✓	✓	✗	✓	✗	✓	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗
Portugal	✓	✓	✓	✓	✗	✓	✗	✗	✓	✗	✗	✗	✗	✗	✗	✗	✗
Qatar	✓	✗	✗	✓	✗	✓	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗
Romania	✓	✓	✓	✓	✗	✓	✗	✗	✓	✗	✗	✗	✗	✗	✗	✗	✗
Russia	✓	✗	✗	✓	✗	✓	✗	✗	✓	✗	✗	✗	✗	✗	✗	✗	✗
Rwanda	✓	✓	✗	✓	✓	✓	✓	✓	✓	✓	✗	✓	✗	✗	✓	✗	✗
Saudi Arabia	✓	✓	✓	✓	✗	✓	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗
Senegal	✓	✓	✓	✓	✓	✓	✓	✓	✗	✓	✗	✗	✓	✗	✗	✗	✗
Serbia	✓	✓	✗	✓	✗	✓	✗	✗	✓	✗	✗	✗	✗	✗	✗	✗	✗
Sierra Leone	✓	✗	✗	✓	✓	✓	✓	✓	✗	✓	✗	✗	✓	✗	✗	✗	✗
Singapore	✓	✗	✗	✓	✗	✓	✗	✗	✗	✓	✗	✗	✗	✗	✗	✗	✓
Slovakia	✓	✓	✓	✓	✗	✓	✗	✗	✓	✗	✗	✗	✗	✗	✗	✗	✗
Slovenia	✓	✓	✗	✓	✗	✓	✗	✗	✓	✗	✗	✗	✗	✗	✗	✗	✗
Somalia	✓	✓	✓	✓	✗	✓	✗	✗	✗	✓	✗	✗	✗	✗	✗	✗	✗
South Africa	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✗	✗	✗	✓	✗	✗	✗
South Sudan	✓	✗	✗	✗	✓	✗	✓	✓	✗	✓	✗	✗	✗	✗	✓	✗	✗

Country	CBD	CMS	Raptors MOU	CITES	African Convention (ACCNNR)	Rotterdam Convention	African Union	AMCEN	All vultures legally protected	IUCN state membership	AMU member (North Africa)	ECCAS member (Central Africa)	ECOWAS member (West Africa)	SADC member (southern Africa)	EAC member (East Africa)	Delhi Declaration	ASEAN member
Spain	✓	✓	✓	✓	✗	✓	✗	✗	✓	✗	✗	✗	✗	✗	✗	✗	✗
Sri Lanka	✓	✓	✗	✓	✗	✓	✗	✗	✗	✓	✗	✗	✗	✗	✗	✗	✗
Sudan	✗	✗	✓	✓	✓	✓	✓	✓	✗	✓	✗	✗	✗	✗	✗	✗	✗
Swaziland	✓	✓	✗	✓	✓	✓	✓	✓	✗	✓	✗	✗	✗	✓	✗	✗	✗
Switzerland	✓	✓	✓	✓	✗	✓	✗	✗	✓	✗	✗	✗	✗	✗	✗	✗	✗
Syrian Arab Republic	✓	✓	✓	✓	✗	✓	✗	✗	✓	✗	✗	✗	✗	✗	✗	✗	✗
Tajikistan	✓	✓	✗	✓	✗	✗	✗	✗	✓	✗	✗	✗	✗	✗	✗	✗	✗
Tanzania	✓	✓	✗	✓	✓	✓	✓	✓	✗	✓	✗	✗	✗	✓	✓	✗	✗
Thailand	✓	✗	✗	✓	✗	✓	✗	✗	✗	✓	✗	✗	✗	✗	✗	✗	✓
Togo	✓	✓	✓	✓	✓	✓	✓	✓	✗	✓	✗	✗	✓	✗	✗	✗	✗
Tunisia	✓	✓	✓	✓	✓	✓	✓	✓	✗	✓	✓	✗	✗	✗	✗	✗	✗
Turkey	✓	✗	✗	✓	✗	✗	✗	✗	✓	✗	✗	✗	✗	✗	✗	✗	✗
Turkmenistan	✓	✗	✗	✓	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗
Uganda	✓	✓	✗	✓	✓	✓	✓	✓	✗	✓	✗	✗	✗	✗	✓	✗	✗
Ukraine	✓	✓	✗	✓	✗	✓	✗	✗	✓	✗	✗	✗	✗	✗	✗	✗	✗
United Arab Emirates	✓	✓	✓	✓	✗	✓	✗	✗	✓	✗	✗	✗	✗	✗	✗	✗	✗
United Kingdom	✓	✓	✓	✓	✗	✓	✗	✗	✓	✓	✗	✗	✗	✗	✗	✗	✗
Uzbekistan	✓	✓	✗	✓	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗
Vietnam	✓	✗	✗	✓	✗	✓	✗	✗	✗	✓	✗	✗	✗	✗	✗	✗	✓
Yemen	✓	✓	✓	✓	✗	✓	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗

Country	CBD	CMS	Raptors MOU	CITES	African Convention (ACCNNR)	Rotterdam Convention	African Union	AMCEN	All vultures legally protected	IUCN state membership	AMU member (North Africa)	ECCAS member (Central Africa)	ECOWAS member (West Africa)	SADC member (southern Africa)	EAC member (East Africa)	Delhi Declaration	ASEAN member
Zambia	✓	✗	✗	✓	✓	✓	✓	✓	✗	✓	✗	✗	✗	✓	✗	✗	✗
Zimbabwe	✓	✓	✗	✓	✗	✓	✓	✓	✗	✓	✗	✗	✗	✓	✗	✗	✗

7 Framework for action

7.1. Goal

To restore the populations of each of the 15 species of Old World vulture to a favourable conservation status by 2029.

7.2. Purpose

To undertake concerted, collaborative and coordinated international actions to:

a. Rapidly halt current population declines in all species covered by the Vulture MsAP;
b. Reverse recent population trends to bring the conservation status of each species back to a favourable level; and,
c. Provide conservation management guidelines applicable to all Range States covered by the Vulture MsAP.

7.3. Objectives, Indicators and Means of Verification

Objective 1. To achieve a significant reduction in mortality of vultures caused unintentionally by toxic substances used (often illegally) in the control and hunting of vertebrates.
Indicator: Use of toxic chemicals to poison animals is prevented through effective education and enforcement by 2029.
Means of verification: Number of CMS Parties and Range States with effective legislation and regulations in place, implemented and enforced.

Objective 2. To recognise and minimise mortality of vultures by non-steroidal anti-inflammatory drugs (NSAIDs) and occurrence and threat of toxic NSAIDs throughout the range covered by the Vulture MsAP.
Indicator: By 2029, potentially harmful NSAIDs no longer available for veterinary use, safe alternatives introduced and widely used.
Means of verification: Number of CMS Parties and Range States to have either banned or voluntarily withdrawn potentially harmful NSAIDs for veterinary use and introduced safe alternatives.

Objective 3. To ensure that CMS Resolution 11.15 on the phasing out the use of lead ammunition by hunters is fully implemented.
Indicator: Policies and legislation in place to ensure phasing out the use of lead ammunition by all CMS Parties and Range States covered by the Vulture MsAP by 2029.
Means of verification: Number of CMS Parties and Range States that have effectively phased out the use of lead ammunition for hunting purposes.

Objective 4. To reduce and eventually to halt the trade in vulture parts for belief-based use.
Indicator: Significant reduction in vulture mortality due to belief-based use as a result of greater public awareness and the introduction of appropriate legislation, including effective implementation and enforcement by 2029.
Means of verification: Number of CMS Parties and Range States where public awareness-raising campaigns have been enacted and with effective legislation and regulations are in place, implemented and enforced.

Objective 5. To reduce and eventually to halt the practice of sentinel poisoning by poachers.
Indicator: Significant reduction in vulture mortality due to elephant and other poaching by 2029.
Means of verification: Annual number of intentional poisoning (sentinel poisoning) incidents recorded throughout the range of the Vulture MsAP.

Objective 6. To substantially reduce vulture mortality caused by electrocutions linked to energy generation and transmission infrastructure.
Indicator: All new energy infrastructure after 2029 should be bird friendly.
Means of verification: Mortality databases; extent of safe infrastructure and retro-fitted structures; number of CMS Parties and Range States with appropriate policies and active implementation in place.

Objective 7. To substantially reduce vulture mortality

caused by collisions linked to energy transmission and generation infrastructure.
Indicator: Mortality through collisions on energy infrastructure is reduced to sustainable levels by 2029.
Means of verification: Mortality databases; proper planning and routing of new networks; number of CMS Parties and Range States with appropriate policies and active implementation in place.

Objective 8. To ensure availability of an appropriate level of safe food to sustain healthy vulture populations.
Indicator: By 2029, no measurable negative impact on productivity and vulture populations due to lack of food.
Means of verification: Breeding success and overall survival within vulture populations of all species within the range covered by the Vulture MsAP.

Objective 9. To ensure availability of suitable habitat for vultures to nest, roost and forage.
Indicator: All major breeding and roosting sites for vultures are known and appropriately protected by 2029.
Means of verification: Breeding success and overall survival within vulture populations of all species within the range covered by the Vulture MsAP.

Objective 10: To substantially reduce levels of direct persecution and disturbance of vultures caused by human activities.
Indicator: Effective measures in place and enforced in all Range States.
Means of verification: Numbers of breeding, roosting and foraging sites protected in Range States and enhanced populations and/or breeding success in areas previously affected.

Objective 11. To support vulture conservation through cross-cutting actions that contribute to addressing knowledge gaps.
Indicator: Ten Endangered and Critically Endangered Old World Vultures listed on CMS Appendix I; all species of vultures are fully protected within the national legislation of all respective Range States by 2029.
Means of verification: Number of CMS Parties and Range States with effective legislation in place, implemented and enforced.

Objective 12. To advance vulture conservation by effective promotion and implementation of the Vulture MsAP.
Indicator: All critical actions of the Vulture MsAP and at least 50% of the high priority actions successfully implemented across the range by 2029.
Means of verification: Number of Actions from Table 6 implemented or completed within the projected timeframes in Vulture MsAP range, as established during the regular reviews of implementation. Number of CMS Parties and Vulture MsAP Range States with National Vulture Conservation Action Plans in place.

7.4 Actions, priorities, timescale and responsibilities

Table 6 reflects the results and actions associated with each of the Objectives reviewed during the Regional Workshops and which are also supported primarily by the separate Egyptian Vulture and Cinereous Vulture Flyway Action Plans (Annexes 4 and 5), SAVE Blueprint (Annex 6) and other documents listed in Annex 7. The Table provides an overall priority for each action (Essential, High or Medium); a suggested timeframe for its implementation; and an indication of the relevant sub-regions in which the action is required, as highlighted in the overarching threats map (Figure 18). Each action is categorized as either Direct Conservation Action, Education & Awareness, Policy & Research or Research & Monitoring. A total of 17 Essential actions have been identified (shaded in pink): their immediate implementation is considered most important to ensure that progress towards achieving the goal of the Vulture MsAP is made as quickly as possible. This does not suggest that the other actions are unimportant – Range States, partners and other stakeholders are encouraged to carefully consider all of the recommended actions for inclusion and implementation, where appropriate, in regional, national, species or threat-focused action plans.

Table 6. Framework of Conservation Actions for African-Eurasian Vultures.

Results	Actions	Category	Time frame (years)	Priority	Stakeholders	North Africa	West Africa	East Africa	Southern Africa	Europe/Central	Middle East	South Asia	East Asia	South-east Asia
Objective 1. To achieve a significant reduction in mortality of vultures caused unintentionally by toxic substances used (often illegally) in the control and hunting of vertebrates.														
Result 1.1 Improved understanding and awareness of human-wildlife conflicts and associated impacts on vultures to inform more effective mitigation approaches	1.1.1. Conduct an overall situation analysis of wildlife poisoning associated with human-wildlife conflict, with special attention to vulture mortality: covering state of knowledge, drivers and motivations, poisons used (actually or potentially), analytical capacity, hotspots, knowledge gaps and best practice on reducing conflicts and related poisoning.	Research & Monitoring	1–6	Essential	NGOs, Universities, Research Institutions, Government	x	x	x	x	x	x	x	x	x
	1.1.2. Collect, collate (e.g. via database) and share basic standardised information about poisoning incidents at national, regional and Vulture MsAP-wide levels.	Research & Monitoring	1–12	High	Government and NGOs	x	x	x	x	x	x	x	x	x
	1.1.3. Implement awareness campaigns, specifically covering (a) negative impacts on vultures and other non-target species; (b) likely ineffectiveness of poisoning as a problem animal control technique; (c) impacts of poisoning on human and livestock health; and (d) legal alternatives to mitigate of human-wildlife conflict.	Education & Awareness	1–12	Essential	Government and NGOs, PPWG, general public, pastoral and farming communities	x	x	x	x	x	x	x	x	x
Result 1.2 Conservation authorities, local communities and other stakeholders take collaborative action to tackle unintentional poisoning directed at vertebrate control	1.2.1. Promote poison-free alternatives to mitigate human-wildlife conflict and predator control measures e.g. improved livestock management techniques, legal selective trapping and crop protection methods.	Direct Conservation Action	1–3	Medium	National and local authorities, Ministries concerned with livestock, pastoral and farming communities	x	x	x	x	x	x			
	1.2.2. Establish protocols and train and support relevant agency staff (conservation, rangers, police and judiciary) to rapidly respond to poisoning incidents including sharing best practice.	Direct Conservation Action	1–6	Essential	Governments, NGOs	x	x	x	x	x	x	x		x
	1.2.3. Improve protected area management to prevent poisoning incidents in and around park boundaries (buffers around protected areas and better enforcement of park boundary integrity) and encourage local communities to form or join local wildlife stewardship programmes.	Direct Conservation Action	1–12	High	National and local authorities	x	x	x	x	x	x			x
	1.2.4. Review, improve and implement compensation and/or livestock insurance schemes where appropriate for vulnerable local communities in response to depredation of livestock by wildlife.	Direct Conservation Action	1–6	Medium	Park or Protected Area Management Authorities, pastoral and farming communities	x	x	x	x	x	x	x		x
	1.2.5. Improve benefit-sharing of conservation revenue from protected areas with local communities to increase value associated with wildlife and therefore discourage poisoning.	Direct Conservation Action	1–6	Medium	Park or Protected Area Management Authorities, Communities	x	x	x	x	x	x			x

Results	Actions	Category	Time frame (years)	Priority	Stakeholders	North Africa	West Africa	East Africa	Southern Africa	Europe/Central	Middle East	South Asia	East Asia	South-east Asia
	1.2.6. Increase capacity and resources of local wildlife and law enforcement authorities to respond to human-wildlife conflict incidents rapidly and effectively.	Direct Conservation Action	1–3	High	Governments, local wildlife authorities	x	x	x	x	x	x			x
	1.2.7. Engage positively with agrochemical producers to investigate methods to avoid non-target species from consuming poisons.	Direct Conservation Action	1–6	Medium	NGOs, national and local authorities, agro-chemical companies	x	x	x	x	x	x			
	1.2.8. Investigate and promote vulture-safe protocols and guidelines for vertebrate control and the disposal of carcasses at dumpsites e.g. sterilisation and vaccination programmes for feral dog control, and including improving management practices at dumpsites for vultures.	Education & Awareness	1–12	Medium	Governments, NGOs, CMS PPWG	x	x	x	x	x	x	x		x
Result 1.3 Legal and policy measures respond to causes and impact of unintentional poisoning directed at vertebrate control	1.3.1. Review, develop and significantly increase enforcement of appropriate legislation to control, ban or restrict the sale, storage, distribution, use and disposal of toxic chemicals used in the indiscriminate killing of wildlife.	Policy & Legislation	1–12	Medium	National and local authorities, CMS PPWG	x	x	x	x	x	x	x	x	x
	1.3.2. Review, introduce and enforce strict penalties for illegal wildlife poisoning acts, sufficient to deter future poisoning.	Policy & Legislation	1–6	Essential	National and local authorities, CMS PPWG	x	x	x	x	x	x	x	x	x
	1.3.3. Implement environmental agreements, Resolutions and mandates (e.g. CMS + Bern-Tunis Action Plan, CBD).	Policy & Legislation	1–5	High	Governments	x	x	x	x	x	x	x	x	x
Objective 2. To recognise and minimise mortality of vultures by non-steroidal anti-inflammatory drugs (NSAIDs) and occurrence and threat of toxic NSAIDs throughout the range covered by the Vulture MsAP.														
Result 2.1 Awareness raising and regulation of veterinary NSAID use at national levels is adequate and implements CMS Resolution 11.15	2.1.1. Situation analysis and publication of results regarding availability and use of NSAIDs in all Vulture MsAP Range States (including analysis of national laboratory capacity to detect NSAIDs either in country or through external links).	Research & Monitoring	1–6	High	Governments (health & environment ministries), NGOs, RSC, SAVE	x	x	x	x	x	x	x	x	x
	2.1.2. Prohibit or withdraw veterinary use of diclofenac, ketoprofen and aceclofenac for the treatment of livestock and substitute it with readily available safe alternatives, such as meloxicam in all Vulture MsAP Range States.	Policy & Legislation	1–6	Essential	Governments (health & environment ministries), NGOs, RSC, SAVE	x	x	x	x	x	x	x	x	x
	2.1.3. Develop a formalised approval process before market authorisation is granted for all veterinary NSAIDs and seek to identify additional safe alternatives to NSAIDs toxic to vultures.	Policy & Legislation	1–6	Essential	Governments (health & environment ministries), NGOs, RSC, SAVE	x	x	x	x	x	x	x	x	x
	2.1.4. Establish government-backed alert system across the Vulture MsAP range to identify potentially dangerous veterinary drugs already in use, based on use levels from pharmacy surveys, cattle carcass analysis and drug safety testing results.	Direct Conservation Action	1–6	High	NGOs, Governments (animal health, environment)	x	x	x	x	x	x	x	x	x
	2.1.5. Carry out robust and mandatory safety testing on vultures and develop a formalised approval process before market authorisation is granted for veterinary NSAIDs. (Aim is to identify NSAIDs and other veterinary pharmaceuticals that are safe for vultures).	Research & Monitoring	1–12	High	NGOs, Governments (IVRI), SAVE					x	x	x		
	2.1.6. Assess consumer requirements and improve availability of effective meloxicam formulations and other identified non-toxic drugs to facilitate stronger uptake by veterinary practitioners and livestock owners.	Direct Conservation Action	1–12	Medium	Pharma industry, NGOs, Governments (livestock)							x		
	2.1.7. Awareness-raising initiatives aimed at veterinarians and potential consumers across the Vulture MsAP range.	Education & Awareness	1–3	High	NGOs	x	x	x	x	x	x	x	x	x

Results	Actions	Category	Time frame (years)	Priority	Stakeholders	North Africa	West Africa	East Africa	Southern Africa	Europe/Central	Middle East	South Asia	East Asia	South-east Asia
Result 2.2 Vulture populations are maintained and/or restored by establishment of Vulture Safe Zones (VSZs)	2.2.1. Maintain and review network of VSZs (with emphasis on NSAIDs issue) in India, Nepal, Pakistan and Bangladesh and develop VSZ criteria for application as an approach in addressing other critical threats in other regions.	Direct Conservation Action	1–6	Medium	NGOs, Regional Governments, SAVE							x		
	2.2.2. Promote development and implementation of new VSZs through drafting and dissemination of guidelines for identification and selection.	Education & Awareness	1–6	Medium	SAVE							x		
	2.2.3. Undertake capacity-building and local advocacy to promote VSZs.	Education & Awareness	1–6	Medium	NGOs, SAVE							x		
	2.2.4. Monitor availability of NSAIDs for veterinary use in VSZs across South Asia and more widely.	Research & Monitoring	1–12	High	NGOs, State Governments, SAVE							x		
Result 2.3 Vulture Safe Zones are monitored	2.3.1. Monitor wild vulture populations and breeding success in VSZs.	Research & Monitoring	1–12	High	NGOs, State Governments, SAVE							x		
Objective 3. To ensure that CMS Resolution 11.15 on the phasing out the use of lead ammunition by hunters is fully implemented.														
Result 3.1 Mitigation measures in place to reduce the impact of lead poisoning on vultures	3.1.1. Quantify impacts of lead poisoning on populations of vultures and conduct regular lead and other heavy metal screening in vultures.	Research & Monitoring	1–6	Medium	NGOs, Universities, Research Institutions, Governments	x		x	x	x	x			x
	3.1.2. Advocate for policy, legislation and action to reduce known risks of lead poisoning to humans and wildlife.	Policy & Legislation	1–12	Medium	NGOs, Research Institutions, Governments	x		x	x	x	x			
	3.1.3. Awareness-raising among relevant stakeholders, especially decision makers.	Education & Awareness	1–3	High	NGOs, Hunters	x		x	x	x	x		x	x
	3.1.4. Promote the implementation of CMS Resolution 11.15 by all CMS Parties as well as voluntary lead ammunition bans in Vulture MsAP range states which are not CMS Parties.	Policy & Legislation	1–3	Essential	CMS Parties, Governments	x		x	x	x	x	x	x	x
	3.1.5. Promote best practices and cost effective alternatives to lead ammunition.	Education & Awareness	1–3	High	NGOs, Hunters	x		x	x	x	x	x	x	x
Objective 4. To reduce and eventually to halt the trade in vulture parts for belief-based use.														
Result 4.1 Improved understanding of the trade in vultures and their parts informs improved conservation approaches	4.1.1. Conduct overall situation analysis on belief-based use of vultures and their body parts, to include: current state of knowledge, best practices for tackling the trade, body parts used, market turnover rates, how vultures are acquired, key markets, socio-economic drivers of the trade and trade pathways	Research & Monitoring	1–6	High	NGOs, Universities, Research Institutions		x	x	x				x	x
	4.1.2. Assess population effects on vultures of trade from body parts for belief-based use.	Research & Monitoring	1–6	High	NGOs, Universities, Research Institutions		x	x	x					
	4.1.3. Assess policies, laws and regulations governing the use, sale, distribution and disposal of poisons and illegal use of agro-chemicals used to poison wildlife, especially vultures, for belief-based use.	Research & Monitoring	1–3	High	NGOs, Universities, Research Institutions, Governments		x	x	x					
	4.1.4. Investigate and test best practices to eliminate the trade in vulture parts for belief-based uses.	Research & Monitoring	1–6	High	CITES, CMS		x	x	x					
	4.1.5. Determine protocols for sampling and promote the establishment or use of suitable facilities to do advanced and accurate toxicological assessment of samples in range countries.	Direct Conservation Action	1–3	Medium	NGOs, Universities, Research Institutions, Laboratories		x	x	x					
	4.1.6. Identify human health impacts of use and consumption of vulture body parts for belief-based use.	Research & Monitoring	1–6	High	Government health department and private healthcare providers		x	x	x					
Result 4.2 Governments, local communities and other stakeholders understand scale and impact of trade in and belief-based use of vulture body parts	4.2.1. Initiate engagement and dialogue with relevant stakeholders, publish and share research and monitoring results on belief-based use of vultures with relevant Government departments (e.g. environment, agriculture, health) and other stakeholders to agree appropriate national actions	Education & Awareness	1–6	Essential	NGOs, Universities, Research Institutions, Government, religious leaders, conventional medical community, local leaders, traditional healers, consumers		x	x	x					

Results	Actions	Category	Time frame (years)	Priority	Stakeholders	North Africa	West Africa	East Africa	Southern Africa	Europe/Central	Middle East	South Asia	East Asia	South-east Asia
	4.2.2. Implement multi-media awareness campaigns to highlight negative (human health and ecological) impacts of belief-based use of vulture body parts; target public (especially suppliers, traditional healers, religious leaders, consumers and youth), using research results.	Education & Awareness	1–12	High	National and Local Government, NGOs		x	x	x					
Result 4.3 All appropriate policy instruments and legal measures are established and/or aligned to reduce belief-based use of vulture body parts	4.3.1. Train customs and law enforcement officers to identify vultures and their body parts to enable effective confiscation and enforcement actions, particularly at borders.	Direct Conservation Action	1–3	High	Governments, NGOs		x	x	x					
Objective 5. To reduce and eventually to halt the practice of sentinel poisoning by poachers.														
Result 5.1 Barriers to prosecuting offenders of wildlife crime are understood	5.1.1. Review existing policy and legislation to identify barriers to successful prosecution of wildlife crime offenders.	Research & Monitoring	1–3	High	NGOs, Universities, Research Institutions, Government - Judiciary			x	x					
Result 5.2 Information on sentinel poisoning incidents is properly collected, managed and shared	5.2.1. Develop new, or support existing, poisoning and poaching-related databases, and link them where possible.	Research & Monitoring	1–12	High	NGOs, Universities, Research Institutions, Governments, IUCN SSC VSG			x	x					
	5.2.2. Confirm or identify poaching hotspots (especially of elephants) and determine sites to focus action to reduce risk or impact to vultures whose ranges overlap with hotspots.	Research & Monitoring	1–3	High	NGOs, Universities, Research Institutions			x	x					
Result 5.3 Governments, local communities and other stakeholders understand scale and impact of sentinel poisoning	5.3.1. Raise awareness of law enforcement, judiciary and public through targeted campaigns on the link between elephant and bushmeat poaching and vulture declines.	Education & Awareness	1–6	High	Governments, Wildlife Authorities, NGOs			x	x					
Result 5.4 Conservation authorities, communities and others take collaborative action to respond to or prevent poisoning incidents	5.4.1. Expand poisoning response training programmes to support conservation staff to rapidly respond to poisoning incidents.	Direct Conservation Action	1–12	Essential	NGOs, national and local governments			x	x					
	5.4.2. Identify and provide effective sustainable (alternative) livelihoods to encourage people to move away from poaching (e.g. recruit poachers into law enforcement).	Direct Conservation Action	1–6	Medium	Governments, NGOs			x	x					
	5.4.3. Enhance capacity to sample and analyse poisons used in elephant and bushmeat poaching among relevant national institutions.	Direct Conservation Action	1–6	Medium	Governments, Laboratories, Research Institutions, NGOs			x	x					
	5.4.4. Increase capacity and resources for effective law enforcement to tackle elephant and bushmeat poaching within Protected Areas.	Direct Conservation Action	1–12	High	Wildlife Authorities, Police service			x	x					
	5.4.5. Enhance networking and coordination between initiatives on vulture conservation and preventing elephant poaching. Improve communication between conservation practitioners, researchers, Governments and elephant anti-poaching groups.	Direct Conservation Action	1–12	High	NGOs, Governments, CITES, IUCN (linkage to MIKE, IUCN SSG Elephant, Rhino and Vulture Specialist Groups)			x	x					
Result 5.5 Legal and policy measures respond to causes and impact of poaching on vultures and are enforced	5.5.1. Introduce and enforce severe penalties on those found guilty of carrying out illegal wildlife poisoning events, treating those that impact on vultures and on other fauna with equal seriousness.	Policy & Legislation	1–6	High	Governments			x	x					
	5.5.2. Develop and enforce legislation to control, ban or restrict the sale, storage, distribution, use and disposal of toxic chemicals used in elephant and bushmeat poaching.	Policy & Legislation	1–6	Medium	Governments			x	x					
Objective 6. To substantially reduce vulture mortality caused by electrocutions linked to energy generation and transmission infrastructure.														
Result 6.1 Vulture mortality and sensitivity in relation to electrocution is better understood, including population impacts and hotspots	6.1.1. Determine baseline impact of electrocution on energy infrastructure at appropriate levels (e.g. total population, sub-region, country or sub-national) for each species within the Vulture MsAP range using standard monitoring protocols.	Research & Monitoring	1–12	High	NGOs, Universities, Research Institutions	x	x	x	x	x	x	x	x	x

Results	Actions	Category	Time frame (years)	Priority	Stakeholders	North Africa	West Africa	East Africa	Southern Africa	Europe/Central	Middle East	South Asia	East Asia	South-east Asia
	6.1.2. Complete sensitivity mapping for Vulture MsAP range. Adding to existing analyses (e.g. Red Sea flyway) to identify areas where energy infrastructure poses greatest electrocution risks to vultures; combine tracking data, site prioritisation, vulture counts and other sources.	Research & Monitoring	1–3	Essential	CMS Energy Task Force, BirdLife, Utilities, Research Institutions	x	x	x	x	x	x	x	x	x
	6.1.3. Develop standardised monitoring protocols which included guidance on access to data and data sharing, and conduct long-term monitoring of impacts of energy infrastructure, both for proposed and existing networks.	Research & Monitoring	1–12	High	Private sector, national or local governments, NGOs, Utilities	x	x	x	x	x	x			
Result 6.2 Public and private sector support and widespread adoption of vulture-friendly energy infrastructure	6.2.1. Promote the use of bird-friendly energy technology as set out in CMS guidelines on energy infrastructure (*Guidelines on How to Avoid or Mitigate Impact of Electricity Power Grids on Migratory Birds in the African-Eurasian Region*, draft *Renewable Energy Technologies and Migratory Species: Guidelines for Sustainable Deployment*).	Education & Awareness	1–6	High	Donors, NGOs, Governments, Utilities	x	x	x	x	x	x	x	x	x
	6.2.2. Develop a Pan-African Energy Task Force probably as a sub-group of the CMS Energy Task Force and engage with energy developers operating in Africa to ensure risk to vultures from planned energy infrastructure is minimised.	Direct Conservation Action	1–3	High	CMS Energy Task Force, CMS Parties Focal Points, energy developers, NGOs	x	x	x	x					
	6.2.3. Engage with donors of large energy infrastructure developments to ensure responsible energy developments and allocation of project resources to enable long-term monitoring	Policy & Legislation	1–6	High	Donors, NGOs, Governments, Utilities	x	x	x	x	x	x			
	6.2.4. Advocate adoption of minimum standards by all energy infrastructure developers that ensures all future energy infrastructure adopts bird-friendly technologies and designs, and enforces phasing-out of old risk-prone technologies.	Policy & Legislation	1–12	High	NGOs, Governments, Donors, Utilities	x	x	x	x	x	x			
	6.2.5. Create, or identify existing, national energy associations and engage them to support vulture-friendly power grids both pre- and post- construction.	Policy & Legislation	1–3	High	Energy companies, Governments, NGOs, Utilities	x	x	x	x	x	x			
Result 6.3 Energy infrastructure (electricity power grids) impacts on vultures are reduced by implementation of improved designs	6.3.1. For new and existing energy infrastructure, promote the implementation of CMS guidelines by phasing out energy infrastructure designs that pose electrocution risk to vultures and other birds, and advocate retro-fitting with known bird-friendly designs within current maintenance schedules.	Policy & Legislation	1–12	Essential	Governments, Utilities, NGOs, CMS	x	x	x	x	x	x	x	x	x
	6.3.2. Ensure full implementation of mitigation measures in all protected areas containing vulture populations within the Vulture MsAP range.	Policy & Legislation	1–3	High	Governments,public bodies, Utilities, NGOs	x	x	x	x	x	x	x	x	x
	6.3.3. Improve planning of routing and construction of new power lines and promote the use of underground options where appropriate.	Policy & Legislation	1–6	High	Utilities, Donors, NGOs, Governments	x	x	x	x	x	x	x	x	x
	6.3.4. Assess the effectiveness and durability of mitigation measures to prevent electrocution.	Research & Monitoring	4–6	Medium	Public officials, private sector companies	x	x	x	x	x	x	x	x	x
	6.3.5. Ensure the monitoring and maintenance of anti-electrocution measures and implement replacement when necessary.	Policy & Legislation	4–6	High	Energy companies	x	x	x	x	x	x	x	x	x
	6.3.6. Conduct training and capacity building to support implementation of guidelines and minimum standards, including monitoring.	Education & Awareness	1–6	Medium	Government, energy companies, NGOs, CMS	x	x	x	x	X	x	x	x	x
Objective 7. To substantially reduce vulture mortality caused by collisions linked to energy transmission and generation infrastructure.														
Result 7.1 Vulture mortality and sensitivity in relation to collision better understood, including	7.1.1. Determine baseline impact of collision on energy infrastructure at appropriate levels (e.g. total population, sub-region, country or sub-national) for each species within the Vulture MsAP range, using standard monitoring protocols.	Research & Monitoring	1–12	High	NGOs, Universities, Research Institutions	x	x	x	x	x	x	x	x	x

Results	Actions	Category	Time frame (years)	Priority	Stakeholders	North Africa	West Africa	East Africa	Southern Africa	Europe/Central	Middle East	South Asia	East Asia	South-east Asia
population impacts and hotspots	7.1.2. Complete sensitivity mapping for the entire MsAP range. Adding to existing analyses (e.g. Red Sea flyway) to identify areas where energy infrastructure poses greatest collision risks to vultures; combine tracking data, site prioritisation, vulture counts and other sources.	Research & Monitoring	1–3	Essential	CMS Energy Task Force, BirdLife, Utilities, Research Institutions	x	x	x	x	x	x	x	x	x
	7.1.3. Develop standardised monitoring protocols which included guidance on access to data and data sharing, and conduct long-term monitoring of impacts of energy infrastructure, both for proposed and existing networks.	Research & Monitoring	1–12	High	Private sector, national or local governments, NGOs, Utilities	x	x	x	x	x	x			
	7.1.4. Conduct long-term monitoring of impacts of energy infrastructure, both for proposed and existing networks and investigate effective on-site mitigation techniques to reduce vulture fatalities. Explore methods to better capture collision data.	Research & Monitoring	1–12	High	Private sector, national or local governments, Utilities	x	x	x	x	x	x		x	
Result 7.2 Public and private sector support and widespread adoption of vulture-friendly energy infrastructure	7.2.1. Promote the use of bird-friendly energy technology as set out in CMS guidelines on energy infrastructure and on-site mitigation measures, targeting a set of decision-makers in key countries where this is known to be an issue (*Guidelines on How to Avoid or Mitigate Impact of Electricity Power Grids on Migratory Birds in the African-Eurasian Region*, draft *Renewable Energy Technologies and Migratory Species: Guidelines for Sustainable Deployment*).	Education & Awareness	1–6	High	Donors, NGOs, Governments, Utilities	x	x	x	x	x	x	x	x	x
	7.2.2. Use existing tools (e.g. sensitivity maps) to ensure appropriate site selection of wind farms and other energy infrastructure, avoiding areas of high risk and vulnerability e.g. vulture colonies.	Direct Conservation Action	1–12	High	Donors, NGOs, Governments, Utilities, Developers	x	x	x	x	x	x	x	x	x
	7.2.3. Develop a Pan-African Energy Task Force, probably as a sub-group of the CMS Energy Task Force and engage with energy developers operating in Africa to ensure risk to vultures from planned energy infrastructure is minimised.	Direct Conservation Action	1–3	High	CMS Energy Task Force, CMS Parties, energy developers, NGOs	x	x	x	x					
	7.2.4. Engage with donors of large energy infrastructure developments to ensure responsible energy developments using appropriate guidelines (International Finance Corporation Standards) and allocation of project resources to enable long-term monitoring.	Policy & Legislation	1–6	High	Donors, NGOs, Governments, Utilities	x	x	x	x	x	x	x	x	x
	7.2.5. Promote the phasing-out of old risk-prone technologies, and support investigations in the improvement of risk-prone designs, e.g. replacing current wind turbines with blade-less designs.	Research & Monitoring	1–12	High	NGOs, Governments, Donors, Utilities, Developers, Designers	x	x	x	x	x	x	x	x	x
	7.2.6. Create, or identify existing, national energy associations and engage them to support vulture-friendly power grids both pre- and post- construction.	Policy & Legislation	1–3	High	Energy companies, Governments, NGOs, Utilities	x	x	x	x	x	x	x	x	x
Result 7.3 Energy infrastructure (electricity power grids) impacts on vultures are reduced by implementation of improved designs	7.3.1. For new and existing energy infrastructure, promote the implementation of CMS guidelines, including by adopting designs that reduce the risk of collision for vultures and other birds, and advocating retro-fitting with bird-friendly mitigation measures, within current maintenance schedules.	Policy & Legislation	1–12	Essential	Governments, Utilities, NGOs, CMS	x	x	x	x	x	x	x	x	x
	7.3.2. Advocate adoption of correct minimum standards by all energy infrastructure developers that ensures all future energy infrastructures adopt bird-friendly technologies and designs.	Policy & Legislation	1–12	High	NGOs, Governments, Donors, Utilities, Developers, Designers	x	x	x	x	x	x	x	x	x
	7.3.3. Ensure full implementation of mitigation measures in all protected areas containing vulture populations within the Vulture MsAP range.	Policy & Legislation	1–3	High	Governments,public bodies, Utilities, NGOs	x	x	x	x	x	x	x	x	x

Results	Actions	Category	Time frame (years)	Priority	Stakeholders	North Africa	West Africa	East Africa	Southern Africa	Europe/Central	Middle East	South Asia	East Asia	South-east Asia
	7.3.4. Improve planning of routing and construction of new power lines and promote the use of underground options where appropriate.	Policy & Legislation	1–6	High	Utilities, Donors, NGOs, Governments	x	x	x	x	x	x	x	x	x
	7.3.5. Assess the effectiveness and durability of mitigation measures to prevent collision.	Research & Monitoring	4–6	Medium	Public officials, private sector companies	x	x	x	x	x	x	x	x	x
	7.3.6. Ensure the monitoring and maintenance of anti-collision measures and replacement when necessary.	Policy & Legislation	4–6	High	Energy companies	x	x	x	x	x	x	x	x	x
	7.3.7. Conduct training and capacity building to support implementation of guidelines and minimum standards, including monitoring.	Education & Awareness	1–6	Medium	Governments, energy companies, NGOs, CMS	x	x	x	x	x	x			
Objective 8. To ensure availability of an appropriate level of safe food to sustain healthy vulture populations.														
Result 8.1 Understanding of role of food availability in vulture declines is improved	8.1.1. Investigate changes in food availability (and water availability and quality - where applicable), quality and distribution for vultures at a range of spatial scales (foraging patterns of fledglings and breeding adults), and any resulting impacts on vulture populations.	Research & Monitoring	1–6	Medium	Research Institutions, Universities, NGOs	x	x	x	x	x	x	x	x	x
	8.1.2. If vulture food shortage is confirmed, identify drivers with specific reference to ungulate declines and stricter sanitation at abattoirs (proposed root causes), hunting practices and social and socioeconomic changes (husbandry practices).	Research & Monitoring	1–6	High	Research Institutions, Universities, NGOs	x	x	x	x	x	x	x	x	x
Result 8.2 Where appropriate, country-specific or more local strategies are developed and implemented to ensure availability of safe food	8.2.1. Identify and promote scavenger-friendly veterinary/sanitary regulations (regarding carcass disposal) and waste management practices and make sure that the food provided is safe (e.g. not contaminated with pesticides and NSAIDs, etc.).	Direct Conservation Action	4–6	High	Veterinary-, conservation- or environmental authorities	x	x	x	x	x	x	x		x
	8.2.2. Promote and implement measures to restore wildlife populations in protected areas, with special attention to benefiting vultures by conserving existing wild ungulate and predator populations and maintaining protected area networks.	Direct Conservation Action	1–12	High	Governments, NGOs, Wildlife Authorities	x	x	x	x	x	x			x
	8.2.3. Promote scavenger-friendly traditional land use practices such a mobile pastoralism.	Direct Conservation Action	1–12	Medium	Governments, NGOs, Wildlife Authorities		x	x	x		x		x	x
	8.2.4. Develop clear goals and science-based guidance and methods to support any supplementary feeding strategies (e.g. vulture restaurants), including ensuring resources to cover operational costs for sites for 5–12 years.	Direct Conservation Action	1–12	High	Governments, NGOs, Wildlife Authorities and vet authorities	x	x	x	x	x	x			
	8.2.5. Training & capacity building in the management of feeding sites (food sustainability, both natural and supplementary).	Education & Awareness	4–6	High	Conservation and vet authorities	x	x	x	x	x	x			
Objective 9. To ensure availability of suitable habitat for vultures to nest, roost and forage.														
Result 9.1 Nesting and roosting sites used by vultures conserved	9.1.1. Investigate and identify key nesting and roosting areas and assess availability in relation to habitat destruction – working with local communities to show importance and impact on vulture populations.	Research & Monitoring	1–6	Medium	Research Institutions, Universities,NGOs	x	x	x	x	x	x	x	x	x
	9.1.2. Review legislation and promote recognition and conservation of key breeding and roosting sites for vultures (including potential establishment of new protected areas).	Policy & Legislation	4–6	Medium	Governments, NGOs, Wildlife Authorities, local communities	x	x	x	x	x	x	x		
	9.1.3. Establish reforestation schemes and woodlots to increase vulture nesting habitat and reduce human pressure for fuel and construction timber.	Direct Conservation Action	1–12	Medium	Governments, NGOs, Wildlife Authorities		x	x	x	x	x			

Results	Actions	Category	Time frame (years)	Priority	Stakeholders	North Africa	West Africa	East Africa	Southern Africa	Europe/Central	Middle East	South Asia	East Asia	South-east Asia
Result 9.2 Rangelands conserved as suitable habitat for vultures	9.2.1. Promote sustainable management of rangelands through holistic land (farm, mining concession etc.) management to ensure healthy environment for vultures e.g. cattle grazing rotation to reduce degradation and traditional mobile pastoralism.	Education & Awareness	1–12	Medium	NGOs working with landowners/associations	x	x	x	x	x	x			
	9.2.2. Integrate knowledge of vulture habitat requirements into land or ecosystem management for rangelands, including Protected Areas etc.	Direct Conservation Action	1–12	Medium	NGOs working with landowners/associations	x	x	x	x	x	x			
	9.2.3. Include vultures as part of biodiversity planning and indicator systems in conservation and/or development (e.g. mining) projects.	Direct Conservation Action	1–12	Medium	Universities, NGOs, Governments, private sector e.g. mining	x	x	x	x	x	x	x	x	x
Objective 10. To substantially reduce levels of direct persecution and disturbance of vultures caused by human activities.														
Result 10.1 Reduced mortality caused by direct persecution	10.1.1. Seek species protection legislation and policies to protect species from persecution and disturbance to be enacted in all Vulture MsAP Range States.	Policy & Legislation	7–12	High	International and local authorities	x	x	x	x	x	x			
	10.1.2. Assess the motivation behind the direct persecution of vultures and engage with relevant stakeholders to promote alternative approaches or interventions.	Education & Awareness	1–12	High	NGOs, media, livestock breeders, hunting assoc.	x	x	x	x	x	x		x	x
	10.1.3. Aim to ensure that appropriate legislation is in place and effectively enforced to prevent direct persecution of vultures.	Direct Conservation Action	7–12	High	NGOs, national and international authorities	x	x	x	x	x	x	x	x	x
Result 10.2 Breeding success increased by reducing disturbance	10.2.1. Implement public awareness campaigns to highlight activities that cause disturbance to vultures at breeding and roosting sites and how to avoid or mitigate it.	Education & Awareness	1–12	High	International and local authorities, NGOs	x	x	x	x	x	x		x	x
	10.2.2. Determine scientifically based guidelines to reduce the impact of disturbance for each species in the Vulture MsAP range.	Research & Monitoring	7–12	High	Governments, NGOs, Universities, Research Institutions	x	x	x	x	x	x	x	x	x
	10.2.4. Improve control of infrastructure development at or near breeding sites (including use of EIA's and other relevant studies).	Direct Conservation Action	7–12	High	NGOs, national and international authorities	x	x	x	x	x	x	x	x	x
Objective 11. To support vulture conservation through cross-cutting actions that contribute to addressing knowledge gaps.														
Result 11.1 Increased understanding of basic biological and ecological parameters and threats influencing vulture populations	11.1.1. Census 2018–2019 + census 2028–2029 of all species to monitor the population size, breeding productivity, distribution and trends across the Vulture MsAP range.	Research & Monitoring	1–12	Essential	Governments, NGOs, Universities, Research Institutions, ARDB	x	x	x	x	x	x	x	x	x
	11.1.2. Study breeding and spatial ecology of vulture species, and identify most important breeding, feeding and roosting sites for each, per country.	Research & Monitoring	1–12	High	Governments, NGOs, Universities, Research Institutions, ARDB	x	x	x	x	x	x	x	x	x
	11.1.3. Undertake GPS/satellite tracking studies of vultures to determine spatial movements for all species and to identify mortality caused by full range of threats. Create a repository for all tracking data across the Vulture MsAP range.	Research & Monitoring	1–3	High	Research Institutions, NGOs	x	x	x	x	x	x	x	x	x
	11.1.4. Improve capacity to conduct autopsies, toxicological and other forensic analysis to determine causes of mortalities throughout the Vulture MsAP range.	Direct Conservation Action	1–12	High	Governments, NGOs, Universities, Research Institutions, CITES	x	x	x	x	x	x	x	x	x
	11.1.5. Improve regulations to facilitate the easier movement of samples between countries where capacity is lacking to facilities than can do the relevant analysis. Permitting process needs to be streamlined.	Direct Conservation Action	1–12	High	Governments, NGOs, CITES	x	x	x	x	x	x	x	x	X
	11.1.6. Promote long-term monitoring of supplementary feeding site management and use and information exchange between sites.	Research & Monitoring	1–12	High	Conservation and vet authorities				x	x	x			
	11.1.7. Conduct a detailed assessment on the scale and impact of legal and illegal trade in live birds, eggs and vulture body parts across the range of the Vulture MsAP.	Research & Monitoring	1–2	High	Universities, Environmental Agencies, CITES, TRAFFIC	x	x	x	x	x	x		x	

Results	Actions	Category	Time frame (years)	Priority	Stakeholders	North Africa	West Africa	East Africa	Southern Africa	Europe/Central	Middle East	South Asia	East Asia	South-east Asia
	11.1.8. In light of outcome of Action 11.1.7. (above), undertake risk-benefit analysis and gauge potential support for of proposing the up-listing of individual species that meet the criteria to CITES Appendix I.	Direct Conservation Action	1–2	Medium	Universities, Environmental Agencies, CITES, TRAFFIC	x	x	x	x	x	x		x	
Result 11.2 Vulture populations restored where extinct and restocked where there is danger of extinction	11.2.1. Assess all project proposals for captive breeding and reintroduction of vultures to ensure full alignment with IUCN Guidelines on restocking and reintroduction.	Research & Monitoring	1–12	Medium	NGOs, Universities, Research Institutions	x	x	x	x	x	x	x	x	x
	11.2.2. Develop conservation breeding programs for critically endangered and endangered vulture species, as last resort.	Direct Conservation Action	1–12	Medium	Governments, NGOs, Environmental Agencies, Research Institutions, Captive Breeding Facilities, Regional Zoo Associations	x	x	x	x	x	x	x		
	11.2.3. Develop a reintroduction strategy using the IUCN guidelines and criteria for reintroduction of species.	Direct Conservation Action	1–12	Medium	Governments, NGOs, Environmental Agencies, Research Institutions, Captive Breeding Facilities	x	x	x	x	x	x	x		
Result 11.3 Environmental and socio-economic values of vultures are understood and promoted	11.3.1. Conduct a Total Economic Value (TEV) study of vultures which includes their role as providers of ecosystem services and in generating eco-tourism attraction.	Research & Monitoring	1–3	Essential	NGOs, Universities, Research Institutions	x	x	x	x	x	x	x	x	x
Result 11.4 Enhanced legal and other protection of African-Eurasian Vultures nationally and internationally	11.4.1. Engage with Range States to promote Proposals to uplist all endangered and critically endangered African-Eurasian vulture species to CMS Appendix I.	Policy & Legislation	1	High	CMS Parties, CMS Raptors MOU	x	x	x	x	x	x	x	x	x
	11.4.2. Aim to ensure that vultures are afforded legal protection in all Range States.	Policy & Legislation	1–6	High	Governments	x	x	x	x	x	x	x	x	x
	11.4.3. Draft guidelines to encourage and assist all Range States to develop National or Regional Vulture Conservation Plans.	Policy & Legislation	1–6	High	Governments	x	x	x	x	x	x	x	x	x
	11.4.4. Develop VSZ criteria and promote application and implementation of this approach to address all critical threats throughout the Vulture MsAP range.	Direct Conservation Action	1–12	Essential	NGOs	x	x	x	x	x	x	x	x	x
Objective 12. To advance vulture conservation by effective promotion and implementation of the Vulture MsAP.														
Result 12.1 Coordination Framework for the Vulture MsAP established, subject to available resources, including financial	12.1.1. Develop a Strategic Implementation Plan for the Vulture MsAP.	Direct Conservation Action	0.5	High	CMS Raptors MOU, Vulture MsAP Coordinators & Partners	x	x	x	x	x	x	x	x	x
	12.1.2. Establish a Framework to coordinate implementation of the Vulture MsAP, including central and regional coordination units to facilitate implementation, support and review across the range.	Direct Conservation Action	1–2	Essential	CMS Raptors MOU, Vulture MsAP partners	x	x	x	x	x	x	x	x	x
	12.1.3. Develop and implement a fundraising strategy to secure the finances and other resources required to effectively implement the Vulture MsAP.	Direct Conservation Action	1	Critical	CMS Raptors MOU, Vulture MsAP Coordinators & Partners, Range States	x	x	x	x	x	x	x	x	x
Result 12.2 Effective communication strategy for the Vulture MsAP is established	12.2.1. Develop and implement a communications strategy, including at national level, comprising tools to promote the conservation of vultures across the flyway in a range of languages.	Education & Awareness	1–3	High	CMS, NGOs, Governments, Media	x	x	x	x	x	x	x	x	x
	12.2.2. Utilise and support existing events at national level, such as International Vulture Awareness Day, to promote the conservation of vultures globally.	Education & Awareness	1–12	High	CMS, NGOs, Governments, Media	x	x	x	x	x	x	x	x	x
	12.2.3. Establish a repository for relevant guidance, awareness-raising materials, other publications and protocols that promote vulture conservation.	Education & Awareness	1–3	High	CMS, NGOs, Governments, Media	x	x	x	x	x	x	x	x	x
	12.2.4. Create an interactive on-line version of the Vulture MsAP to enable ongoing updating and enhancement as new information and knowledge is accumulated.	Education & Awareness	1–12	High	CMS, Vulture MsAP Coordinators & Partners	x	x	x	x	x	x	x	x	x

7.5. Summary of critical threats, key issues and associated Essential actions

The full range of anthropogenic threats facing vultures is identified and discussed in some detail in Section 4. The Framework of Conservation Actions (Table 6) sets out a total of 125 actions that need to be implemented to respond and ultimately combat the wide range of threats impacting vultures and their populations. In Table 6, each action is assigned a level of priority based on the scale, scope and urgency of the overarching threat which it is intended to address. As a result, 17 are identified as Essential actions which need to be acted on immediately. This section aims to link these Essential actions with the critical threats they seek to address.

7.5.1. Poisoning (see Section 4.1)

Unintentional secondary poisoning - Human-wildlife conflict

Vultures are killed when feeding on poisoned bait set for mammalian predators as a result of human-predator conflicts or for the control of problem animals, e.g. feral dogs.

- Action 1.1.1. Conduct an overall situation analysis of wildlife poisoning associated with human-wildlife conflict, with special attention to vulture mortality: covering state of knowledge, drivers and motivations, poisons used (actually or potentially), analytical capacity, hotspots, knowledge gaps and best practice on reducing conflicts and related poisoning.
- Action 1.1.3. Implement awareness campaigns, specifically covering (a) negative impacts on vultures and other non-target species; (b) likely ineffectiveness of poisoning as a problem animal control technique; (c) impacts of poisoning on human and livestock health; and (d) legal alternatives to mitigate of human-wildlife conflict.
- Action 1.2.2. Establish protocols and train and support relevant agency staff (conservation, rangers, police and judiciary) to rapidly respond to poisoning incidents including sharing of best practices.
- Action 1.3.2. Review, introduce and enforce strict penalties for illegal wildlife poisoning acts, sufficient to deter future poisoning.

Unintentional secondary poisoning – NSAIDs and other veterinary medicines

This threat has caused massive declines in the populations of a range of Asian vultures and also poses a potential threat elsewhere within the Vulture MsAP range. Mortality occurs when birds feed on the carcasses of animals treated with a range of NSAIDs that are highly toxic to vultures.

- Action 2.1.2. Prohibit or withdraw veterinary use of diclofenac, ketoprofen and aceclofenac for the treatment of livestock and substitute it with readily available safe alternatives, such as meloxicam in all Vulture MsAP Range States.
- Action 2.1.3. Develop a formalised approval process before market authorisation is granted for all veterinary NSAIDs and seek to identify additional safe alternatives to NSAIDs toxic to vultures.

Unintentional secondary poisoning – Lead poisoning

Lead residues in carcasses and gut-piles from ammunition used by hunters or livestock owners to kill animals pose a substantial risk of poisoning if these are available for vultures to feed on.

- Action 3.1.4. Promote the implementation of CMS Resolution 11.15 by all CMS Parties as well as voluntary lead ammunition bans in Vulture MsAP Range States which are not CMS Parties.

Intentional poisoning – Belief-based use

The killing of vultures for the use of their body parts for various beliefs is known to be widespread in West, East and southern Africa.

- Action 4.2.1. Initiate engagement and dialogue with relevant stakeholders, publish and share research and monitoring results on belief-based use of vultures with relevant Government departments (e.g. environment, agriculture, health) and other stakeholders to agree appropriate national actions.

Intentional poisoning – Sentinel poisoning

Poachers wishing to prevent detection of their illegal killing of elephants and other large game animals in Africa deliberately poison the carcasses of the poached animals to destroy large numbers of vultures whose soaring behaviour can indicate the location of such activities to law enforcement officials.

- Action 5.4.1. Expand poisoning response training programmes to support conservation staff to rapidly respond to poisoning incidents.

7.5.2. Mortality caused by energy infrastructure (see Section 4.2)

Electrocution on energy infrastructure

In large parts of the Vulture MsAP range, vultures are at risk of being electrocuted when perching, roosting or nesting on unsafe energy infrastructure, particularly power distribution poles.

- Action 6.1.2. Complete sensitivity mapping for Vulture MsAP range. Adding to existing analyses (e.g. Red Sea flyway) to identify areas where energy infrastructure poses greatest electrocution risks to vultures; combine tracking data, site prioritisation, vulture counts and other sources.
- Action 6.3.1. For new and existing energy infrastructure, promote the implementation of CMS guidelines by phasing out energy infrastructure designs that pose electrocution risk to vultures and other birds, and advocate retro-fitting with known bird-friendly designs within current maintenance schedules.

Collisions with energy infrastructure (powerlines and wind turbines)

Poorly planned and located energy infrastructure, particularly power lines and wind turbines), can impose substantial impacts on vultures as a result of collision which can cause serious injury or death. Increasing use of renewable energy sources such as wind has generated extensive plans for wind turbine installations in many parts of the Vulture MsAP range, with a corresponding increase in the risk of vulture mortalities due to collision with these structures.

- Action 7.1.2. Complete sensitivity mapping for the entire MsAP range. Adding to existing analyses (e.g. Red Sea flyway) to identify areas where energy infrastructure poses greatest collision risks to vultures; combine tracking data, site prioritisation, vulture counts and other sources.
- Action 7.3.1. For new and existing energy infrastructure, promote the implementation of CMS guidelines, including by adopting designs that reduce the risk of collision for vultures and other birds, and advocating retro-fitting with bird-friendly mitigation measures, within current maintenance schedules.

7.5.3. Cross-cutting conservation actions and implementation of the Vulture MsAP

In addition to those Essential actions intended to address critical threats, there is also a suite of four Essential actions that focus on supporting vulture conservation through cross-cutting activities. These contribute to addressing important knowledge gaps, including in terms of the numbers and trends of vulture populations and the economic and other benefits these birds provide. In addition, establishing a framework to effectively coordinate implementation of the Vulture MsAP is considered crucial for success. See Section 8 for further discussion.

- Action 11.1.1. Census 2018-2019 + census 2028-2029 of all species to monitor the population size, breeding productivity, distribution and trends across the MsAP range.
- Action 11.3.1. Conduct a Total Economic Value (TEV) study of vultures which includes their role as providers of ecosystem services and eco-tourism attraction.
- Action 11.4.4. Develop VSZ criteria and promote application and implementation of this approach to address all critical threats throughout the Vulture MsAP range.
- Action 12.1.2. Establish a Framework to coordinate implementation of the Vulture MsAP, including central and regional coordination units to facilitate implementation, support and review across the range.

7.6 Results and actions per Range State

To guide decision-making by Range States further in terms of the implementation of appropriate actions from Table 6, the following (Table 7) gives an indication of results that would be appropriate to pursue per country, based on available information obtained from the Questionnaires and Regional Workshops.

Table 7. Suggested priority results and actions per Range State.

Key to cell shading:

Critical priority		Low priority		Not known	
High priority		Needs to be assessed		Not relevant	
Medium priority		No information			

Country	Result 1.1	Result 1.2	Result 1.3	Result 2.1	Result 2.2	Result 2.3	Result 3.1	Result 4.1	Result 4.2	Result 4.3	Result 5.1	Result 5.2	Result 5.3	Result 5.4	Result 5.5	Result 6.1	Result 6.2	Result 6.3	Result 7.1	Result 7.2	Result 7.3	Result 8.1	Result 8.2	Result 9.1	Result 9.2	Result 10.1	Result 10.2	Result 11.1	Result 11.2	Result 11.3	Result 11.4	Result 12.1	Result 12.2
Afghanistan																																	
Albania																																	
Algeria																																	
Andorra																																	
Angola																																	
Armenia																																	
Austria																																	
Azerbaijan																																	
Bahrain																																	
Bangladesh																																	
Belarus																																	

Country	Result 1.1	Result 1.2	Result 1.3	Result 2.1	Result 2.2	Result 2.3	Result 3.1	Result 4.1	Result 4.2	Result 4.3	Result 5.1	Result 5.2	Result 5.3	Result 5.4	Result 5.5	Result 6.1	Result 6.2	Result 6.3	Result 7.1	Result 7.2	Result 7.3	Result 8.1	Result 8.2	Result 9.1	Result 9.2	Result 10.1	Result 10.2	Result 11.1	Result 11.2	Result 11.3	Result 11.4	Result 12.1	Result 12.2
Belgium																																	
Benin																																	
Bhutan																																	
Bosnia & Herzegovina																																	
Botswana																																	
Brunei Darussalam																																	
Bulgaria																																	
Burkina Faso																																	
Burundi																																	
Cabo Verde																																	
Cambodia																																	
Cameroon																																	
Central African Republic																																	
Chad																																	
China (PR of)																																	
Congo (DR of)																																	
Congo (Rep. of)																																	
Croatia																																	
Cyprus																																	
Czech Republic																																	
Denmark																																	
Djibouti																																	
Egypt																																	
Equatorial Guinea																																	
Eritrea																																	
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Hungary																																	
India																																	
Iran (Islamic Republic of)																																	
Iraq																																	
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Nigeria																																	
Oman																																	
Pakistan																																	
Philippines																																	

Country	Result 1.1	Result 1.2	Result 1.3	Result 2.1	Result 2.2	Result 2.3	Result 3.1	Result 4.1	Result 4.2	Result 4.3	Result 5.1	Result 5.2	Result 5.3	Result 5.4	Result 5.5	Result 6.1	Result 6.2	Result 6.3	Result 7.1	Result 7.2	Result 7.3	Result 8.1	Result 8.2	Result 9.1	Result 9.2	Result 10.1	Result 10.2	Result 11.1	Result 11.2	Result 11.3	Result 11.4	Result 12.1	Result 12.2
Poland																																	
Portugal																																	
Qatar																																	
Romania																																	
Russia																																	
Rwanda																																	
Saudi Arabia																																	
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United Arab Emirates																																	
United Kingdom																																	
Uzbekistan																																	
Vietnam																																	
Yemen																																	
Zambia																																	
Zimbabwe																																	

8 International Coordination of Implementation

8.1. The need for an Implementation Plan

An Implementation Plan is a management tool which requires key stakeholders to think through the way in which planned actions can be put into practice, including devising appropriate organisational structures, roles and responsibilities of the parties involved and the monitoring methods required to facilitate delivery of tangible outputs within set timeframes. In the context of the Vulture MsAP, the process to develop an Implementation Plan encouraged consideration of the critical components required to deliver successful vulture conservation initiatives before any actions are executed, thereby saving time, effort and money. This planning is proactive, instead of reactive, which allows best practices to be applied with the aim of ensuring the most effective stewardship of time and resources to deliver the anticipated results in a timely manner. It also allows an opportunity to consider vital aspects such as international coordination; the need for and securing of resources; and effective communication of the aims, objectives and actions recommended in the Vulture MsAP to identified key stakeholder groups through a communications strategy.

Implementation of the Vulture MsAP was one of the key issues considered during the Overarching Workshop which was held in Toledo, Spain on 16–19 February 2017.

8.2. Framework for coordination

A functional structure to facilitate implementation of the Vulture MsAP is essential to drive the process forward following its anticipated adoption at the 12th Session of the Conference of Parties (COP12) to CMS in October 2017. The proposed coordination structure for the implementation is reflected in Figure 23. It follows closely the organisational structure established to develop the Vulture MsAP as set out in the original Project Charter published by the Coordinating Unit of the CMS Raptors MOU in early 2016, and can be summarised as follows:

Coordinating Unit of the CMS Raptors MOU: It is proposed that the Coordinating Unit should retain overall responsibility for guiding and overseeing the implementation of the Vulture MsAP. This includes spearheading efforts to secure resources, recruitment and appointment of one or more Coordinators and liaison with the Range State governments, Vulture MsAP Working Group and associated Steering Group, other CMS structures and relevant stakeholder groups.

Overarching Coordinator: It is considered essential for an Overarching Coordinator to be appointed to take responsibility for, and oversee the day-to-day implementation of, the Vulture MsAP throughout the vast African-Eurasian range. This person should report directly to the Coordinating Unit of the CMS Raptors MOU. The appointment of a full time Overarching Coordinator is seen as a vital step towards successful implementation of the Vulture MsAP; finding the necessary resources to fund this position is therefore a priority.

Regional Coordinators: The appointment of 3–4 Regional Coordinators covering Europe, Asia, Africa and the Middle East would further assist in the implementation of the Vulture MsAP at regional levels. This structure worked extremely well during the development of the Vulture MsAP and can potentially facilitate continued direct involvement by key partners such as BirdLife International, Vulture Conservation Foundation and IUCN SSC Vulture Specialist Group. These positions could be part-time if insufficient resources are initially available. Existing Terms of Reference for these positions could readily be modified to encompass functions relating to implementation.

Vulture MsAP Working Group (VWG): The VWG was established in early 2016 based on nominations received from Range State governments and partners in response to a call issued by the Coordinating Unit to all Range States covered by the Vulture MsAP, partners and interested parties. The aim was to create an efficient and effective mechanism for two-way communications with all Range States, partners and interested parties, to ensure implementation of a comprehensive and widely-supported Vulture MsAP. Currently there are over 60 members of the VWG but the number can be open-ended because it is anticipated that the VWG will function solely by means of electronic communications. However, sub-

ject to available resources, VWG members will be invited to participate in relevant regional implementation-related meetings and workshops covering their respective regions.

Vulture MsAP Steering Group (VSG): In September 2016, 20 members of the VWG were invited by the Coordinating Unit to serve on a VSG, to actively support development of the Vulture MsAP. Subsequently, three online teleconferences were held which proved to be an effective way in which to guide the process. It is proposed that the VSG continues to operate during the implementation phase of the Vulture MsAP. Members are expected to act as champions of the Vulture MsAP and to take responsibility for leading and driving forward discrete tasks, relevant to their respective regions. The VSG will communicate electronically, including via online teleconferences as and when required. Subject to available resources, the VSG will aim to hold at least one face-to-face meeting in the intersessional period between CMS COPs.

Regional Vulture Committees (RVCs): Due to the vast geographic scope of the Vulture MsAP, it is envisaged that RVCs be established by the Regional Coordinators to facilitate communications within the regions. Subject to available resources, these RVCs should aim to meet annually but would otherwise communicate electronically, including via regular online teleconferences hosted by the respective Regional Coordinator.

National Vulture Task Forces (NVTFs): The Vulture MsAP has been drafted to ensure that it is relevant to each and every one of the 128 Range States covered by the plan. However, it is anticipated that each national government may decide to utilise the Vulture MsAP to develop a tailored National Vulture Conservation Strategy (NVCS) focussed solely on the species that occur within their jurisdiction and to address the specific threats each of these species are facing. This is a critically important step to be taken by countries hosting internationally important breeding, wintering or migrant species. Ideally, these NVCSs should be developed to complement and support existing National Biodiversity Strategies and Action Plans (NBSAPs) already in place under the Convention on Biological Diversity (CBD). Establishing a NVTF is considered an extremely effective way to bring together representatives from relevant government departments and other stakeholders to develop the NVCS. Where appropriate, these Task Forces should also promote the implementation of other relevant policies and plans that contribute to the conservation of vultures, e.g. CMS Resolutions, guidelines, relevant species flyway action plans, etc.

Public support: Broad public awareness and support for the Vulture MsAP and its objectives could be a powerful tool when engaging with Range States and other stakeholders. In addition to implementing an effective communications plan aimed at a range of target audiences, consideration should be given to the establishment of a structure through which interested individuals and organisations can express their support. An example of such a structure is the 'Friends of the Landbirds Action Plan' (FLAP) which was adopted to support the implementation of the African-Eurasian Migratory Landbirds Action Plan. Potential synergies with existing initiatives such as International Vulture Awareness Day (IVAD) could assist in making this possible without requiring substantial additional resources.

8.3. Monitoring and Evaluation

To avoid placing an unnecessary additional burden on Range State governments, it is proposed that existing CMS practices be followed in terms of monitoring and evaluation during implementation of the Vulture MsAP. Accordingly, the proposed reporting arrangements integrate neatly with existing triennial online reporting requirements for CMS Parties and Signatories to the Raptors MOU.

8.3.1 Triennial Evaluation and Reporting

It is proposed that the Overarching Coordinator, supported by the Regional Coordinators and including contributions from members of the Vulture Working Group, will prepare regular written progress reports on the implementation of the Vulture MsAP. These reports will need to be submitted to the Coordinating Unit at least six months in advance of meetings of the Conference of Parties to CMS and three months in advance of Meetings of Signatories to the Raptors MOU. To avoid duplication of effort, active liaison will be required by those promoting implementation of the Vulture MsAP to ensure effective engagement with existing CMS National Focal Points and National Contact Points to the Raptors MOU. Range States that are not a Party to CMS or a Signatory to the Raptors MOU will be encouraged to report in concert with the existing CMS-related time frames via a specially developed online questionnaire.

8.3.2 Mid-term Evaluation and Progress Report

A mid-term progress report is envisaged in 2023, approximately half way through the implementation period proposed in the Vulture MsAP. The Overarching Coordinator will take the lead in gathering the information via the Regional Coordinators and other established networks, which may differ between regions. This process should not only assess progress in terms of existing objectives, but also contribute to informing and guiding decisions in terms of actions that may need to be amended according to changing circumstances and emerging threats.

8.3.3 Full-term Final Report

A Final Report on implementation of the Vulture MsAP should be prepared in 2029 in time for consideration by CMS COP16. Prepared by the Overarching Coordinator, this report should review and assess implementation and

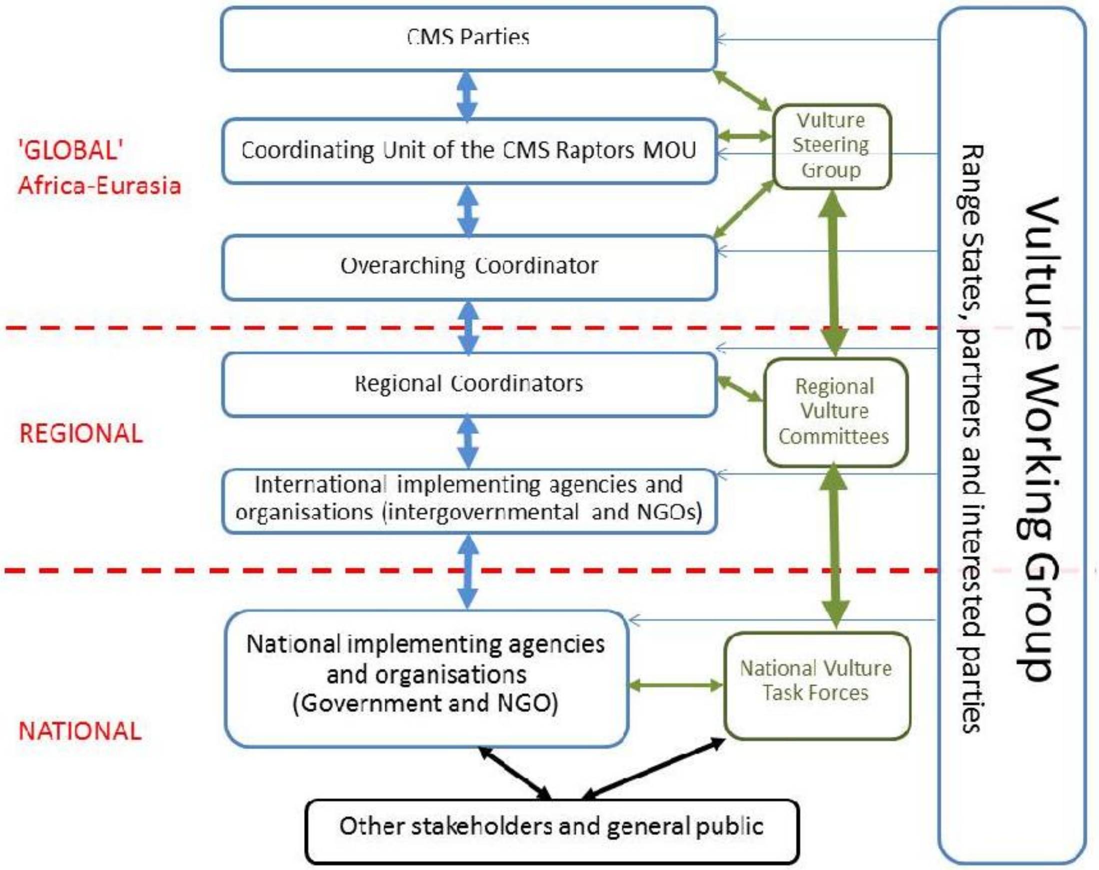

Figure 23. Proposed coordination framework to oversee implementation of the Vulture MsAP. Arrows indicate reporting or supervision/advisory relationships. Green arrows and boxes indicate primarily advisory structures; blue arrows and boxes primarily concern implementation and reporting.

the overall impact on the populations of all 15 species within their respective ranges. Range States would be encouraged to submit national reports on progress over the entire Vulture MsAP timeframe to contribute to this full-term Final Report.

8.4. Communication

8.4.1 The need for communication of the Vulture MsAP

Strategic communication is an essential supporting component of the overall coordination of the implementation of any action plan. This section outlines the main messages that should be communicated to support the implementation of the Vulture MsAP; proposes some of the main communications mechanisms; and identifies key communication outputs. It is not in itself a strategic communication plan – such a plan will need to be elaborated in greater detail through the coordination framework and by stakeholder institutions, and should sit alongside the Vulture MsAP. It will need to identify actions, key messages, audiences, lead institutions, timescales and resources required.

Intensive communications have been essential to the development of the Vulture MsAP, for example, ensuring wide participation in the Public Consultation Exercise and encouraging
Range States to support adoption of the Vulture MsAP at CMS COP12. The challenge to implement the Vulture MsAP will require the buy-in of Range State governments and a wide range of partners and stakeholders.

The purpose of a strategic communications plan for the Vulture MsAP is to raise awareness of it, and to gain multilateral support for its financing and implementation. Specific communications objectives should be to:

- Ensure that partners are fully briefed and understand the actions proposed in the plan;
- Engage new and important sectors and stakeholders in the implementation partnership;
- Promote appreciation and understanding of the value and importance of vultures and of the actions that need to be taken to conserve them, as defined in the Vulture MsAP (recognising that negative perceptions of vultures often exist among decision makers and the public); and,
- Encourage the mainstreaming of vulture conservation actions into wider strategies, sectoral policies and plans.

8.4.2 Messages and audiences

The communications related to the Vulture MsAP should aim to communicate, inter alia, the following key messages:

- Vultures are a characteristic, distinctive and spectacular component of the biodiversity of the environments they inhabit;
- Vultures perform essential ecosystem services, and can play a significant role in achieving sustainable development; however, further scientific substantiation of these services and their economic benefits may be needed for this role to gain wide and unequivocal recognition;
- Vultures are among the most highly threatened groups of animals on earth: the majority of species are listed as Critically Endangered, indicating a very high risk of extinction in the wild; the threats are all caused by human activity, and are predominantly preventable;
- The Vulture MsAP has a clear mandate and aims: (1) to rapidly halt current population declines in all the 15 African-Eurasian vulture species that it includes; (2) to bring the conservation status of each species back to a favourable level; and, (3) to provide conservation management guidelines applicable to all Range States;
- Everyone and anyone can become involved and can potentially make a difference for vulture conservation either by contributing to the actions described in the Vulture MsAP, or by encouraging others to implement them; actions are not restricted to protected areas, nor carried out only by professional conservationists;
- Conserving vultures for future generations will require commitment by all sectors of society.

The audiences are very diverse, potentially involving any and all of the stakeholders identified in Section 5.

8.4.3 Communications mechanisms and channels

A wide range of communications mechanisms will need to be used to generate support for the Vulture MsAP, and also to build consensus and further elaborate plans and commitments for its implementation. Supporters should not miss opportunities to promote the Vulture MsAP in their existing communication streams, whether these primarily concern vultures or other relevant conservation themes.

Appropriate communications mechanisms and channels include:

- Websites and existing electronic communication channels of the many stakeholders, including secretariats of multilateral or intergovernmental agreements, including especially CMS, CBD and CITES, and events such as COPs, Meetings of Signatories to the Raptors MOU and UN Environment Assembly (UNEA);
- Other multilateral and bilateral institutions, governments and civil society organisations including NGOs; major civil society congresses (e.g. BirdLife International, IUCN) can provide strong opportunities to project messages;
- High level advocacy events, such as those hosted by large institutions and conventions may provide opportunities for side-events which can attract strong interest;
- International Vulture Awareness Day, marked annually, provides unique global communications opportunities;
- Development of an interactive (multi-media) web -based tool to present the content of the Vulture MsAP in an attractive, user-friendly and accessible way; and
- Production of a range of online and hard copy publications, including translations into the UN suite of languages, such as briefings, posters, articles and reports.

Messaging must be developed with and among networks and partners – no single organisation has a complete understanding of how to reach all stakeholders. In particular, developing synergies with relevant non-vulture interest groups is vital: there are many of these, among environmental (such as elephant and carnivore conservation groups) and non-environmental (such as public health and agricultural) constituencies.

8.4.4 Supporting materials and information sharing

The story of the vulture crisis, together with the importance of the vultures and the stories of those working to conserve them makes for compelling narrative. This has already attracted a significant amount of attention from the mainstream media as well as in social and other online media, particularly in association with the Asian and African vulture crises. The potential for video documentaries and articles is very high.

At a more technical level, as indicated above (8.4.3), simple illustrated digests or summaries of the Vulture MsAP in appropriate local languages are considered likely to be highly effective, typically covering the rationale for conservation, threats, objectives, actions and how individuals can provide support. An interactive online version of the Vulture MsAP could allow readers to extract information and to generate concise reports relevant to their country, region or species of interest.

Brochures and infographics can be used to reinforce key messages and encourage implementation of specific parts of the Vulture MsAP. Finally, national vulture conservation plans or strategies should be developed as a priority, and promoted where none exist, driven by national task

forces. This is an ideal way to promote pride and national ownership of vultures and the need to conserve them.

For information sharing, a central repository of information on vultures and their conservation could be effective, perhaps in the form of a 'Friends of the Vultures' website or portal where anyone could engage and be kept up to date with vulture news and conservation actions. This would provide a mechanism for stakeholders and the general public to engage and to stay involved. This may also allow links to other environmental programmes or campaigns relevant to specific threats to vultures, for example on illegal killing or taking of birds, illegal wildlife trade or renewable energy impact mitigation.

8.5. Budgeting, fundraising and resource mobilisation

Developing a comprehensive budget and fundraising plan is beyond the scope of this Vulture MsAP. However, it is considered useful to confirm the key principles that should guide budgeting, fundraising and resource mobilisation, and also to identify some opportunities in relation to specific issues associated with vulture conservation.

8.5.1 Budgeting

Costs relating to the implementation of the Vulture MsAP can be considered in terms of those which relate to the coordination structure, and those required to implement the practical conservation actions. Budgeting and fundraising for vulture conservation implementation activities to deliver the Vulture MsAP should be driven primarily by the stakeholders most responsible for those activities. To support this, proponents may wish to elaborate on the Framework of Conservation Actions for African-Eurasian Vultures outlined in this plan (Table 7). The proposed Overarching and Regional Coordinators, together with other key individuals contributing to the coordination framework (Section 8.2), should be well placed to facilitate or provide inputs to this process. To enable this, it will be necessary for all stakeholders to keep the relevant the coordinators informed.

The costs of the proposed coordination structure will include the employment costs of the coordinators, together with operational costs, mainly travel and office costs. Travel for the Coordinators and others may include the suggested annual meetings of the Regional Vulture Committees and for engagement with appropriate CMS Task Forces, Working Groups and other technical or capacity-building gatherings that may be required. Regular meetings to promote implementation of the Vulture MsAP should also include Vulture Steering Group meetings, mostly via online teleconferences. Communications and awareness-raising costs would include activities identified in Section 8.3 (above), including development of a web-portal and information repository (subject to the development or enhancement of existing databases, to avoid duplication or undermining).

It is therefore important to seek pledges of funding, most likely from CMS Parties, for the coordination structure and its operations (mainly coordinators and meetings) at the earliest possible opportunity. Following recruitment, the anticipated Overarching and Regional Coordinators should assist with fundraising for the practical implementation of the Vulture MsAP.

Project expenditures to deliver the Vulture MsAP are required to cover a vast range of actions. Approaches based on nationally developed vulture conservation plans and prioritised projects may be the most cost-effective way forward. As a step towards this, support is needed to develop fundraising and communications plans including lists of agreed priority projects to which to fundraise and agreed fundraising roles.

8.5.2 Fundraising and resource mobilisation

Projects and plans

National plans and priority projects would be suitable for support through small to medium-sized grants which could be funded nationally.

However, the large scale of the threats, together with their policy relevance, makes vulture conservation highly suitable for larger donors such as governments, bilateral and multilateral agencies. Larger projects could support governments to develop National Vulture Conservation Action Plans (preferably multi-species, where more than one occurs) drawing directly on information contained in the Vulture MsAP, followed by implementation of agreed actions. The coordination framework will be expected to play a key role in encouraging and recruiting stakeholders to support development of such large projects and the proposals to source the funding for these.

The top priority funding sources should therefore be governments, and in certain regions multilateral agencies where these channel government support: for example, the European Union LIFE+ programme has been the single biggest supporter of vulture conservation in Europe. Only they can deliver and sustain the level of funding to implement the Vulture MsAP effectively. Fundraising, in line with the advocacy necessary effectively to promote support for the Vulture MsAP, should look beyond the wildlife and environment arenas and actively consider engaging other sectors such as agriculture, livestock farming and public health, into which vulture conservation needs to be integrated or mainstreamed. Mainstreaming is likely to be based at least partly on the ecosystem services offered by vultures, on which further research is needed to fully develop robust arguments for support.

At smaller or more localised scales, other supporters are likely to be appropriate, including:

- Embassies may be approached to finance small to medium sized national projects;

- Trusts and foundations are best suited to specific priority action projects with high chances of achieving rapid impact; national Vulture MsAPs are likely to be valuable mechanisms to assist in identifying and promoting such projects as well as selecting other funding sources;
- Individuals, often but not always those of high net worth, may make commitments to provide medium and long term resources for conservation actions under CMS family (which includes the Raptors MOU). Such supporters can become Migratory Species Champions by helping to guarantee the timely planning and implementation of projects and other initiatives;
- Fundraising appeals, typically through NGOs, face challenges related to negative public perceptions of vultures, but can be successful if well planned and including a component of attitude change (which is also an additional benefit);
- The private sector may contribute either through philanthropy or Corporate Social Responsibility programmes.

Non-project approaches: mobilising and mainstreaming

Mainstreaming of environmental issues can be defined as the active promotion of environmental sustainability in the identification, planning, design, negotiation and implementation of strategies, policies and investment programmes. Environmental issues are addressed strategically as a cross-cutting dimension of development, and implies moving beyond environmental impact mitigation to a more encompassing and strategic approach to achieving sustainability. Clearly, this is a vast subject area on which only brief notes can be presented here, where specific approaches can be recommended that are particularly appropriate for vulture conservation.

Mainstreaming may be based on development and advocacy for sectoral guidelines, of which a range exists to support migratory species conservation including vultures (Section 6). Resources for vulture conservation can be mobilised by promoting the application of these guidelines into development projects and other long term plans. Mainstreaming is often most realistic and achievable when existing policies are being opened up for review.

Resources can also be mobilised for vulture conservation without classical fundraising or governmental or intergovernmental funding or planning approaches. Support in kind, underpinned by awareness, may be equally or perhaps even more powerful. Vulture Range States often include significant areas of land where management can be influenced in favour of vultures, working with land owners and land managers to encourage positive action for vultures. This is the principle behind the concept of Vulture Safe Zones, being implemented in Asia and now also Africa. This has the added advantage that the focus is less on prohibition and negative messaging, and more on positive action. With appropriate definition and marketing, this has the potential to develop into a recognised sign of good environmental practice, with reputational and business benefits. Moreover, the Vulture Safe Zones concept is potentially applicable in any of the Range States and could be led by small NGOs, community groups or even highly motivated individuals. National networks of Vulture Safe Zones have the potential to offer a realistic, achievable and effective grass roots approach to vulture conservation.

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ANNEXES

Annex 1: Workshop participants and other contributors

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Annex 2: Range and population status

Annex 2.1 Range and status of the 15 species covered by the Vulture MsAP

Key to cell shading:

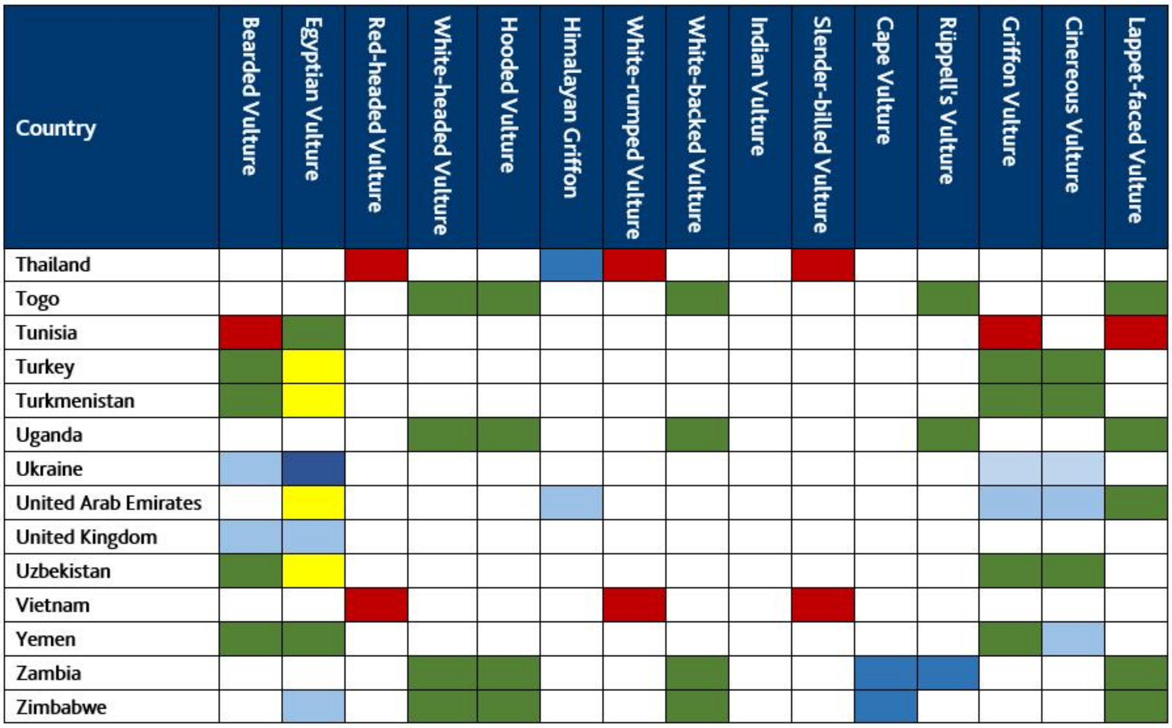
Resident	(green)	Extinct since 1985	(red)	No data	
Breeding visitor	(yellow)	Possibly extinct	(peach)		
Non-breeding	(blue)	Vagrant	(light blue)		

Country	Bearded Vulture	Egyptian Vulture	Red-headed Vulture	White-headed Vulture	Hooded Vulture	Himalayan Griffon	White-rumped Vulture	White-backed Vulture	Indian Vulture	Slender-billed Vulture	Cape Vulture	Rüppell's Vulture	Griffon Vulture	Cinereous Vulture	Lappet-faced Vulture
Afghanistan	Resident	Breeding visitor				Resident	Possibly extinct						Resident	Resident	
Albania	Extinct since 1985	Breeding visitor											Extinct since 1985		
Algeria	Extinct since 1985	Resident											Resident	Non-breeding	Non-breeding
Andorra	Resident												Resident		

Country	Bearded Vulture	Egyptian Vulture	Red-headed Vulture	White-headed Vulture	Hooded Vulture	Himalayan Griffon	White-rumped Vulture	White-backed Vulture	Indian Vulture	Slender-billed Vulture	Cape Vulture	Rüppell's Vulture	Griffon Vulture	Cinereous Vulture	Lappet-faced Vulture
Angola															
Armenia															
Austria															
Azerbaijan															
Bahrain															
Bangladesh															
Belarus															
Belgium															
Benin															
Bhutan															
Bosnia & Herzegovina															
Botswana															
Brunei Darussalam															
Bulgaria															
Burkina Faso															
Burundi															
Cabo Verde															
Cambodia															
Cameroon															
Central African Republic															
Chad															
China (People's Republic of)															
Congo (Democratic Republic of)															
Congo (Republic of)															
Croatia															
Cyprus															
Czech Republic															
Denmark															
Djibouti															
Egypt															
Equatorial Guinea															
Eritrea															
Estonia															
Ethiopia															
Finland															
France															

Country	Bearded Vulture	Egyptian Vulture	Red-headed Vulture	White-headed Vulture	Hooded Vulture	Himalayan Griffon	White-rumped Vulture	White-backed Vulture	Indian Vulture	Slender-billed Vulture	Cape Vulture	Rüppell's Vulture	Griffon Vulture	Cinereous Vulture	Lappet-faced Vulture
Gabon															
Gambia															
Georgia															
Germany															
Ghana															
Greece															
Guinea															
Guinea-Bissau															
Hungary															
India															
Iran (Islamic Republic of)															
Iraq															
Ireland															
Israel															
Italy															
Ivory Coast															
Japan															
Jordan															
Kazakhstan															
Kenya															
Korea (Democratic People's Republic of)															
Korea (Republic of)															
Kuwait															
Kyrgyzstan															
Lao PDR															
Latvia															
Lebanon															
Lesotho															
Liberia															
Libya															
Macedonia (Former Yugoslav Republic of)															
Malawi															
Malaysia															
Mali															
Malta															
Mauritania															

Country	Bearded Vulture	Egyptian Vulture	Red-headed Vulture	White-headed Vulture	Hooded Vulture	Himalayan Griffon	White-rumped Vulture	White-backed Vulture	Indian Vulture	Slender-billed Vulture	Cape Vulture	Rüppell's Vulture	Griffon Vulture	Cinereous Vulture	Lappet-faced Vulture
Moldova															
Mongolia															
Montenegro															
Morocco															
Mozambique															
Myanmar															
Namibia															
Nepal															
Netherlands															
Niger															
Nigeria															
Oman															
Pakistan															
Philippines															
Poland															
Portugal															
Qatar															
Romania															
Russia															
Rwanda															
Saudi Arabia															
Senegal															
Serbia															
Sierra Leone															
Singapore															
Slovakia															
Slovenia															
Somalia															
South Africa															
South Sudan															
Spain															
Sudan															
Sri Lanka															
Swaziland															
Switzerland															
Syrian Arab Republic															
Tajikistan															
Tanzania															



Annex 2.2–2.5 Status and breeding population estimates for European, Middle East and Central Asian Range States

The following tables were derived from the Questionnaires circulated as part of the development of the Vulture MsAP and were augmented by inputs received at the European and Middle Eastern Regional Workshops held in October 2016 and February 2017, respectively. These data reflect current status and breeding population estimates for the four vulture species about which we know the most. Unfortunately, the same level of information is not available for species occurring in Africa and a substantial part of Asia. This lack of information should be addressed by the implementation of Result 11.1 (Table 6).

Annex 2.2: Status and breeding population estimates for European, Middle East and Central Asian Range States – Bearded Vulture

Country	Status	Breeding pairs	Data quality	Year(s) of estimate	Breeding population trend in the last 10 years	Data quality
Afghanistan	breeding		M			
Albania	extinct					
Andorra	breeding	1	G	2016	stable	G
Armenia	breeding	1–10	M	2007–2009	stable	M
Austria	breeding	3	G	2015	small increase	G
Azerbaijan	breeding	20–100	P	2000–2016	stable	P
Bosnia & Herzegovina	extinct					

Country	Status	Breeding pairs	Data quality	Year(s) of estimate	Breeding population trend in the last 10 years	Data quality
Bulgaria	extinct		G	2016		
Egypt	breeding	2–3	M	2015		
France	breeding	59–61	G	2016	small increase / large increase	G
Georgia	breeding	20–25	M	2001–2012	small increase	M
Greece	breeding	6	G	2016	moderate increase	G
Iran	breeding		P			
Iraq	breeding	20	M	2013		
Israel	extinct		G	2016		
Italy	breeding	12	G	2016	large increase	G
Jordan	extinct		M	1995		
Kazakhstan	breeding	50–100	M	2012	stable	M
Macedonia (FYR of)	extinct		G	2015		
Mongolia	breeding	500–1000	P	2016	small increase	P
Palestine	extinct		P			
Portugal	extinct		G	2005		
Romania	extinct					
Russian Federation (Caucasus)	breeding	181–237	G	2008	moderate increase	G
Russian Federation (Altai-Sayan region)	breeding	55–75	G	2016	stable	G
Saudi Arabia	extinct		M	2010		
Serbia	extinct		G	2016		
Spain	breeding	116 (134*)	G	2015	moderate increase /small increase	G/M
Switzerland	breeding	14	G	2016	large increase	G
Syrian Arab Republic	extinct		M	2008		
Tajikistan	breeding	100s	P			P
Turkey	breeding	160–200	M	2013	decline	M
Turkmenistan	breeding	15–21	M	2013		
Uzbekistan	breeding	50–70	M	2009	stable	P
Yemen	breeding					

Data quality: G =Good, M = Medium, P = Poor
*Territorial pairs

Annex 2.3: Status and breeding population estimates for European, Middle East and Central Asian Range States – Cinereous Vulture

Country	Status	Breeding pairs	Data quality	Year(s) of estimate	Breeding population trend in the last 10 years	Data quality
Afghanistan	unknown		M			
Albania	extinct					
Armenia	breeding	50	M	2007–2009	stable	M
Austria	extinct		G			
Azerbaijan	breeding	20–100	M	2000–2016	stable	M
Bosnia & Herzegovina	extinct					
Bulgaria	extinct		M	2016	stable	M
Croatia	extinct					
Cyprus	extinct		G			
Egypt	vagrant					
France	breeding	31	G	2016	small increase	G
Georgia	breeding	10–25	G	1995–2016	stable	G
Greece	breeding	21–35	G	2006–2015	stable	G
Hungary	extinct					
Iran	wintering					
Israel	extinct		G	2016		
Italy	extinct		G	2016		
Jordan	wintering		P			
Kazakhstan	breeding	150–300	M	2012	stable	M
Kyrgyzstan	breeding	50–60	M	2007		
Macedonia (FYR of)	extinct		G	2015		
Mongolia	breeding	5000 - 7000	P	2016	small decline	P
Portugal	breeding	18	G	2016	large increase	G
Romania	extinct					
Russia (Caucasus)	breeding	63–102	M	2004	small decline	M
Russia (Altai-Sayan)	breeding	71–96	G	2009	moderate increase	G
Saudi Arabia	wintering			2003		
Serbia	extinct		M	2016		
Spain	breeding	2068	G	2015/2012	moderate increase	G
Syrian Arab Republic	wintering		M	2009	decline	
Tajikistan	breeding	10–100	P			
Turkey	breeding	80–200	M	2013	decline	M/P
Turkmenistan	breeding	30–32	M	2013		
Ukraine	breeding	15–19	G	2016	stable	G
Uzbekistan	breeding	80–120	M	2005	small decline	P

Country	Status	Breeding pairs	Data quality	Year(s) of estimate	Breeding population trend in the last 10 years	Data quality
Yemen			M			

Data quality: G =Good, M = Medium, P = Poor

Annex 2.4: Status and breeding population estimates for European, Middle East and Central Asian Range States – Egyptian Vulture

Country	Status	Breeding pairs	Data quality	Year(s) of estimate	Breeding population trend in the last 10 years	Data quality
Afghanistan	breeding		M			
Albania	breeding	10	G	2016	large decline	G
Armenia	breeding	40–60	M	2007–2010	stable	M
Azerbaijan	breeding	200–500	G	2000–2016	small decline	P
Bosnia & Herzegovina	extinct					
Bulgaria	breeding	28	G	2016	large decline	G
Croatia	extinct					
France	breeding	70–80	M	2015	stable	G
Georgia	breeding	30–50	M	1980–2016	decline	M
Greece	breeding	5	G	2016	large decline	G
Hungary	extinct					
Iran	breeding	150–200	G			
Iraq	breeding	250–500	P	2013	decline	P
Israel	breeding	50–55	G	2016	stable	G
Italy	breeding	8	G	2015	decline	G
Jordan	possibly breeding		P			
Kazakhstan	breeding	80–100	M	2012	decline	
Kyrgyzstan						
Lebanon	extinct					
Macedonia (FYR of)	breeding	23	G	2015	large decline	G
Oman	breeding	>100	M	2013	stable	G
Palestine	breeding					
Portugal	breeding	110–130	M	2012	large decline	M
Qatar						
Romania	extinct			2005–2016		
Russian Federation (Caucasus)	breeding	88–121	G	2005	stable	G
Saudi Arabia	breeding	?	M	2012	large decline	M
Serbia	extinct		M	2016		

Country	Status	Breeding pairs	Data quality	Year(s) of estimate	Breeding population trend in the last 10 years	Data quality
Spain	breeding	1452–1556	G	2008/2015	stable/decline	G
Syrian Arab Republic	breeding	25	M	2011		
Tajikistan	breeding	50–500	P			
Turkey	breeding	1000–2000	G	2013	decline	G
Turkmenistan	breeding	60–70	M	2012/2014	decline	M
United Arab Emirates	possibly breeding	2–5	M	2015		
Uzbekistan	breeding	135–140	G	2011	decline	G
Yemen	breeding	800	G	2012	stable	G

Data quality: G =Good, M = Medium, P = Poor

Annex 2.5: Status and breeding population estimates for European, Middle East and Central Asian Range States – Griffon Vulture

Country	Status	Breeding pairs	Data quality	Year(s) of estimate	Breeding population trend in the last 10 years	Data quality
Afghanistan	breeding		M			
Andorra	breeding	2–3	G	2016	small increase	G
Armenia	breeding	35–40	M	2007–2010	stable	M
Azerbaijan	breeding	100–400	M	2000–2016	small decline	P
Bosnia & Herzegovina	extinct		M			
Bulgaria	breeding	80–100	G	2016	large increase	G
Croatia	breeding	90	G	2016	decline	G
Cyprus	breeding	1–3	G	2016	decline	G
Egypt	breeding	35–40	M	2010	small decline	
France	breeding	2000	G	2016	moderate increase	G
Georgia	breeding	40–60	M	1991–2016	small decline	M
Greece	breeding	350–400	G	2015	moderate increase	G
Hungary	extinct					
Iran	breeding		M			
Israel	breeding	42	G	2016	decline	G
Italy	breeding	170	M	2016	moderate increase	G
Jordan	breeding	8–15	G	2014	stable	G
Kazakhstan	breeding	80–150	M	2012	decline	M
Kyrgyzstan	unknown		M			
Macedonia (FYR of)	breeding	14	G	2015	decline	G
Palestine	breeding		M			

Country	Status	Breeding pairs	Data quality	Year(s) of estimate	Breeding population trend in the last 10 years	Data quality
Portugal	breeding	750	G	2007	moderate increase	G
Romania	extinct					
Russian Federation (Caucasus)	breeding	152–223	M	2001–2003	decline	P
Saudi Arabia	breeding	3000	M	2015	large decline	M
Serbia	breeding	150–200	G	2016	large increase	G
Spain	breeding	24609	G	2012	large increase	G
Syrian Arab Republic	breeding	30–50	G	2009	decline	G
Tajikistan	breeding		M			
Turkey	breeding	150–200	P	2013	small decline	P
Turkmenistan	breeding		M			
Ukraine	breeding	23–25	G	2016	stable	G
Uzbekistan	breeding	140–150	P	2009	decline	P
Yemen	Breeding		M			

Annex 3: Threat maps per species

This Annex maps the most severe (Critical and High) threats for each species in each sub-region, using the same logic and colour scheme as the overarching threat map (Figure 18). This allows the reader to understand in greater detail the threats affecting each vulture species. As in Figure 18, only range states where vultures are regularly present are brightly coloured; vagrant range states are not shown.

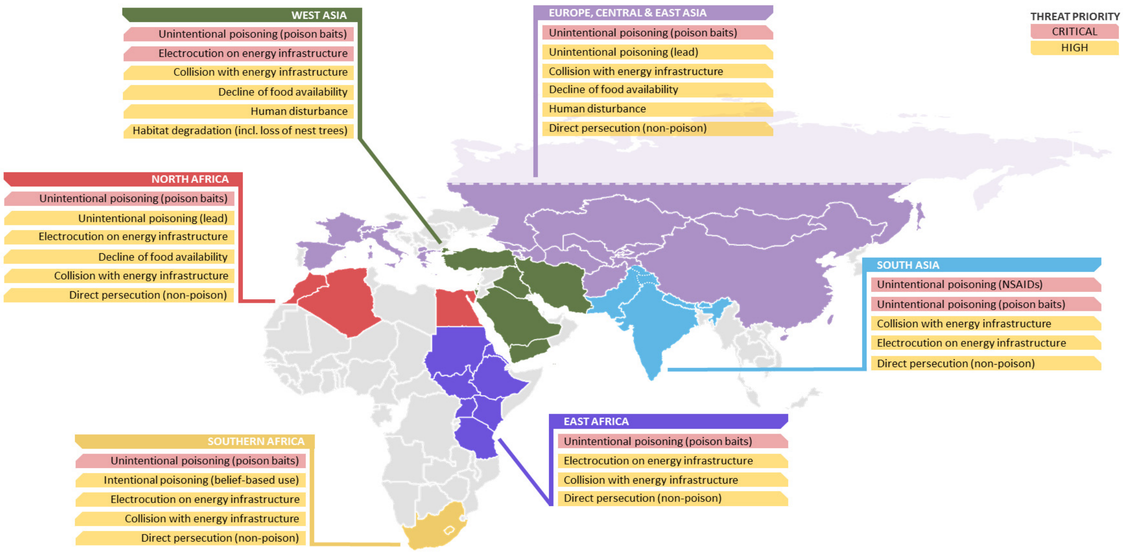


Figure A3.1. Threats to the Bearded Vulture *Gypaetus barbatus* in each sub-region of its range.

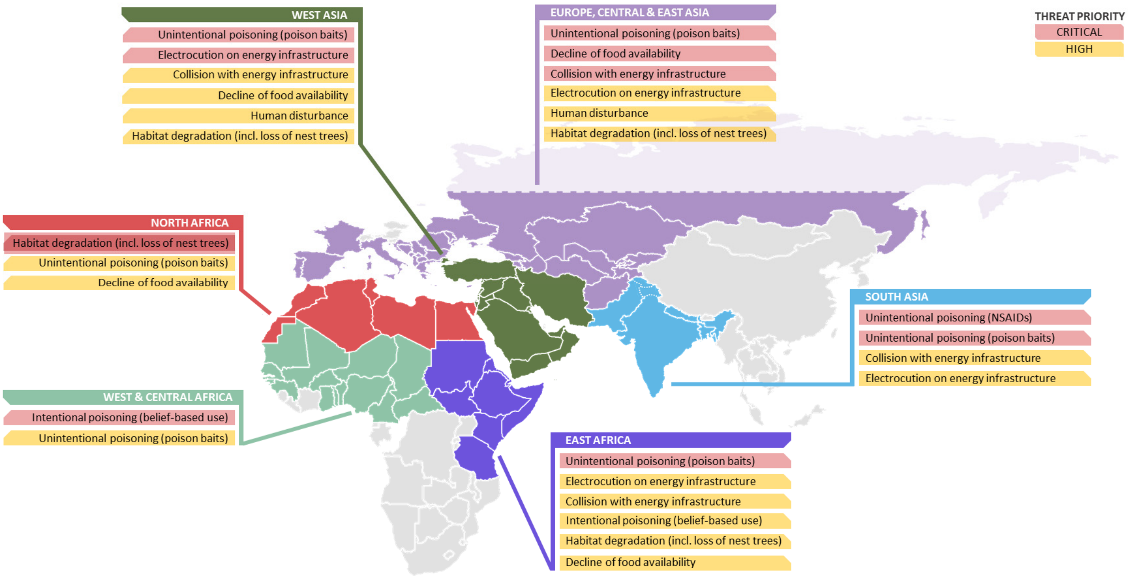


Figure A3.2. Threats to the Egyptian Vulture *Neophron percnopterus* in each sub-region of its range.

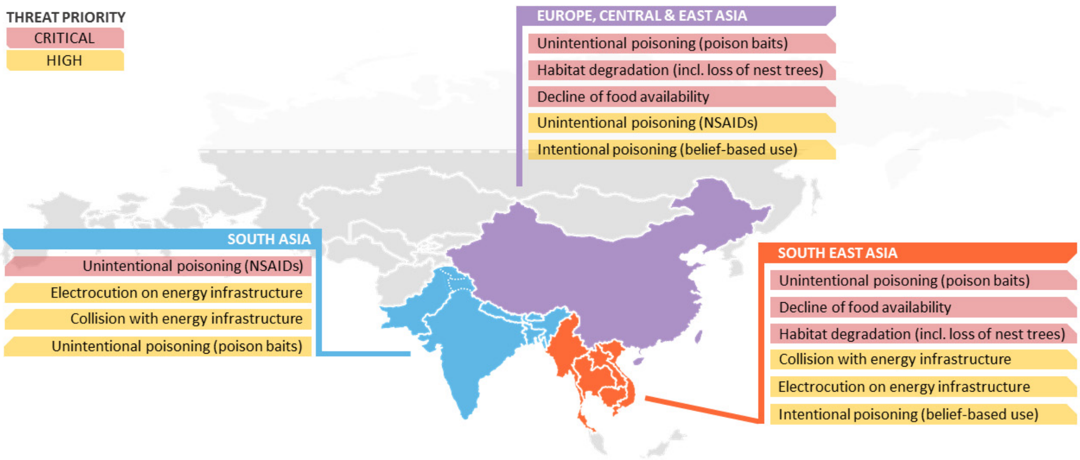


Figure A3.3. Threats to the Red-headed Vulture *Sarcogyps calvus* in each sub-region of its range.

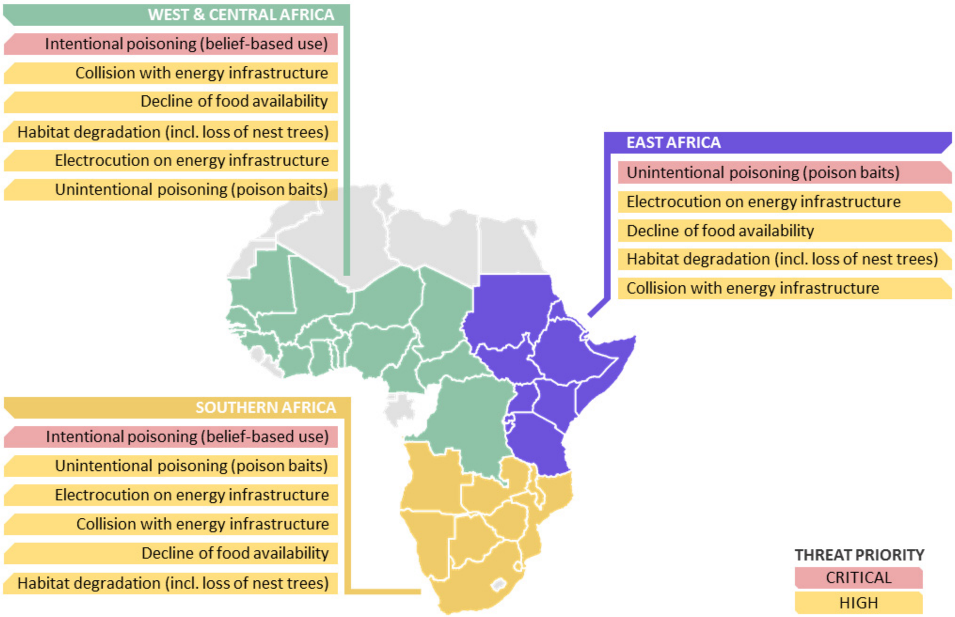


Figure A3.4. Threats to the White-headed Vulture *Trigonoceps occipitalis* in each sub-region of its range.

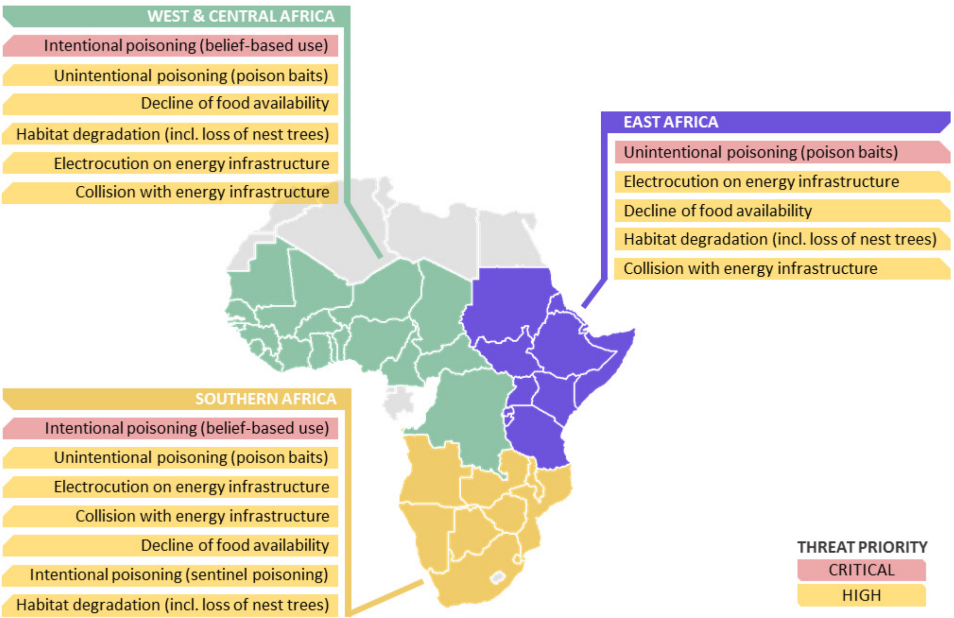


Figure A3.5. Threats to the Hooded Vulture *Necrosyrtes monachus* in each sub-region of its range.

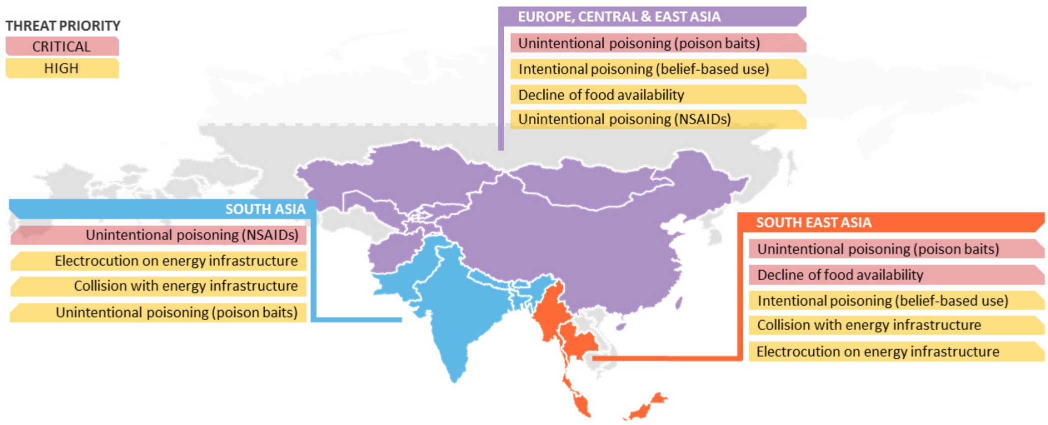


Figure A3.6. Threats to the Himalayan Griffon *Gyps himalayensis* in each sub-region of its range.

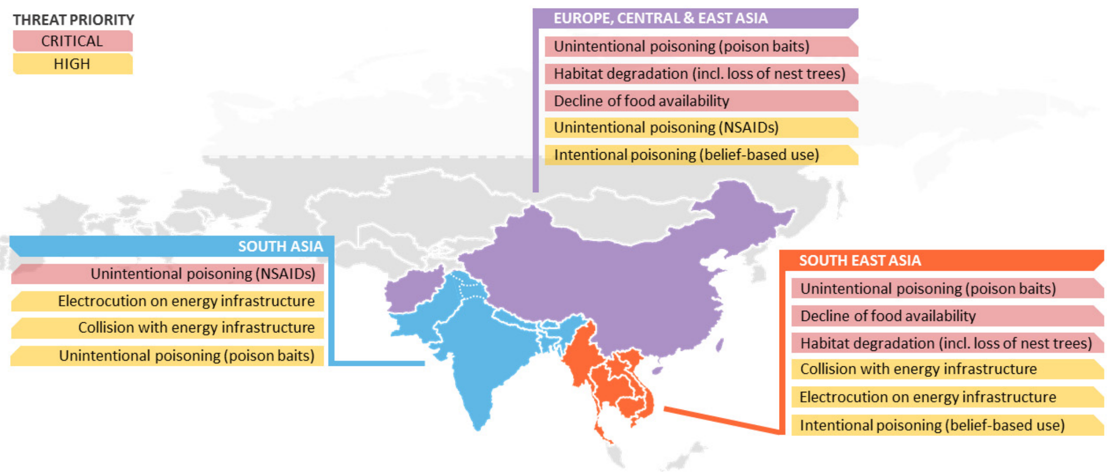


Figure A3.7. Threats to the White-rumped Vulture *Gyps bengalensis* in each sub-region of its range.

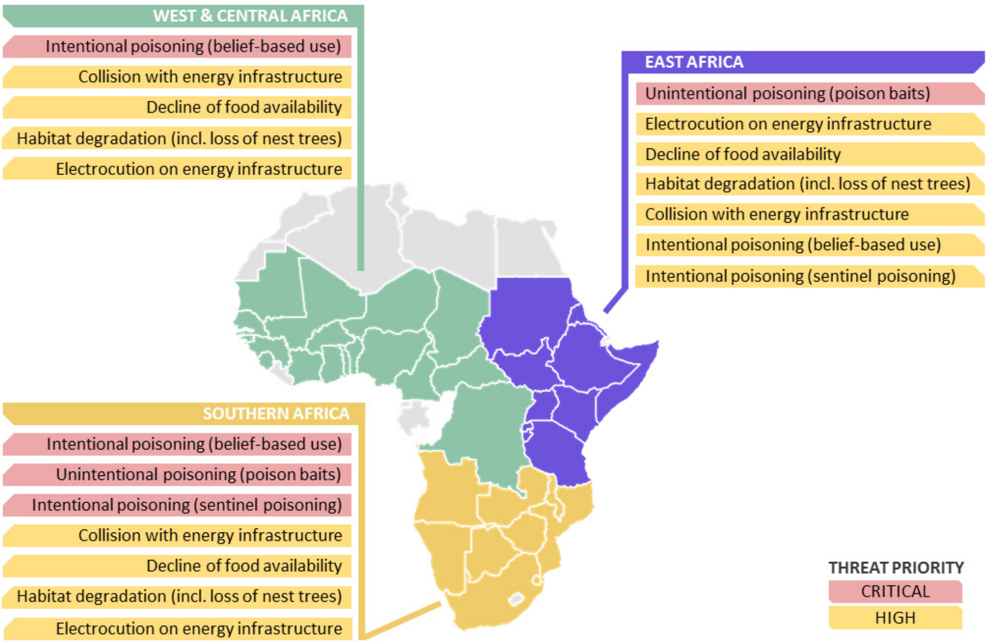


Figure A3.8. Threats to the White-backed Vulture *Gyps africanus* in each sub-region of its range.

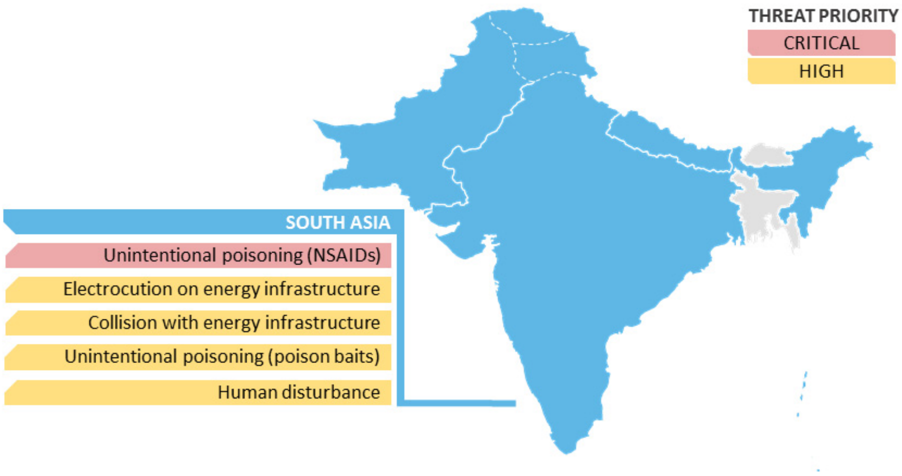


Figure A3.9. Threats to the Indian Vulture *Gyps indicus* in each sub-region of its range.

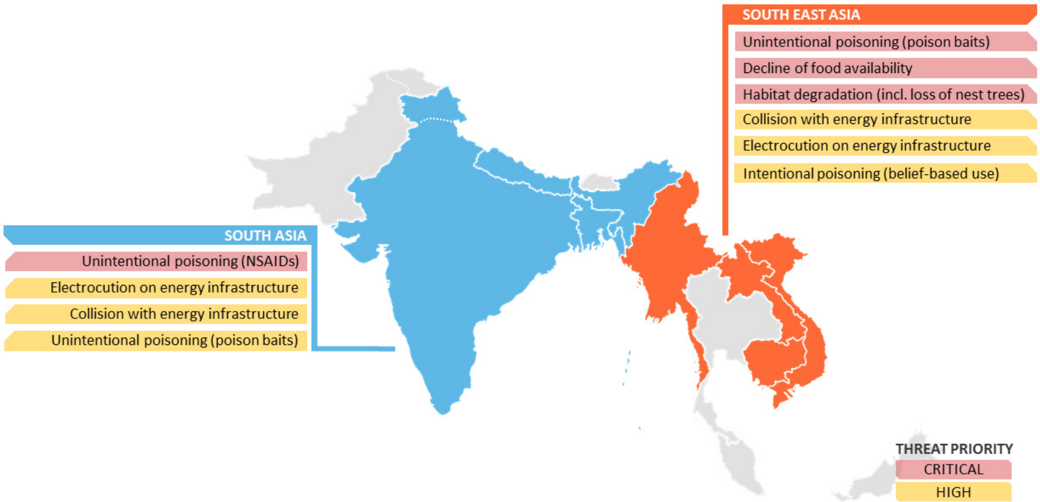


Figure A3.10. Threats to the Slender-billed Vulture *Gyps tenuirostris* in each sub-region of its range. This species also occurs marginally in China, where threats are similar to those in South-east Asia.

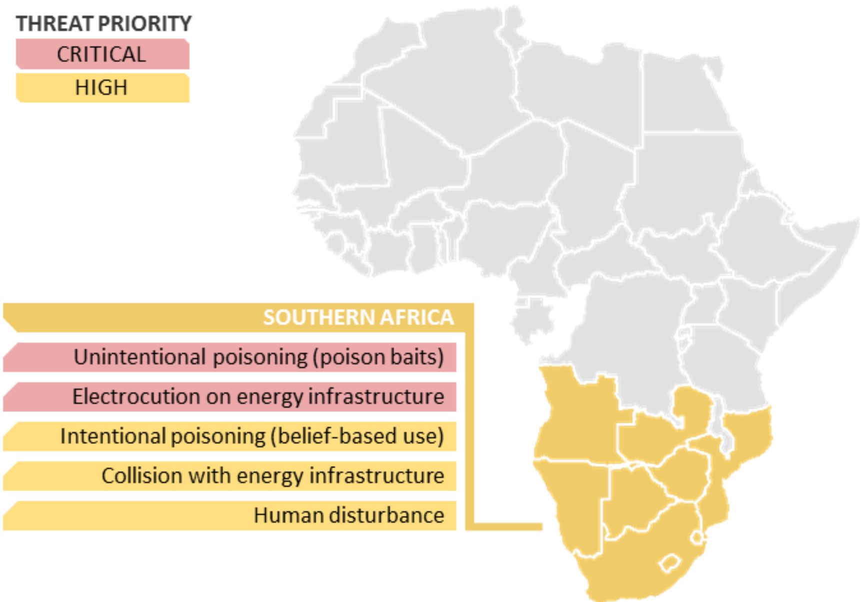


Figure A3.11. Threats to the Cape Vulture *Gyps coprotheres*.

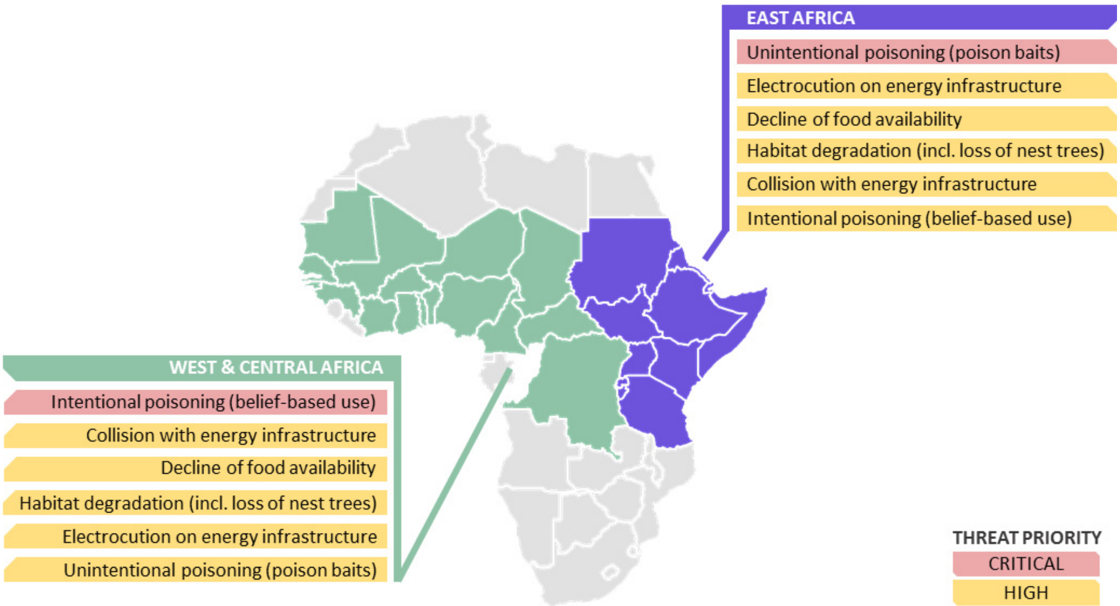


Figure A3.12. Threats to the Rüppell's Vulture *Gyps rueppelli* in each sub-region of its range.

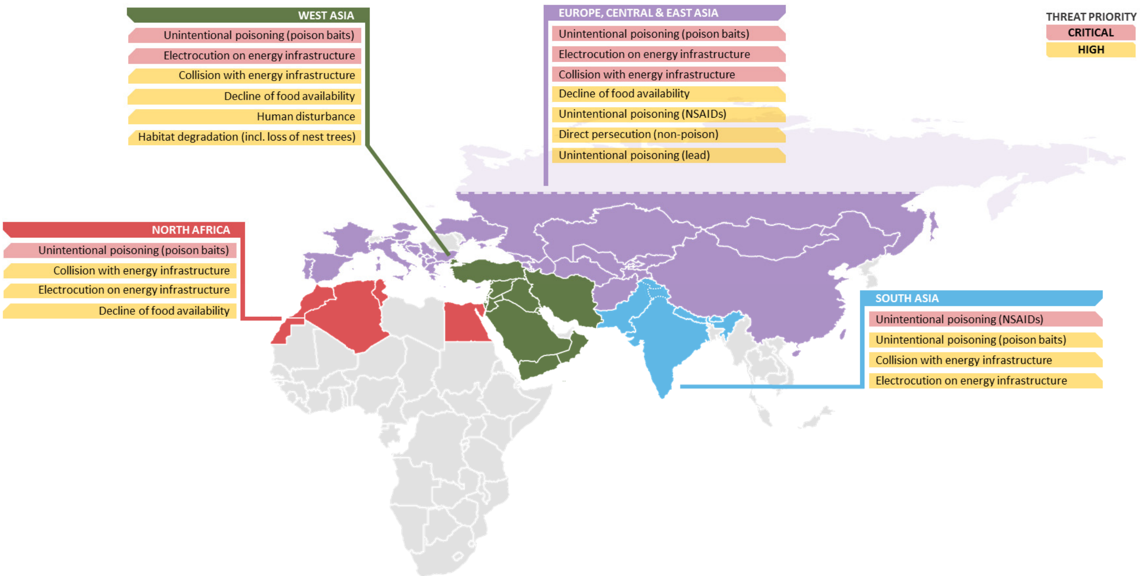


Figure A3.13. Threats to the Griffon Vulture *Gyps fulvus* in each sub-region of its range .

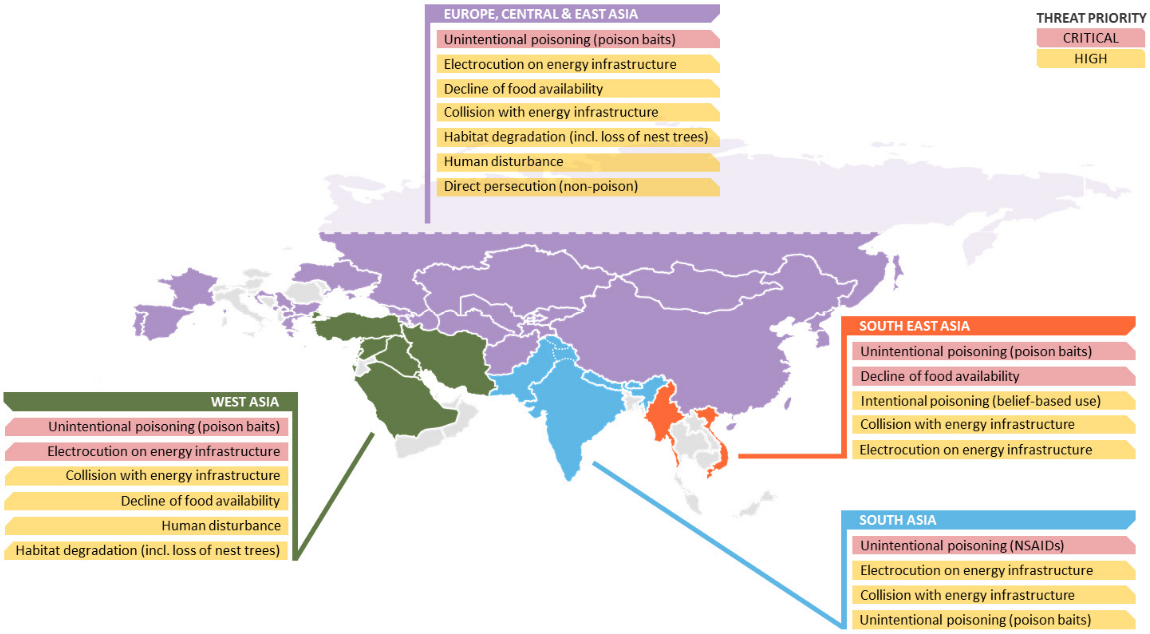


Figure A3.14. Threats to the Cinereous Vulture *Aegypius monachus* in each sub-region of its range.

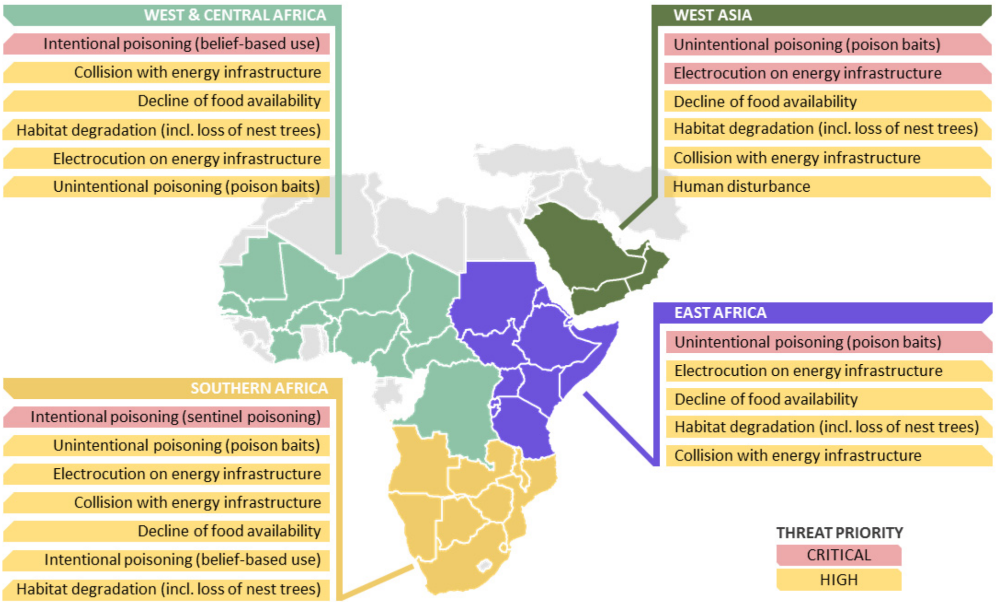


Figure A3.15. Threats to the Lappet-faced Vulture *Torgos tracheliotos* in each sub-region of its range.

Annex 4: Flyway Action Plan for the Conservation of the Balkan and Central Asian Populations of the Egyptian Vulture

[see separate document]

Annex 5: Flyway Action Plan for the Conservation of the Cinereous Vulture

[see separate document]

Annex 6: A Blueprint for the Recovery of South Asia's Critically Endangered Gyps Vultures

[see separate document]

Annex 7: Current international, regional and national strategies and Species Action Plans

This compilation is in addition to the three plans concerning Egyptian Vulture, Cinereous Vulture and South Asian Gyps vultures which are presented in full in Annexes 4, 5 and 6.

A7.1 List of and links to current region-specific plans

7.1.1. Pan-African Vulture Conservation Strategy (2012) https://www.ewt.org.za/BOP/PAVS%20PROCEEDINGS.pdf

7.1.2. Wildlife Comeback in Europe http://bigfiles.birdlife.cz/ebcc/WildlifeComeback_in_Europe-the_recovery_of_selected_mammal_and_bird_species.pdf (Bearded Vulture page: 228; Griffon Vulture 232; Cinereous Vulture page: 238).

7.1.3. Proposed EU Action Plan to Prevent Illegal Poisoning in Wildlife http://www.cms.int/en/document/proposal-eu-action-plan-prevent-illegal-poisoning-wildlife

A7.2 List of and links to current national (country-specific) plans

7.2.1. Bearded Vulture Biodiversity Management Plan (South Africa) http://www.gov.za/sites/www.gov.za/files/37620_gon350.pdf

7.2.2. Cambodia Vulture Action Plan 2016–2025 http://save-vultures.org/resources/action-plans/

7.2.3. Vulture Conservation Action Plan for Nepal 2015–2019 http://save-vultures.org/resources/action-plans/

7.2.4. Action Plan for Vulture Conservation in India http://save-vultures.org/resources/action-plans/

7.2.5. Bangladesh Vulture Action Plan http://save-vultures.org/resources/action-plans/

7.2.6. Pakistan Vulture Action Plan https://www.iucn.org/asia/pakistan/countries/pakistan/national-vulture-conservation-strategy

A7.3 List of and links to existing species-focused plans

7.3.1. Bearded Vulture Species Action Plan - http://ec.europa.eu/environment/nature/conservation/wildbirds/action_plans/docs/gypaetus_barbatus.pdf

7.3.2. Cinereous Vulture Species Action Plan -http://www.avibirds.com/saps/EU/Europe/EN/Cinereous%20Vulture1996.pdf

7.3.3. Review report for Bearded and Cinereous Vulture Species Action Plans: http://ec.europa.eu/environment/nature/conservation/wildbirds/action_plans/docs/Final%20report%20BirdLife%20review%20SAPs.pdf (Cinereous Vulture page: 85; Bearded Vulture page: 144)

7.3.4. Egyptian Vulture EU Species Action Plan http://ec.europa.eu/environment/nature/conservation/wildbirds/action_plans/docs/neophron_percnopterus.pdf

7.3.5. Bearded Vulture Biodiversity Management Plan (Southern Africa)

http://www.gov.za/sites/www.gov.za/files/37620_gon350.pdf

7.3.6. Lappet-faced Vulture http://www.avibirds.com/saps/AF/Africa/EN/Lappet-faced%20Vulture2005.pdf

7.3.7. Action Plan for the conservation of the Cape Vulture in Namibia http://www.the-eis.com/data/literature/Cape_Vulture_Action_Plan_and_workshop_proceedings.pdf

7.3.8. Report on progress with regard to the Conservation Action Plan for the Cape Vulture in South Africa http://www.vulpro.com/wp-content/uploads/2016/05/cvtf-report-2012.pdf

A7.4 Threat-focused plans and strategies

7.4.1. CMS Guidelines to Prevent The Risk of Poisoning To Migratory Birds http://www.cms.int/sites/default/files/document/Guidelines%20to%20Prevent%20the%20Risk%20of%20Poisoning%20to%20Migratory%20Birds.pdf

7.4.2. CMS Resolution on Preventing Poisoning of Migratory Birds http://www.cms.int/en/document/preventing-poisoning-migratory-birds

7.4.3. Proposal EU Action Plan to Prevent Illegal Poisoning in Wildlife http://www.cms.int/en/document/proposal-eu-action-plan-prevent-illegal-poisoning-wildlife

7.4.4. UNEP final review of scientific information on Lead http://www.cms.int/en/document/final-review-scientific-information-lead-unepgc26inf11add1-dec2010

7.4.5. Sub-regional plan to prevent the Poisoning of Migratory Birds in southern Africa http://www.cms.int/en/document/sub-regional-implementation-plan-prevent-poisoning-migratory-birds-southern-african

7.4.6. CMS/AEWA/Raptors MOU Guidelines on How to Avoid or Mitigate Impact of Electricity Power Grids on Migratory Birds in the Africa-Eurasian Region http://www.unep-aewa.org/sites/default/files/publication/ts50_electr_guidelines_03122014.pdf

7.4.7. CMS resolution on Powerlines and Migratory Birds http://www.cms.int/sites/default/files/document/10_11_powerlines_e_1_0.pdf

7.4.8. CMS resolution on Renewable Energy and Migratory Species http://www.cms.int/sites/default/files/document/Res_11_27_Renewable_Energy_E.pdf

7.4.9. IUCN SSC Guidelines on the Use of Ex Situ Management for Species Conservation (includes captive breeding) https://portals.iucn.org/library/sites/library/files/documents/2014–064.pdf

7.4.10. IUCN SSC Guidelines for Reintroductions and Other Conservation Translocations https://portals.iucn.org/library/efiles/documents/2013–009.pdf