Vulture MsAP

Convention on Migratory Species

Multi-species Action Plan to Conserve African-Eurasian Vultures

2nd Draft

16 March 2017

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

Overall project management:

Nick P. Williams, CMS Raptors MoU
Head of the Coordinating Unit
nick.williams@cms.int

Jenny Renell, CMS Raptors MoU
Associate Programme Officer
jenny.renell@cms.int

Compiled by:

André Botha, Endangered Wildlife Trust
Overarching Coordinator: Multi-species Action Plan to conserve African-Eurasian Vultures
andreb@ewt.org.za

Jovan Andevski, Vulture Conservation Foundation
European Regional Coordinator: Multi-species Action Plan to conserve African-Eurasian Vultures
j.andevski@4vultures.org

Chris Bowden, Royal Society for the Protection of Birds
Asian Regional Coordinator: Multi-species Action Plan to conserve African-Eurasian Vultures
chris.bowden@rspb.org.uk

Masumi Gudka, BirdLife International
African Regional Coordinator: Multi-species Action Plan to conserve African-Eurasian Vultures
masumi.gudka@birdlife.org

Roger Safford, BirdLife International
Senior Programme Manager: Preventing Extinctions
roger.safford@birdlife.org

Nick P. Williams, CMS Raptors MoU
Head of the Coordinating Unit
nick.williams@cms.int

Technical support:

Roger Safford, BirdLife International

José Tavares, Vulture Conservation Foundation

Regional Workshop Facilitators :

Africa - Chris Bowden, Royal Society for the Protection of Birds
Europe – Boris Barov, BirdLife International
Asia and Middle East - José Tavares, Vulture Conservation Foundation

Overarching Workshop Chair :

Fernando Spina, Italian Bird Ringing Centre

Contributors
Lists of participants at the action planning workshops and of other contributors can be found in Annex 1.

Additional contributions to the text: Robert D. Sheldon and Andrew Callander.

Maps prepared by Mark Balman (range states), Hannah Wheatley (species range) and Tris Allison (threats), all from BirdLife International.

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.
- February 2017 – Middle East Regional Workshop in Sharjah, UAE.
- February 2017 – Overarching Workshop in Toledo, Spain.
- March 2017 – Public consultation exercise for draft Vulture MsAP.
- April 2017 – Production of final draft of Multi-species Action Plan.
- May 2017 – Submission of Multi-species Action Plan to CMS Secretariat.
- June 2017 – Review of Multi-species Action Plan by CMS Scientific Council.
- August 2017 – Publication on CMS website as document for COP12.
- October 2017 – 12th Meeting of the Conference of Parties to CMS (COP12).

Geographical scope
127 Range States, which host populations of one or more of the species that are the focus of the Multi-species Action Plan (Fig. 2).

Species scope
This Multi-species Action Plan covers 15 of the 16 species classified as the Old World vultures (Table 3), 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
Botha, A.J., Andevski, J., Bowden, C.G.R., Gudka, M., Safford, R. J., Tavares, J. and Williams, N. P. (2017) *CMS Multi-species Action Plan to conserve African-Eurasian Vultures*. Coordinating Unit of UNEP/Raptors MoU, Abu Dhabi.

Authority for taxonomy, sequence and species names
Del Hoyo, J., Collar, N. J., Christie, D. A., Elliot, A. and Fishpool, L. D. C. (2014) *The 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

Opinions, findings, conclusions or recommendations expressed in this publication are those of the authors, and do not necessarily reflect the official policy of CMS. The designation of geographical entities does not imply the expression of any opinion on the part of CMS concerning the legal status of any country, territory or area, or of its authorities, or concerning the delimitation of its frontiers or boundaries. Links to resources outside this document are provided as a convenience and for informational purposes only and should not be construed as an endorsement or approval by CMS of information provided through other sites and computer systems.

Information sources

This Multi-species Action Plan is based on information provided freely by the large number of experts and specialists listed below, 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, these had been greatly contributed to by the work of **Rob Davies** (HabitatInfo) and **Ralph Buij** (Wageningen University) using information from the African Raptor Databank and tracking data from a range of research projects across the continent.

Photograph credits

Andre Botha: White-headed Vulture, Hooded Vulture, White-backed Vulture, Cape Vulture, Rüppell's Vulture, Lappet-faced Vulture; **Angel Sanchez**: Bearded Vulture, Egyptian Vulture, Griffon Vulture, Cinereous Vulture; **Tulsi Sebedi**: Himalayan Griffon, White-rumped Vulture, Indian Vulture; **Phearun Sum**: Red-headed Vulture, Slender-billed Vulture.

Contents

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 3-4 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 a Multi-species Action Plan to conserve African-Eurasian Vultures under the Convention on Migratory Species.

This Multi-species Action Plan (Vulture MsAP), 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 it includes; to bring the conservation status of each species back to a favourable level; and to provide 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 so that the millions of people who benefit from them in so 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 man. This Multi-species Action Plan for the conservation of Africa-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 tracheliotus*

With the exception of Western Europe, where populations of most species are increasing, vulture populations in Africa, Europe and Asia are in decline and 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 were 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 currently mainly ascribed to the use of a single anti-inflammatory 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, in particular: 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 avoid them exposing their activities to wardens by soaring above illegally killed Elephant and other game; and deliberate collection of vultures for illegal trade and belief-based use and to fuel superstitions.

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

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; and,

- 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. Achieve a significant reduction in mortality of vultures caused unintentionally by toxic substances used (often illegally) in the control and hunting of vertebrates.
2. Mortality of vultures by NSAIDS and occurrence and threat of toxic NSAIDs recognised and minmised throughout the range covered by the the MsAP.
3. Ensure that CMS Resolution 11.15 on the phasing out the use of lead ammunition by hunters is fully implemented.
4. Reduce and eventually halt the trade in vulture parts for belief-based use.
5. Reduce and eventually halt the practice of sentinel poisoning by poachers.
6. Substantially reduce vulture mortality caused by electrocutions linked to energy transmission and generation infrastructure
7. Substantially reduce vulture mortality caused by collisions linked to energy transmission and generation infrastructure.
8. Ensure availability of an appropriate level of safe food to sustain healthy vulture populations.
9. Ensure availability of suitable habitat for vultures to nest, roost and forage.
10. Substantiallly reduce levels of direct persecution and disturbance of vultures caused by human activities.
11. Support vulture conservation through cross-cutting policies, legislation and actions to enable mitigation of most or all of the most serious threats.

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.

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, and components that should be included in communications and fundraising and resource mobilisatation plans to promote and garner support for the plan from range countries and other target audiences. The document concludes with a series of Annexes which provide supplementary information that was collected during the course of the MsAP's development and is considered potentially valuable to support planning and implementation.

How to use this Action Plan

This CMS Multi-species Action Plan to Conserve African and Eurasian Vultures (Vulture MsAP) begins with an introduction on the rationale, aim, objectives, timeframe and methods that were followed to develop the Plan for consideration at the 12th Conference of the Parties to the Convention on Migratory Species (CMS) (Section 1). Section 2 explains the overall geographical and species scope of the Plan, and moves 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 the main threats to their survival.

The threats are described in more detail (Section 4) and mapped according to their severity in each region (continent). 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 (this section). 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 links through 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 Annexes.

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 referred to 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)
- Flyway Action Plan for the Conservation of the Cinereous Vulture (CVFAP)

An established Blueprint for the Recovery of Asia's Critically Endangered *Gyps* Vultures 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 and the recommended actions in the Vulture MsAP reflects this.

List of acronyms and abbreviations

AMCEN	African Ministerial Conference on the Environment
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 Migratory Species
CoP	Conference of the Parties
CR	Critically Endangered
CU	Coordinating Unit
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
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
OECD	Organisation for Economic Co-operation and Development
pVSZ	Provisional Vulture Safe Zone
RSC	Regional Steering Committee (of South Asian Governments)
RSPB	Royal Society for the Protection of Birds (UK)
SAVE	Saving Asia's Vultures from Extinction (consortium)
SEO/BirdLife	Spanish Ornithological Society
SsAP	Single-species Action Plan
TPF	The Peregrine Fund, Inc. (USA)
UAE	United Arab Emirates
UNEA	United Nations Environmental Assembly
UNEP	United Nations Environmental 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
Vulture MsAP	CMS Multi-species Action Plan for African-Eurasian Vultures
WCS	Wildlife Conservation Society
WWF	World Wide Fund for Nature

1. Multi-species Action Planning for vultures: background and approach

1.1 Rationale

Mandate

The mandate for the development of this international Multi-species Action Plan to conserve African-Eurasian Vultures (VMsAP) 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 (UNEP/CMS 2015). In addition, the Technical Advisory Group (TAG) was tasked to support the Coordinating Unit in facilitating development of the VMsAP. 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 Multi-species Action Plan to conserve African-Eurasian Vultures (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:

1. To rapidly halt current population declines in all species covered by the Vulture MsAP;
2. To reverse recent population trends 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 covered by the Vulture MsAP.

Timeline and milestones

Table 1 reflects the outline timetable that has been followed to ensure that the overall delivery deadline, established by CMS Resolution 11.14, is met.

Table 1. Outline timetable for the drafting, review and submission of the Vulture MsAP

Date	Action
January 2016	Interim Steering Group established
February 2016	Project Charter published; Engagement with all Range States and key Stakeholders
March 2016	Vulture Working Group Established
April 2016	Critical funding support from Switzerland received
July 2016	African, European and Asian Regional Coordinators appointed
August 2016	Overarching Coordinator appointed
August, September and December 2016	Circulation of Regional Workshop Questionnaires
September 2016	Steering Group established
October/November 2016	Regional Workshops held – Africa, Europe and Asia
January 2017	1st Draft of Vulture MsAP completed
6-8 February 2017	Middle Eastern Regional Workshop
16-19 February 2017	Overarching Workshop
Mid-March 2017	Vulture MsAP Draft for public consultation finalised
March/April 2017	Month-long public consultation process
April/May 2017	Comments incorporated into final MsAP draft
25 May 2017	Submit VMsAP to CMS Secretariat (COP12 document deadline)
June 2017	Review by CMS Scientific Council
August 2017	Publication of Vulture MsAP with draft resolution on CMS COP12 website
October 2017	Considered by CMS Parties at COP12, Manilla, Philipines

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, which requires a broad collaborative approach and the engagement of all Range States. These fundamentals underpin the principles for developing such plans: scientific rigour, stakeholder consultation, participation and consensus and consideration of existing efforts. The methods were developed so that these were adhered to.

Species assessment and status review

The 15 species of vultures agreed on and stipulated in the Vulture MsAP Project Charter were assessed by means of extensive literature review. Evidence for threats identified, and for the success or otherwise of conservation measures taken, were similarly assessed. Species conservation status is based 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 countries and species experts on biological information, threats and conservation effort. This tool also enabled the capture of current information that was not yet necessarily 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 2.

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 sub-set were 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 2). 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, covering 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 conducted by the Coordinators with facilitation support provided by a range of experienced participants who were briefed on the methods to be followed.

Table 2. Regional Vulture MsAP Workshop details

Region	Date	Location	Number of Delegates	Questionnaire responses (total xxx)
Africa	18-21 October 2016	Dakar, Senegal	54	62
Europe	26-28 October 2016	Extremadura, Spain	79	89
Asia	29-30 November 2016	Mumbai, India	37	44
Middle East	6-8 February 2017	Sharjah, United Arab Emirates	42	13

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 information 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 timeframe and also evaluated 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 then analysed to determine demographic impacts, drivers and root causes. These allowed problem trees to be drawn up, an example of which, for unintentional poisoning (Fig. 1) is shown below. The threats are presented, along with supporting scientific evidence, in Section 3.

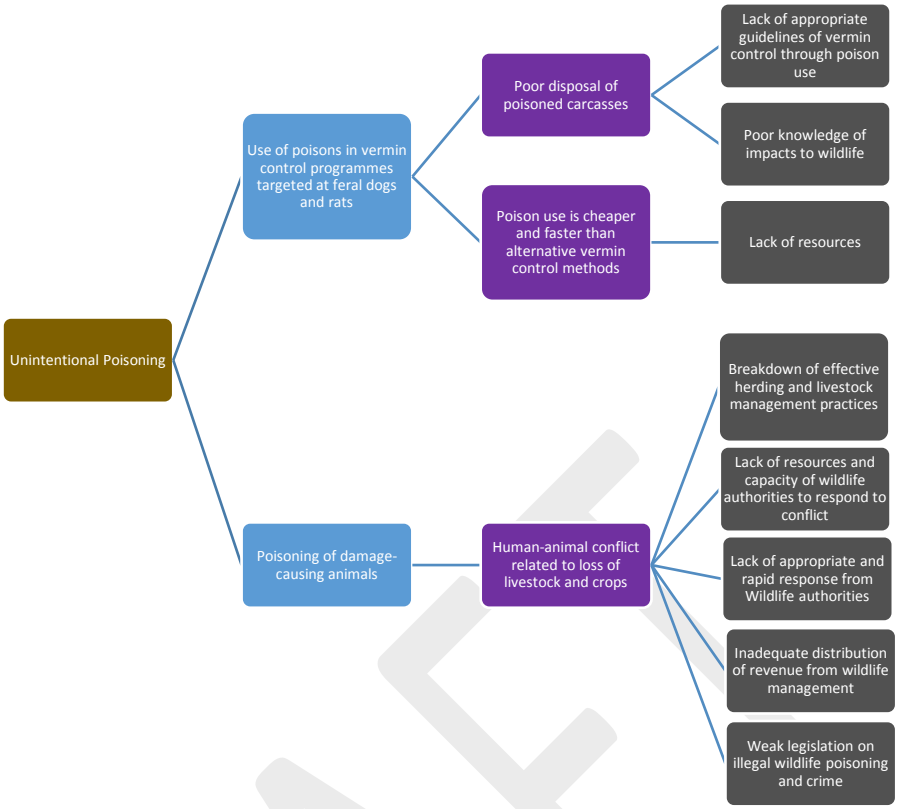


Fig. 1. An example of a problem tree for Unintentional Poisoning produced from results of threat analysis at the African Regional Workshop

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.

Overarching Workshop

An Overarching Workshop was held in February 2017, attended by 40 participants, carrying out the following tasks to prepare for completion of the consultative draft of the Vulture MsAP and for its adoption and implementation:

- Review the 1st 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 was 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 text to be inserted following the Public Consultation Exercise]…

2. Scope

2.1 Geographic scope

The Vulture MsAP covers 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 127 Range States (Fig. 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.

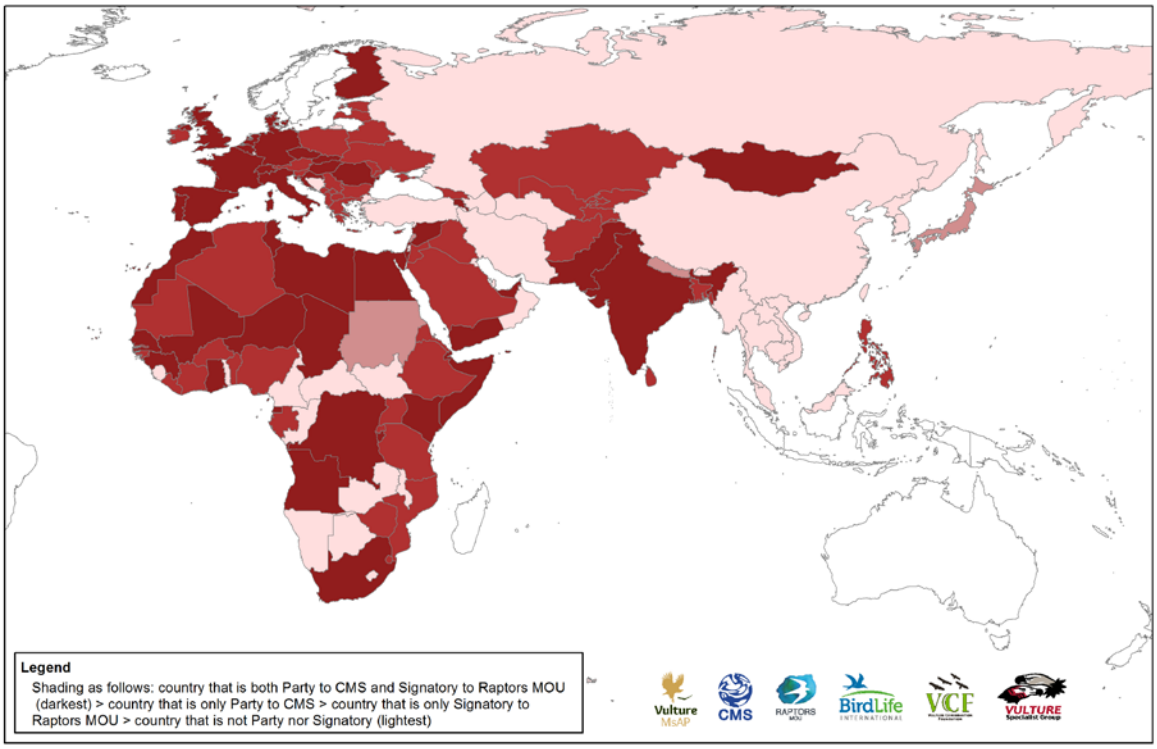


Fig. 2. Map showing vulture range states of Africa and Eurasia, together with Parties to CMS and Signatories to the Raptors MoU.

2.2. Taxonomic scope

The Vulture MsAP covers 15 of the 16 species classified as Old World vultures (Table 3). 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.

Table 3. Species covered by the Vulture MsAP. Nomenclature follows del Hoyo *et al*. (2014)

Species	**Range**	**Global level of threat (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)

The 16th 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.

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 in updraughts and thermals. They feed on tissues from carcasses of large mammals located from the air, either by seeing 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 trees or cliffs; 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 vulture sightings 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 Vultures, 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 range 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

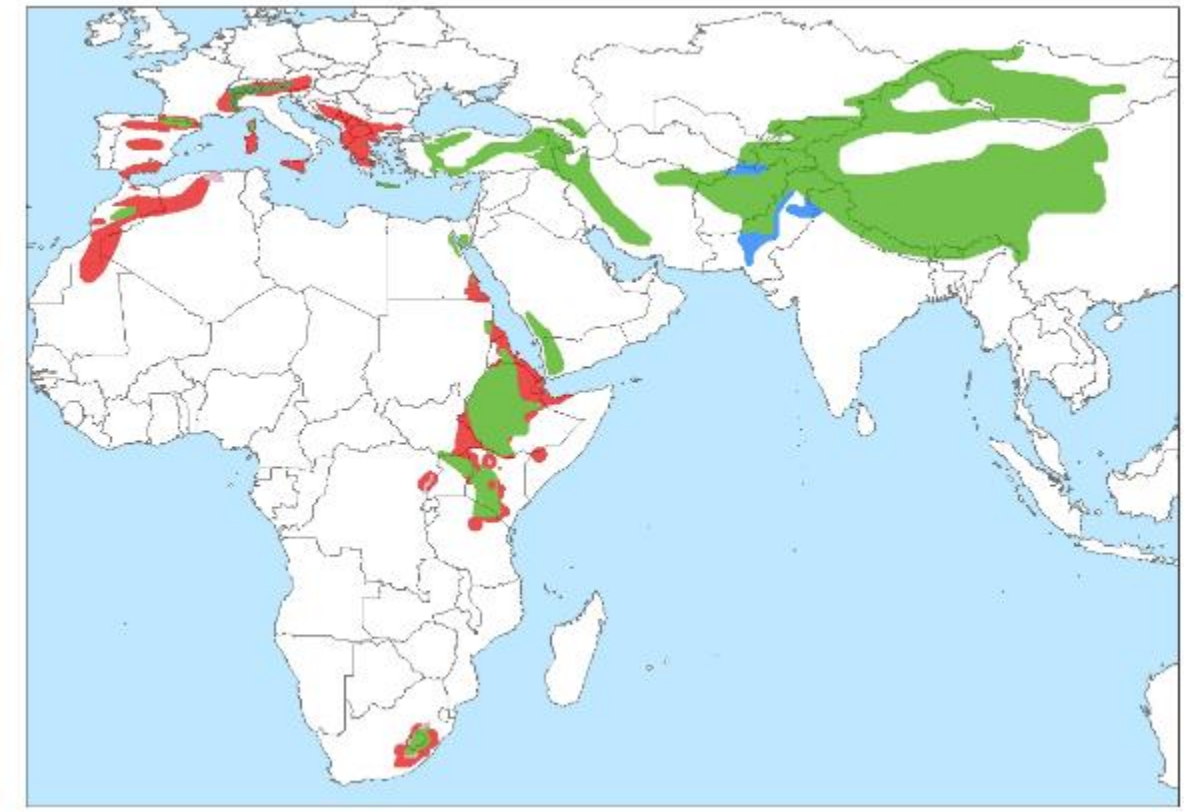
3.2 Bearded Vulture *Gypaetus barbatus*

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

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

Population trend: Decreasing

Distribution: Africa, Europe, Asia



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, more recently (not mapped) Andalusia, Grands Causses and Picos de Europa. In Asia, 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 SW Iran into much of Turkey, with more isolated populations in Yemen and SW 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 to extinction respectively. There is a lack of information for the species in Turkey and the Caucasus (VCF LIFE EuroSAP Bearded Vulture status review 2015). Asian populations are regarded as being relatively large and stable but with signs of significant but 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 survive in these areas. The higher Himalayan populations together with those in SE 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 2011), 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 elsewhere.

Movements: It is resident but has vast home ranges, and 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 for this species in Europe with recent records for this species from The Netherlands, Denmark and UK. In southern Africa, tracking studies indicate that adult, breeding birds are largely sedentary and forage within close proximity of active nests while 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, and 70% of the biomass of their diet are 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 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 on average 54 days and nestlings fledge after almost 4 months in the nest (Margalida 2002). In the case of double clutches obligatory "cainism" occurs in which the older sibling kills the younger (Thaler and Pechlaner 1980), a common trait in raptors.

Major threats:

- Unintentional poisoning. The use of poison baits targeted at mammalian predators and feeding on carcasses poisoned by these is thought to be the most significant cause for declines in this species in Europe (Margalida *et al*, 2008) and southern Africa (Krüger *et al*, 2014). In Ethiopia, the species is threatened by the use of poisons to control dogs at refuse tips (Angelov *in litt*. 2011).
- Collision with power lines/cables. Mortalities of birds colliding with power lines and other cables are known from Europe and southern Africa (Krüger *et al*, 2014). The planned

expension of the power line network in the Ethipian highlands can have a substantial impact on this species (Angelov *in litt*. 2011). Other types of cables with which this species is known to collide include ski-lift and cable car infrastructure.

- Disturbance caused by human activities. A range of human activities in proximity to known 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 (S. Viter *in litt*. 2014) that could impact on this species.

Secondary threats:

- Pastoralism changes driving habitat degradation and lack of food. Rapid increases in grazing pressure and human populations in West Asia could reduce the amount of food and available nesting sites for this species (S. Viter *in litt*. 2014).
- Genetic bottle-necks. 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-inroduced populations in areas where genetic exchange with existing wild populations is unlikely.
- Direct persecution has been recorded in Nepal where a bird was found shot (T. Subedi pers comm.).

Potential threats:

- NSAID poisoning. 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 at 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 (C. Inskipp and H. S. Baral *in litt*. 2013).
- Wind farms, Proliferation of wind farm in various parts of the speces' range should be closely monitored to assess and record any impact on the species. Rushworth and Kruger (2014) predicts deveastating consequences for the southern African Bearded Vulture population should the current several thousand turbines planned for development by the Lesotho government materialise.
- Lead intoxication (hunting with lead ammunition). A study by Krüger (2014) revealed lead accumulation in the bones of Bearded Vultures in southern Africa which indicate that this substance is either ingested by feeding on carcasses containing lead shot or fragments of lead bullets of by means of preening feathers contaminated with lead during bathing in pools of water. This contamination is likely also possible in other areas within the species' ramge where hunting activities occur.
- 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).
- Food shortage has been suggested as a serious issue in the Nepalese Himalayas although not yet clearly substantiated (T Subedi pers. comm.).

3.3 Egyptian Vulture *Neophron percnopterus*

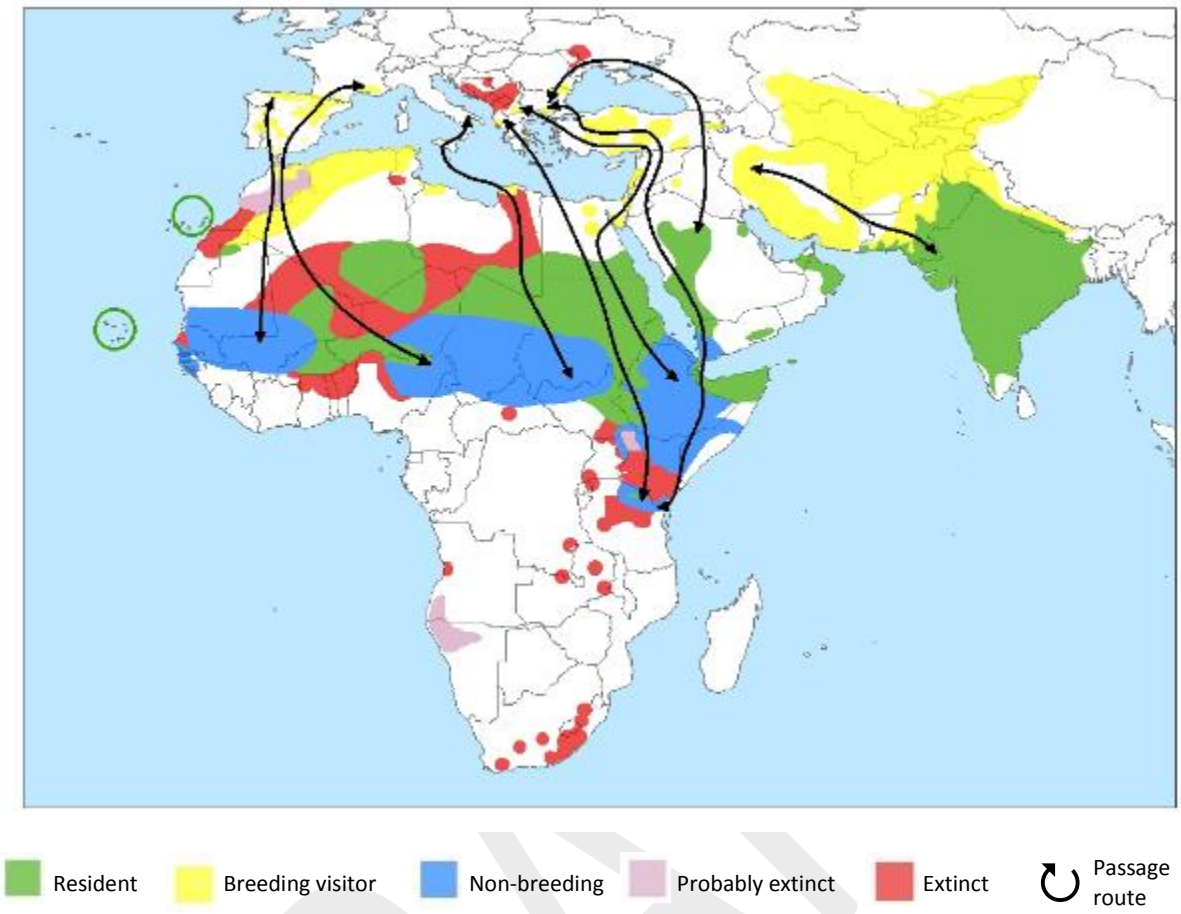
Red List Category: Endangered (since 2007, last update 2016)

Population size: 18,000-57,000 (12,000-38,000 mature individuals)

Population trend: Decreasing

Distribution: Africa, Europe, Asia

Distribution: Egyptian Vulture is a Palearctic, Afrotropical and western Indohimalayan 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, Afghanistan, China, Kazakhstan, Turkmenistan, Uzbekistan, Tajikistan, Kyrgyzstan, Georgia, Azerbaijan, Armenia, Ukraine and Moldova. The smaller Asian subspecies (*ginginianus*) is largely sedentary, remaining within the Indian sub-continent (Pakistan, India, Nepal), although other populations (of the nominate race) are also sedentary in Arabia (Oman, UAE, Saudi Arabia 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) west to Senegal (Rhondeau & 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 1000 – 2000 pairs). Other countries with significant populations (about 100 pairs) are: Azerbaijan, Oman, Iran, Iraq, Yemen, France, Georgia, Kazakhstan, Portugal, Russia and Uzbekistan. The European breeding population is estimated to number 3,000-4,700 breeding pairs, equating to 6,000-9,400 mature individuals (BirdLife International 2015). 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 (BirdLife International 2015a), except for some isolated island populations in the southwestern part of Asia, notably Socotra (Ferguson-Lees *et al*. 2001, Porter & Suleyman 2012) and Masirah (Angelov *et al*. 2013c). In India, it has declined by >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 do 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 of these numbers has been reported over the last 5 years (Arkumarev *et al*. 2014). In Chad, Niger, Nigeria, Djibouti and Somali the current population status is unknown (Meyburg *et al*. 2004, Oppel *et al*. 2015).

Movements: The populations breeding on the Canary Islands, Balearic Islands, Cape 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 utilising 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*. 2013); Suez in Egypt (Bougain & Oppel 2016), and Bab el Mandeb between Yemen and Djibouti (McGrady *et al*. 2013).

In the Indian subcontinent, the population is increased especially in NW India by the migrant nominate race in the winter, but the exact distribution and status of the two races in the region 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 in 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 case up to 3 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. Usually occurs singly or in pairs, less commonly in small groups, and rarely in large groups of more than 100. Soars low in search of food. Roosts on cliff faces or in dead trees and is rarely found far from nesting cliffs. Less wary and more tolerant of humans than other vultures. The wintering habitat includes mainly sub-deserts and savanna in Sahel zone (Oppel *et al*. 2015; Meyburg *et al*. 2004) where birds are often roosting on pylons (Arkumarev *et al*. 2014).

Ecology: 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). Forages in lowland and montane regions over open, often arid, country. Also scavenges at human settlements. Opportunistic scavenger with broad diet including carrion (not only livestock but often domestic chicken), tortoises, organic waste, insects, young vertebrates, eggs and even faeces (Margalida *et al*. 2012, Dobrev *et al*. 2015, 2016). Usually solitary, but will congregate at feeding sites, such as rubbish tips, or vulture restaurants (i.e. supplementary feeding stations), and forms roosts of non-breeding birds (Ceballos & Donázar 1990). Pairs performs 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. The use of poison baits targeted at mammalian predators and feeding on carcasses poisoned by these 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 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 n Ethiiopia also pose a threat (Angelov *in litt*. 2011).
- Food shortage due to declining wild and domestic ungulate populations. Improvement of slaughterhouse sanitation and declines in wild ungulate populations seems 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 Fazaro & McGrady, 2016) may also result in reduced availability of food from this source for this species.
- Electrocution and collision with energy infrastructure. Incidents of mortality involving this species has been recorded on the Canary Islands (Donázar *et al*. 2002, 2007a) and is

considered a possible risk in regions of Spain (Donázar *et al.* 2007b, 2010) and in Africa especially in congregation sites where a single power line (30 km) in Port Sudan was known to cause the death of hundreds Egyptian vultures and other birds of prey since its construction in the 50es (Angelov *et al.* 2013).

- Veterinary drugs (NSAIDs) have been implicated in the serious declines of this species recorded within South Asia (Cuthbert *et al*. 2006, Galligan *et al*. 2014), with population trends closely corresponding to those of *Gyps* vultures known to be reflecting diclofenac use in that region. NSAIDs are therefore regarded as a major threat, applying the precautionary principle.

Secondary threats:

- Habitat loss and nest competition
- Direct persecution (belief-based use)

3.4 Red-headed Vulture *Sarcogyps calvus*

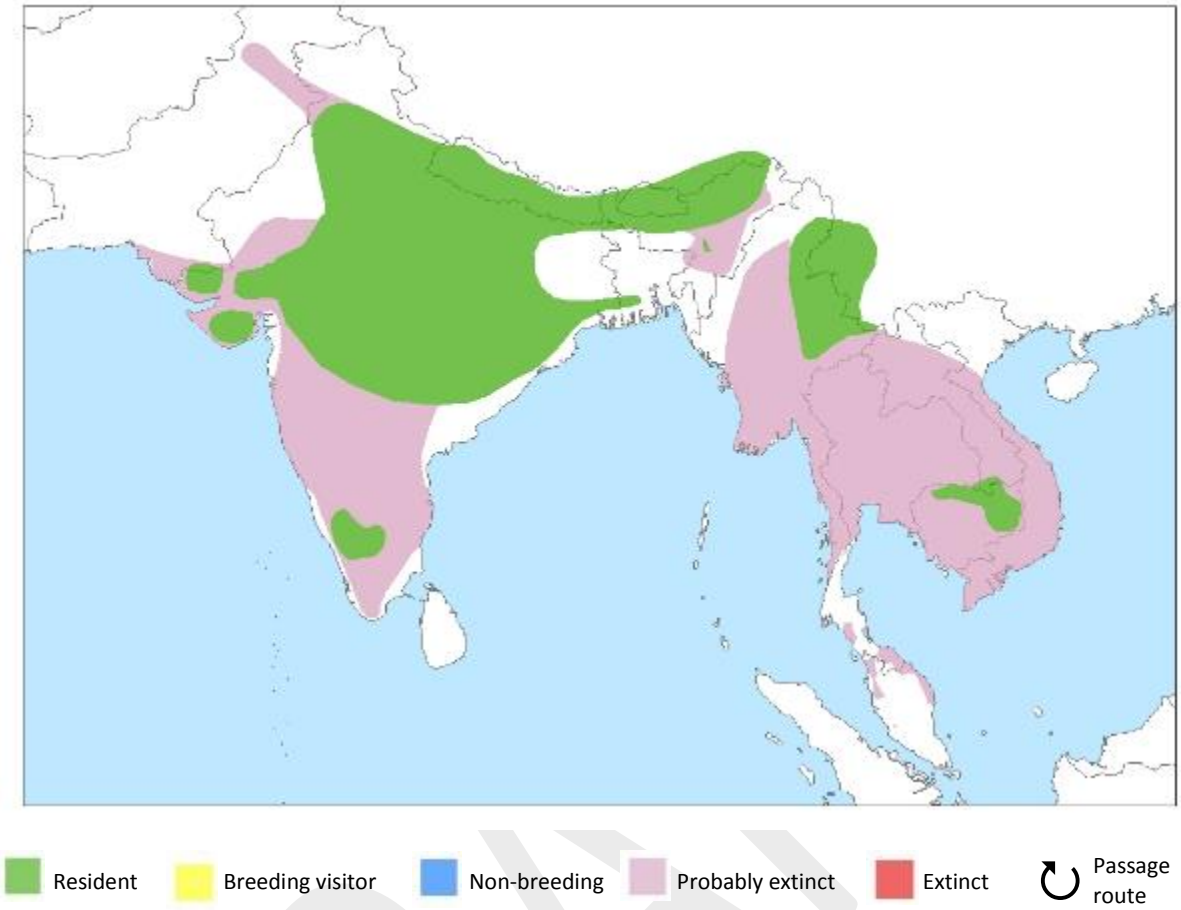
Red List Category: Critically endangered (LC in 1988, NT in 1994, CR in 2007)

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

Population trend: Decreasing or possibly stabilising

Distribution: Asia

Distribution: Red-headed Vulture occurs 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). There are no recent records from Bangladesh or Pakistan, where it may be extinct.



Population size and trend: Cuthbert *et al.* (2006) calculated a decline in excess of 90% in 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 2000's. Smaller Cambodia population undoubtedly also under pressure but no clear trend (Clements *et al*. 2012).

Movements: The species is largely sedentary, however individuals can forage over considerable areas and there is some seasonal altitudinal movement (Ferguson-Lees & 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 (UNEP/CMS 2015). Range of movement patterns may also have reduced in tandem with its decline (Naoroij 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 2016a)

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 its territorial behaviour Red-headed Vultures tend to occur at lower densities than other Asian vulture species.

Major threats

- 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 wild to 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), it is prudent to treat diclofenac as a major threat to this species pending improved information.
- A second NSAID commonly used in India, ketoprofen, has also recently been identified to be lethal to *Gyps* vulture species (Naidoo *et al.* 2009), and measurements of residue levels in ungulate carcasses in India indicates 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 prudent to treat regard NSAIDs as a major threat to this species pending improved information.
- The primary reason behind its 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).
- Accidental poisoning at carcasses deliberately laced with pesticides to kill stray dogs or wild carnivores (BirdLife International 2016a); a major threat in south-east Asia and more recently in NE India (Assam).

Secondary threats

- Changes in the processing and disposal of dead livestock which have occurred in response to the collapse in vulture numbers (BirdLife International 2016a).

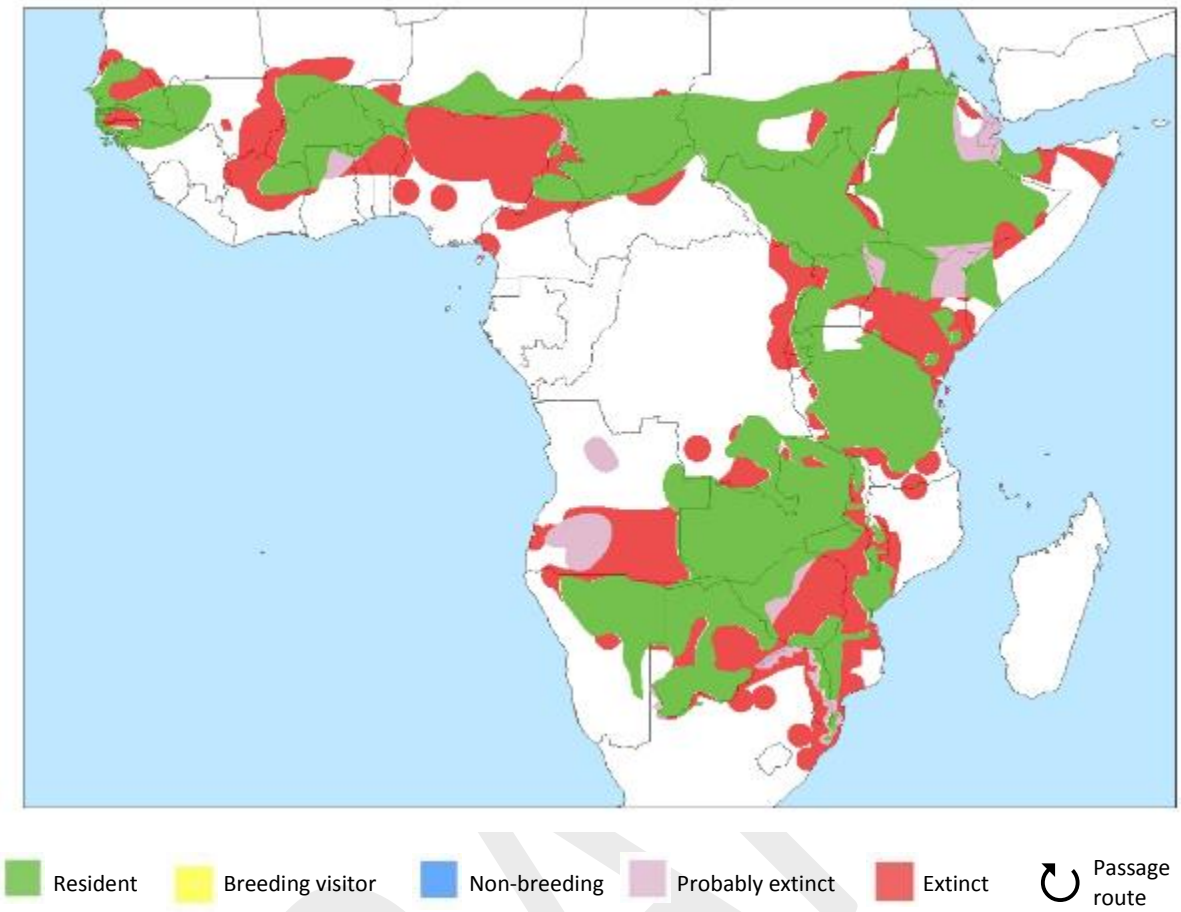
3.5 White-headed Vulture *Trigonoceps occipitalis*

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

Distribution: 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. In Southern Africa it is now largely confined to protected areas.

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 & Christie 2001). Compared to many vulture species, there is little knowledge of the movements (Murn & Holloway 2014) but recent results from satellite-tracked individuals in South Africa (UNEP/CMS 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: Feeds mainly on carrion and bone fragments from large and small carcasses. Feeds alone or in pairs, rarely more than two pairs congregating at larger carcasses. Often snatches food from other vulture species and then consumes nearby. Is often the first vulture species to arrive at a carcass (Mundy *et al.* 1992). Known to take some small or weak 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 (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 (BirdLife Botswana 2008).

Major threats

- Unintentional poisoning (especially eastern and southern Africa). Poisoned baits targeted at at mammalian carnivores causing livestock losses kills these birds when they feed on the baits themselves or the animals that were killed by them.
- Declining wild ungulate populations in West Africa (Craigie *et al*. 2010) and East Africa (Western *et al.* 2009).
- Habitat conversion/degradation (throughout range) (Mundy *et al.* 1992, R. Davies *in litt* 2012)
- Belief-based use (West, Central and Southern Africa) (Roxburgh & McDougall 2012, Buij *et al*. 2016)

Secondary threats

- Sentinel poisoning, especially in southern Africa (Roxburgh & McDougall 2012, Ogada *et al*. 2015a). 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 areas where poachers are active due to large numbers of birds getting killed in this manner. White-headed Vultures, like most other species occurring in are where this practise is prevalent, are susceptible to this threat.

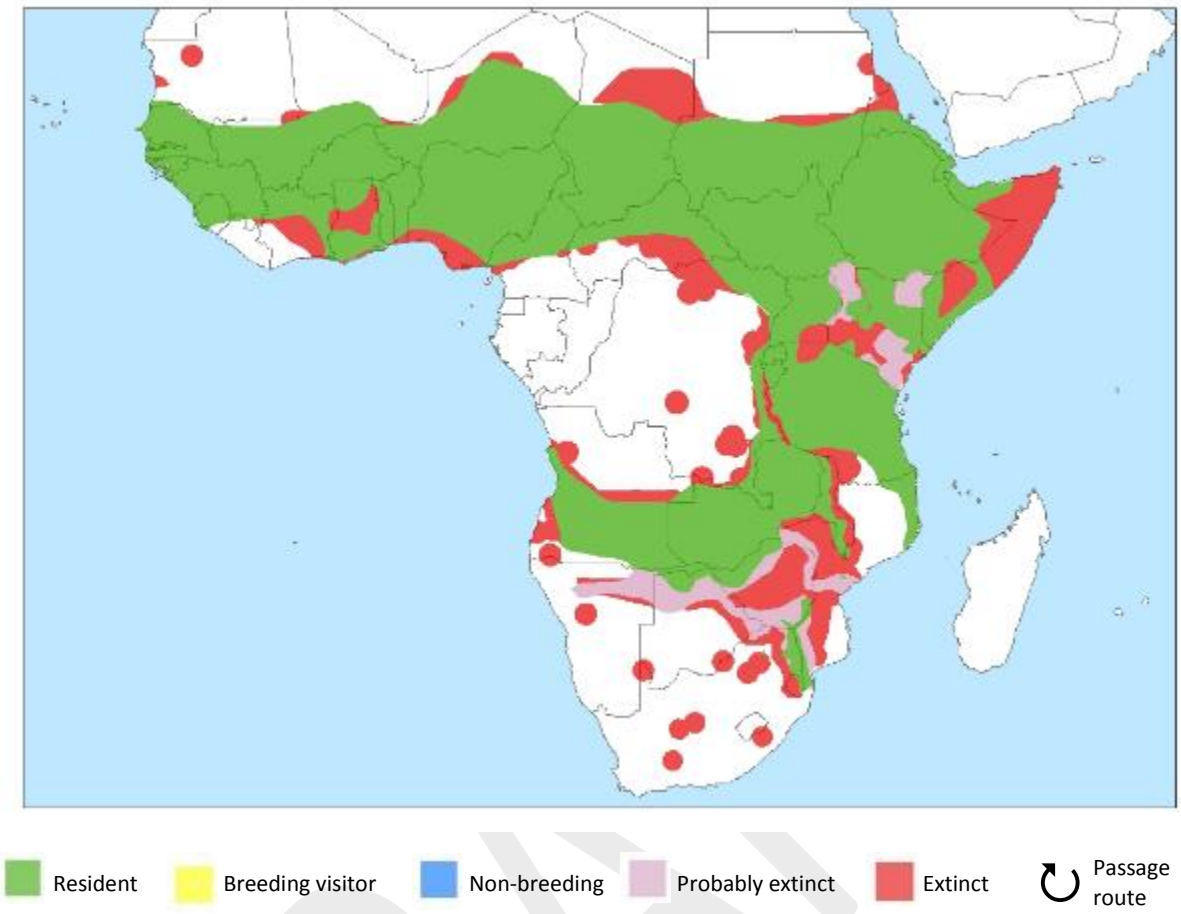
3.6 Hooded Vulture *Necrosyrtes monachus*

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

Population size: 197,000 birds

Population trend: Decreasing

Distribution: Africa



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

Population size and trend: Estimated at 197,000 individuals (Ogada & Buij 2011) but rapidly declining; this decline has been estimated at 83% (range 64-93%) in the last 30 years (Ogada *et al.* 2015b).

Movements: Generally considered sedentary, with some dispersal of non-breeders and immature birds, especially in response to rainfall (Ferguson Lees & Christie 2001). Recent satellite tracking has shown that individuals move several hundreds of kilometres from their capture sites between South Africa, Mozambique and Zimbabwe (UNEP/CMS 2015).

Habitat: Often associated with human settlements, but also found in open grassland, forest edge, wooded savannah, semi-desert and along coasts (Ferguson-Lees & Christie 2001). It occurs up to 4,000 m, but is most numerous below 1,800 m. It nests mainly in trees.

Ecology: Feeds on carrion, but in areas where it is associated with urban areas it congregates at slaughterhouse disposal sites and rubbish dumps. Gregarious at larger carcasses but because of its smaller size is often outcompeted by larger species. Generally, north of the equator it is a human commensal gathering in large numbers in urban areas (Ogada & 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 November to July. Breeding in north-east 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 & Christie 2001).

Major threats

- Killing for belief-based use (especially West and Central Africa) (McKean *et al.* 2013; Saidu & Buij 2013; Buij *et al.* 2016), mainly through poisoning but locally by capture at abattoirs (e.g. Uganda: D. Pomeroy *in litt*.) 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.
- Food and bushmeat trade. The species is known to be consumed as a source of food by people in west and central Africa (Rondeau & Thiollay 2004).
- Unintentional poisoning (East Africa) (Roxburgh & McDougall 2012) Poisoned baits targeted at at mammalian carnivores causing livestock losses kills these birds when they feed on the baits theselves or the animals that were killed by them.
- Sentinel poisoning (Ogada *et al*. 2015b). 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 areas where poachers are active due to large numbers of birds getting killed in this manner. Hooded Vultures, like most other species occurring in areas where this practise is prevalent, are susceptible to this threat.

Secondary threats

- Reduction in available food due to insensitive improvements to slaughterhouse hygiene and rubbish disposal (Ogada & Buij 2011)
- Mortality from avian influenza due to feeding on discarded poultry carcasses (Ducatez *et al*. 2007) although this requires further substantiation.

3.7 Himalayan Griffon *Gyps himalayensis*

Alternative name: Himalayan Vulture

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

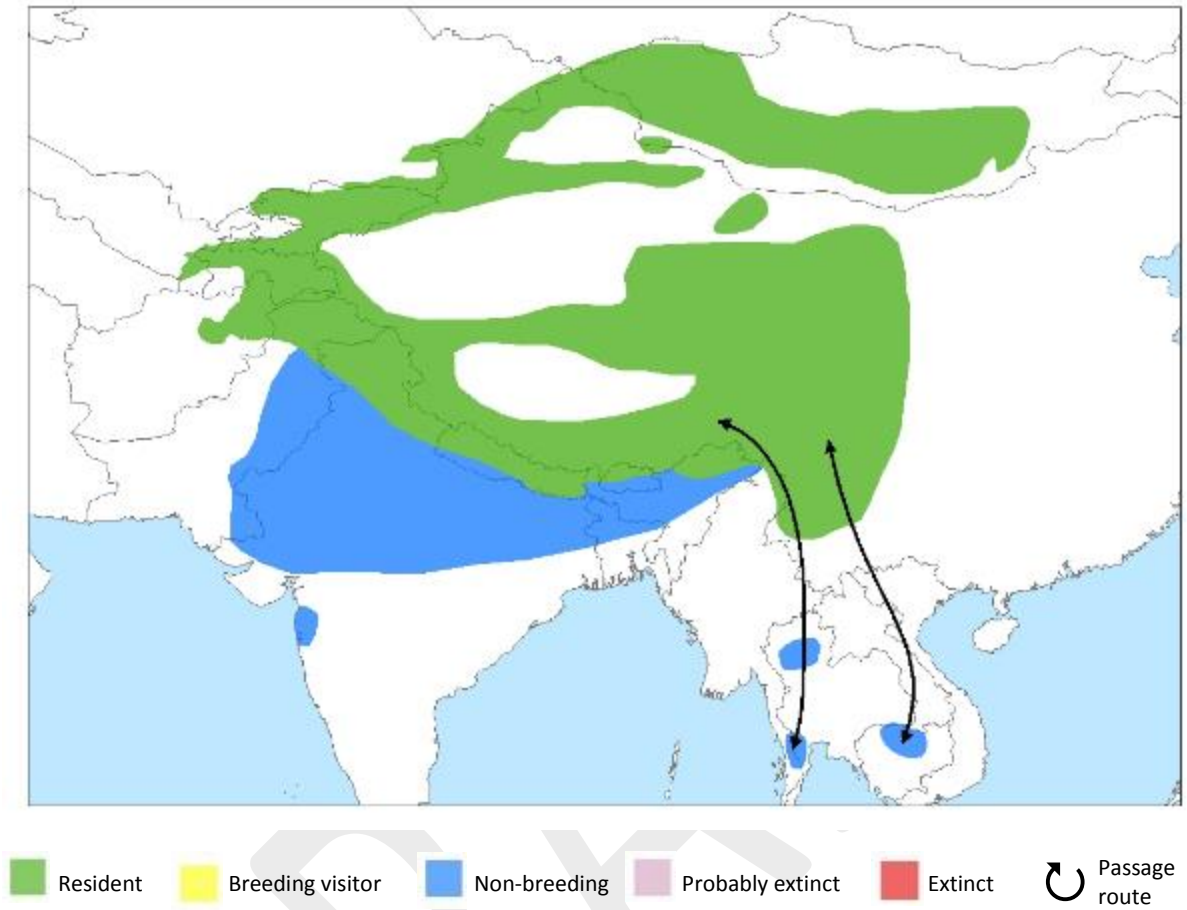
Population size: 66,000-334,000 individuals

Population trend: Decreasing but partial recovery in part of range

Distribution: Asia

Distribution: The Himalayan Griffon is present throughout the Himalayan mountain range in Kazakhstan, Uzbekistan, Kyrgyzstan, Tajikistan, Afghanistan and Pakistan, and further east into India, Nepal and Bhutan, to central China and Mongolia. Juveniles and sub adults undertake a mainly southward migration outside the breeding season into the 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 & Christie 2001, BirdLife International 2016a), 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 between 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 & 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 & 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 & Christie 2001). In winter it moves lower down, with juveniles wandering into open plains and grasslands and 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 singularly or in small, loose colonies of up to 6 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:

- 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 diclofenac (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 and indeed there are documented incidents of this (Das *et al*. 2010). Given the high sensitivity of vulture population growth rate to additional mortality of adults (Niel & 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.
- Risk of poisoning from other non-steroidal anti-inflammatory drug (NSAIDs).

Secondary threats:

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

3.8 White-rumped Vulture *Gyps bengalensis*

Alternative name: Oriental White-backed Vulture

Red List Category: Critically endangered (CR since 2000)

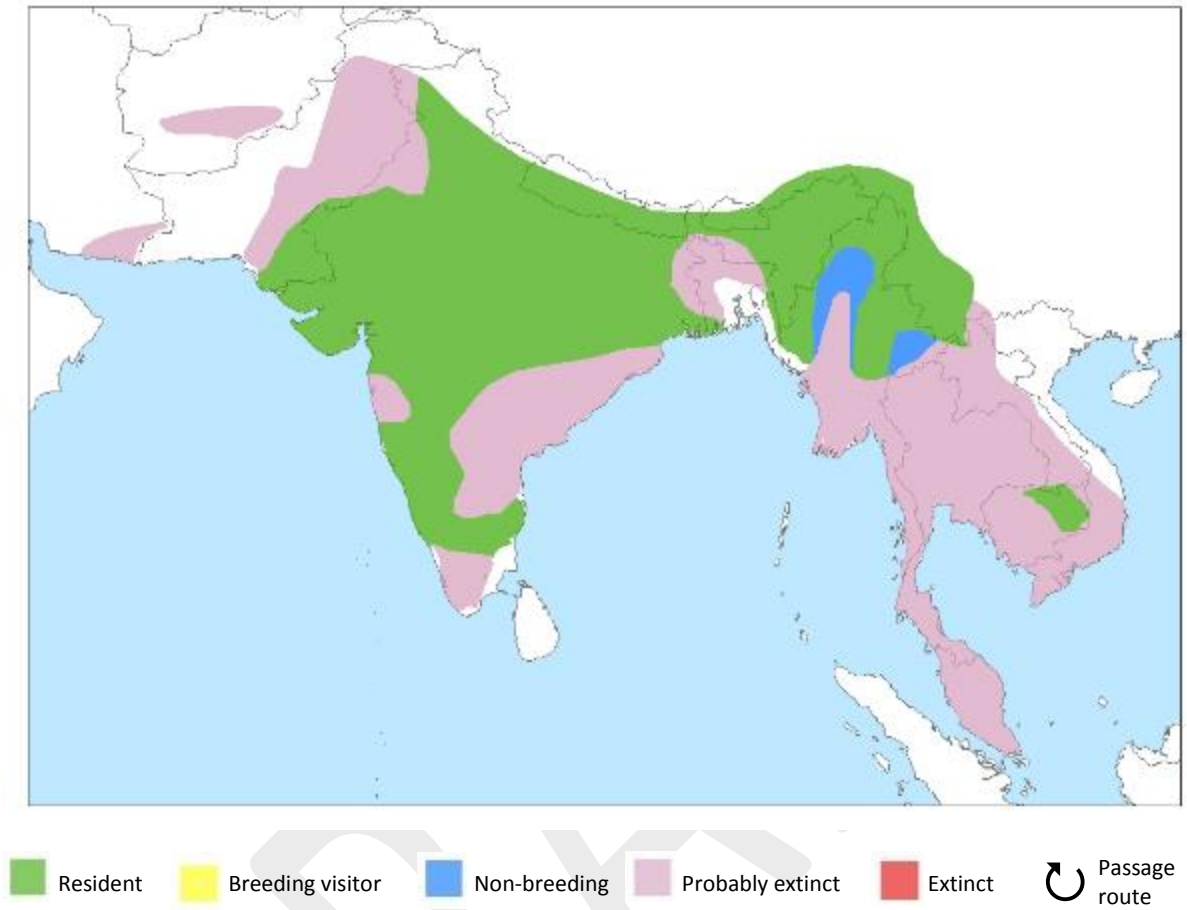
Population size: 3,500-15,000 individuals

Population trend: Large decrease but stable since 2007

Distribution: South and SE Asia

Distribution: The White-rumped Vulture occurs in Pakistan, India, Bangladesh, Nepal, Bhutan, Myanmar and Cambodia (del Hoyo *et al.* 1994, Eames 2007a,b, Hla *et al.* 2011). It is probably extinct in Iran, Afghanistan, Thailand, Laos and Vietnam. The few records from south-east Afghanistan and

Iran are not recent and its status is currently unknown (Naoroji 2006, BIrdLife International 2016a) and 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). The current population is estimated at 3,500-15,000 individuals, equating to 2,500-9,999 mature birds (BirdLife International 2016a). Extremely rapid population declines by 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 since 2007, 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*. submitted). 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).

Movements: The species is largely sedentary; however individuals forage over large areas and immatures are thought to be nomadic (Ferguson-Lees & Christie 2001). Bildstein (2006) considers White-rumped Vulture to be a partial migrant. Birds recorded in the past in Afghanistan are thought to be a migrant population presumably from Pakistan (Naoroji 2006). 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 (UNEP/CMS 2015).

Habitat: When formerly 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 1500 m where it utilises light woodland, open areas and human settlements (Del Hoyo *et al.* 1994).

Ecology: White-rumped Vultures feed exclusively on carrion and often associates 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).

Major threats

- 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).
- A second NSAID commonly used in India, ketoprofen, has also more recently been identified to be lethal to the species, and measurements of residue levels in ungulate carcasses in India indicate that concentrations are sufficient to cause vulture mortalities (Naidoo *et al.* 2009, Taggart *et al.* 2007).
- Risk of poisoning from other non-steroidal anti-inflammatory drug (NSAIDs). The recent co-occurrence of extensive visceral gout in dead wild vultures of this species with high levels of the NSAID nimesulide in the liver and kidneys indicates that this drug is probably also causing vulture deaths (Cuthbert *et al.* 2016).
- Demise of large ungulate populations and improvements in animal husbandry resulting in a lack of available carcasses for vultures (BirdLife International 2016a); likely to be the primary reason behind long-term decline in south-east Asia, where diclofenac is not used
- Accidental poisoning at carcasses deliberately laced with pesticides to kill stray dogs and wild carnivores (BirdLife International 2016a); a major threat in south-east Asia and has also occurred recently in NE India (Assam).

Secondary threat

- Changes in the processing of dead livestock which have occurred in response to the collapse in vulture numbers (BirdLife International 2016a).

3.9 White-backed Vulture *Gyps africanus*

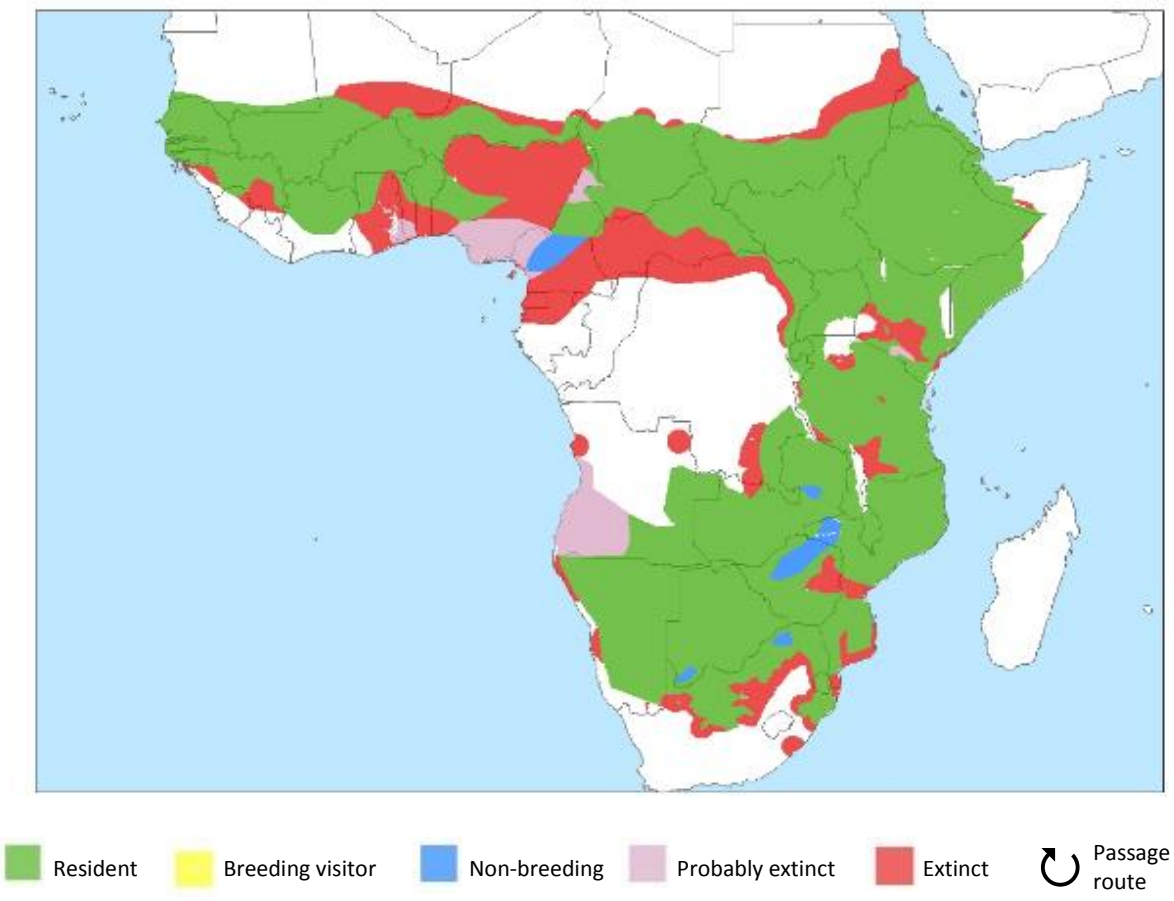
Red List Category: Critically endangered (LC in 2004, NT in 2007, EN in 2012, CR in 2015)

Population size: 270,000 individuals

Population trend: Decreasing

Distribution: Africa

Distribution: The White-backed Vulture is the most widespread and commonest 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 at a few strongholds in Ghana and Niger. Declines are also recorded in Sudan, South Sudan, Somalia and Kenya but 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; a decline by 90% (range 75-95%) has been documented in the last 30 years (Ogada *et al.* 2015b).

Movements: The species is generally considered sedentary, but individuals will cover huge areas in search of food (BirdLife International 2016a, Ferguson-Lees & 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 900km from their place of capture (Oschadleus 2002, Phipps *et al.* 2013*a*) with mean foraging range of 269,103km^2. Some populations are thought to shift their ranges in response to food availability and seasonal rains (Bildstein 2006, Ferguson-Lees & Christie 2001). Individuals tagged in Kenya were found to have an average home range size of 50,000km^2, with movements between Kenya, Tanzania, Uganda and Democratic Republic of Congo (UNEP/CMS 2015). 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 northern migration; however, numbers reaching Iberia appear to be significantly smaller than for Rüppell's, more suggestive of vagrancy, and this occurence is not mapped.

Habitat: Primarily a lowland species of op0065n 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 (Andreson & Hohne, 2007, de Swardt 2013).

Ecology: White-backed Vultures are 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, using their behaviour to locate food. 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 visiting supplementary food (a vulture restaurant).

Major threats

- Unintentional poisoning (especially east and southern Africa) (Ogada & Keesing 2010, Otieno *et al.* 2010, Kendall & Virani 2012, Roxburgh & McDougall 2012)
- Sentinel poisoning (southern Africa) (Roxburgh & McDougall 2012, Ogada *et al*. 2015a, Murn & 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 areas where poachers are active due to large numbers of birds getting killed in this manner. White-backed Vultures, like most other species occurring in are where this practise is prevalent, are susceptible to this threat but the threat to this species is more severe due to the large number of birds of this species that normally congregate at carcasses.
- Belief-based use (especially West and Southern Africa) (McKean & Botha 2007, P Hall *in litt* 2011, McKean *et al.* 2013)
- Habitat loss and degradation: nest tree loss in rangelands, and rangeland conversion to crop farming (Virani *et al*. 2011)
- Declining wild ungulate populations, especially in West Africa (Craigie *et al*. 2010) but also in East Africa (Western *et al.* 2009)

Secondary threats

- Electrocution on powerline poles (Anderson & Kruger 1995, BirdLife International 2016a)
- Nest harvesting or disturbance by humans (Bamford *et al.* 2009)

3.10 Indian Vulture *Gyps indicus*

Alternative name: Long-billed Vulture

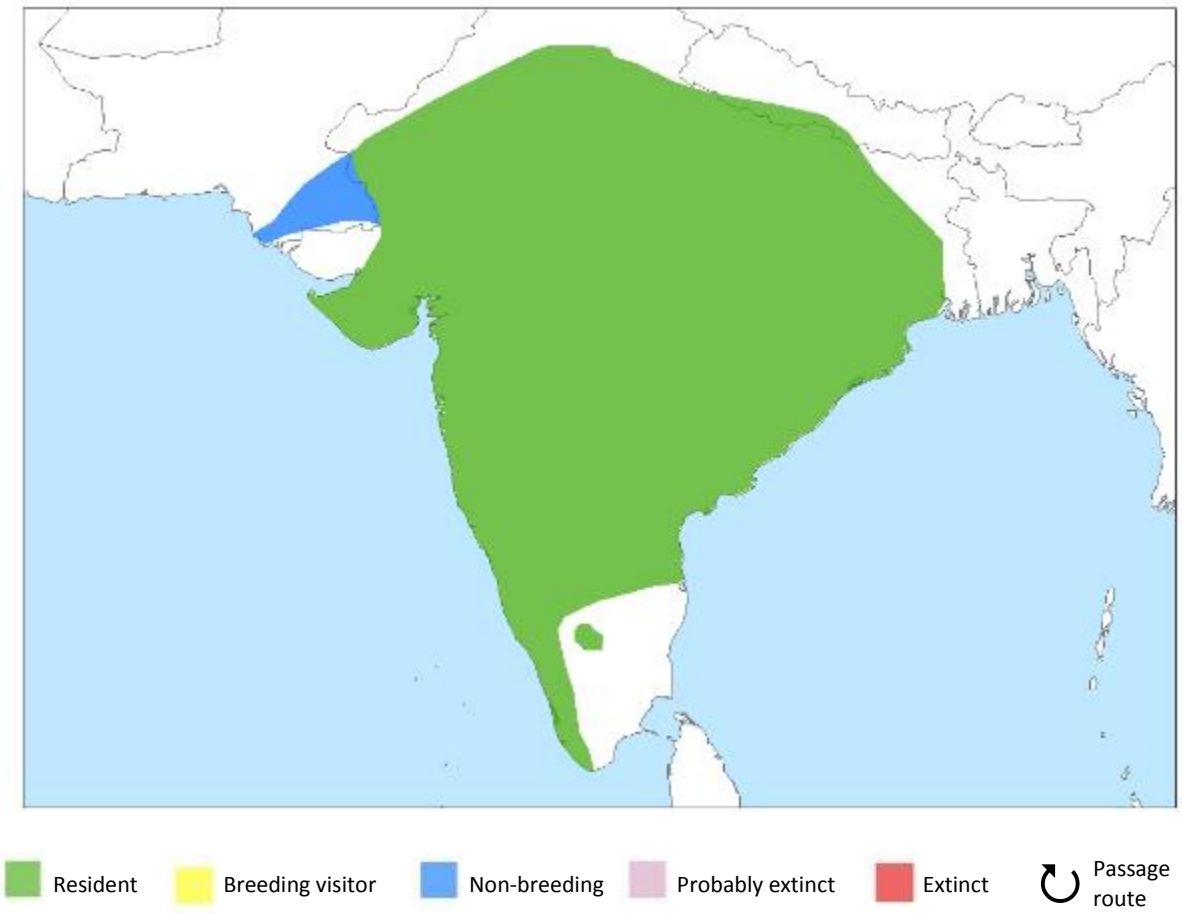
Red List Category: Critically endangered (CR since 2002)

Population size: 45,000 individuals

Population trend: Large decrease since 1990s, approximately stable 2007-2011. Possible recent decrease.

Distribution: South Asia

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: In 2007 the population was estimated to be approximately 45,000 individuals extrapolated from a survey of 18,000 km transects (Prakash *et al*. 2007). Extremely rapid population declines by 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 since 2007, 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*. submitted).

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) showed 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 adapts well to supplementary food provided at vulture restaurants. They nest in small to large colonies at cliff-nesting sites and smaller colonies when nesting in trees. Large trees (7-15m in height) are used as in which to nest (Del Hoyo *et al.* 1994).

Major threats

- 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).
- A second NSAID commonly used in India, ketoprofen, 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).
- Risk of poisoning from other non-steroidal anti-inflammatory drug (NSAIDs). The recent co-occurrence of extensive visceral gout in dead wild vultures of related species with high levels of the NSAID nimesulide in the liver and kidneys indicates that this drug is probably also causing vulture deaths (Cuthbert *et al.* 2016).

Secondary threats

- Accidental poisoning at carcasses deliberately laced with pesticides to kill stray dogs or wild carnivores
- Changes in the processing of dead livestock which have occurred in response to the collapse in vulture numbers (BirdLife International 2016a).

3.11 Slender-billed Vulture *Gyps tenuirostris*

Birds now referred to as this species were previously treated as a sub-species 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 & Parry (2001).

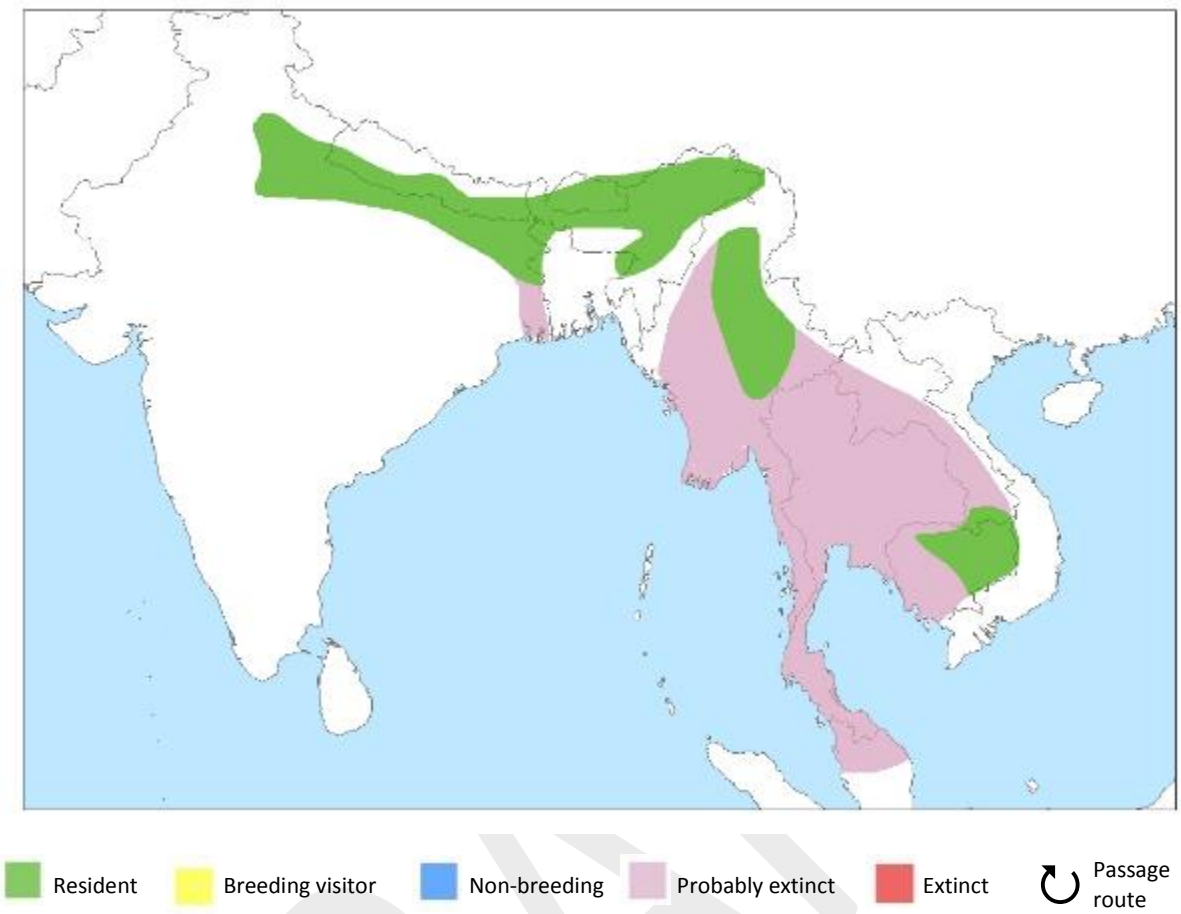
Red List Category: Critically endangered (CR since 2002, species previously not recognised)

Population size: 1,500-3,750 individuals

Population trend: Large decrease since 1990s. May currently be stable

Distribution: South & SE Asia

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 2016a). A small breeding population was recently discovered in Cambodia and a total of 51 individuals have been recorded feeding at vulture restaurants (BirdLife International 2016a). It 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 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* submitted). The species was formerly widespread in Nepal, but is now very rare there. The main populations remaining are in Assam (NE 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 & 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 patterns showed 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:

- 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).
- A second NSAID commonly used in India, ketoprofen, 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).
- Risk of poisoning from other non-steroidal anti-inflammatory drug (NSAIDs). The recent co-occurrence of extensive visceral gout in dead wild vultures of related species with high levels of the NSAID nimesulide in the liver and kidneys indicates that this drug is probably also causing vulture deaths (Cuthbert *et al.* 2016).
- 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).
- Accidental poisoning at carcasses laced with pesticides to kill stray dogs (BirdLife International 2016a); a major threat in south-east Asia but also occurs in Assam (NE India).

Secondary threats:

- Changes in the processing of dead livestock which have occurred in response to the collapse in vulture numbers (BirdLife International 2016a).

3.12 Cape Vulture *Gyps coprotheres*

Alternative names: Cape Griffon

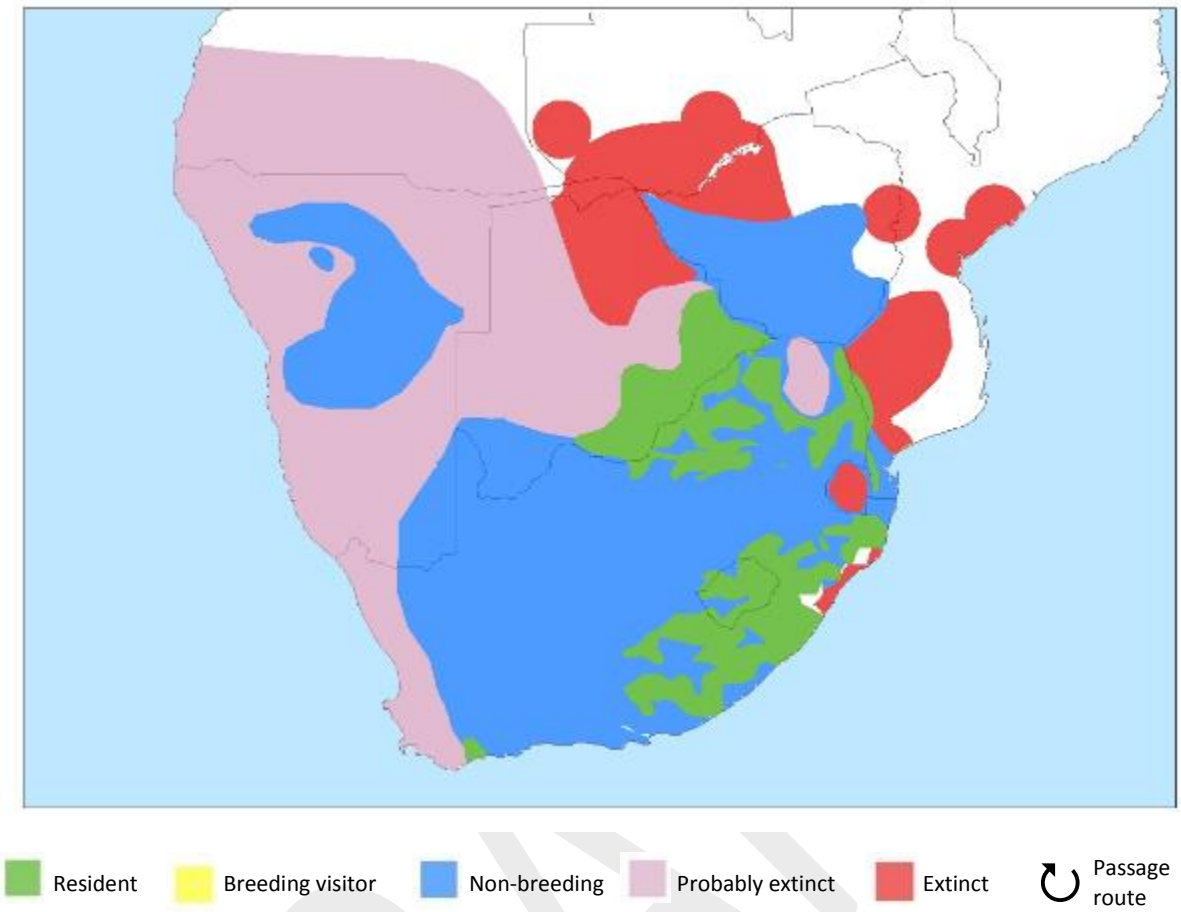
Red List Category: Endangered (VU in 1994, EN in 2015)

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

Population trend: Stable or increasing

Distribution: 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, 2016).

Movements: The species is considered an irruptive and local migrant by Bildstein (2006). Recent satellite tracking projects has shown that individuals can cover large distances. Phipps *et al.* (2013b) reported home ranges of 121,655 km^2 for five adults and 492,300 km^2 for four immature birds satellite tagged in South Africa. The tagged vultures travelled more than 1,000 km 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 UNEP/CMS 2015). Small numbers of Cape Vultures have been released in Namibia with satellite tags and have made cross-border movements into Angola (Diekmann & 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. The practice of the placement of poisoned baits targeted at mammalian carnivores that kill these birds when they feed on the baits theselves or the animals that were killed by them is known to be the most significant threat that affects this species across its range (Boshoff & 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 & Strachan 2006). Electrocution on pylons or collisions with cables (Boshoff *et al.* 2011)
- Electrocutions and collisions with power lines. 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).
- Decrease in the amount of carrion (particularly during chick rearing).
- Belief-based use especially in *muthi* (so-called traditional medicine in southern Africa) Vultures are caught and consumed for perceived 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 consumption events in eastern South Africa each year, involving an estimated 1,250 hunters, traders and healers. At current 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

- Disturbance at colonies. 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 & Borello, 2002). These include recreational and tourism-related activities such as mountaineering, climbing and recreational aviation such as paragliding.
- Bush encroachment. Schultz (2007) indicated the foraging ability in certain parts of the species' range may be severaly impeded by bush encroachment and –thickening which affects the birds' ability to detect food in the ground.
- Climate change. It is predicted that the species breeding at higher-altitudes, such as Cape Vulture in southern Africa may experience range contractions due to increased temperatures (Simmons 2007).

3.13 Rüppell's Vulture *Gyps rueppelli*

Alternative name: Rüppell's Griffon

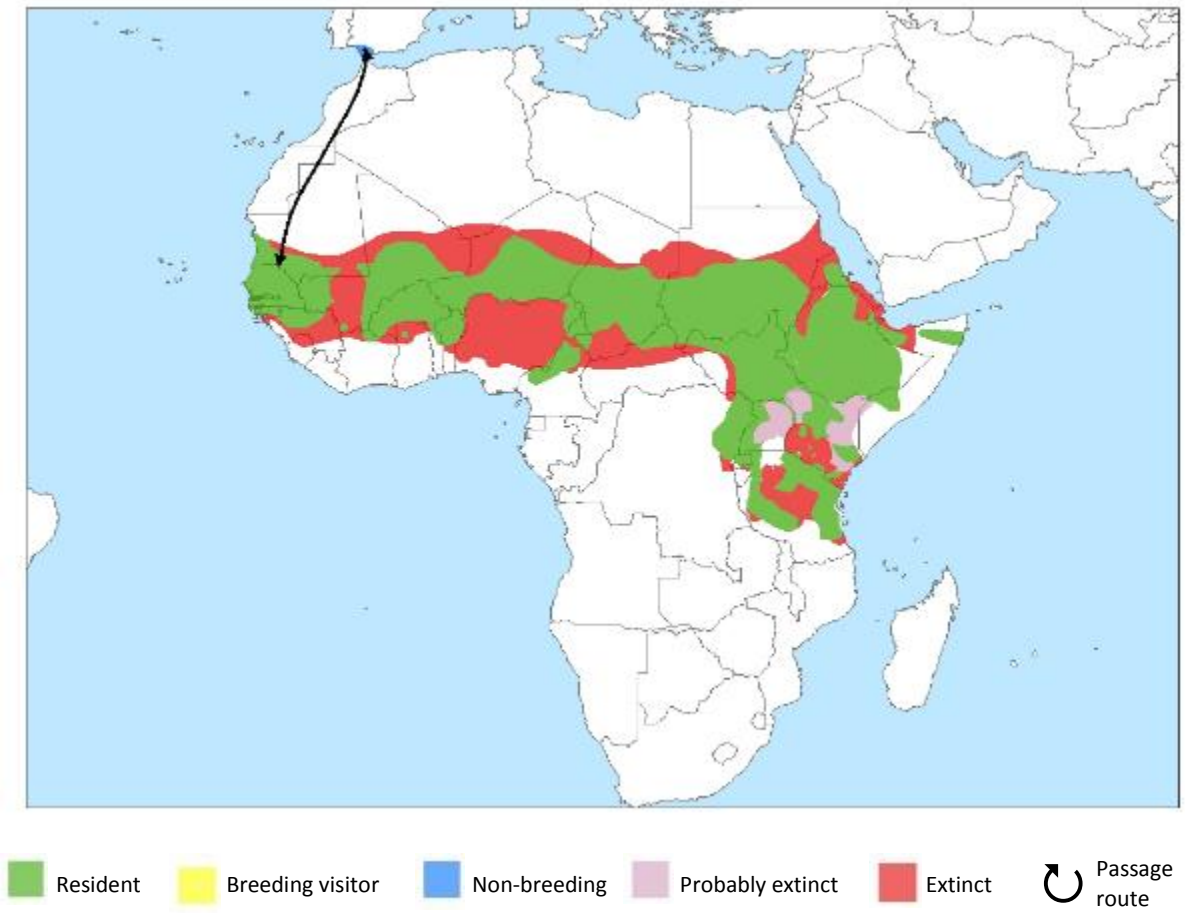
Red List Category: Critically Endangered (LC in 1994, NT in 2007, EN in 2012, CR in 2015)

Population size: 22,000 individuals

Population trend: Decreasing

Distribution: 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 are reported to occur in N 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 estimated at 22,000 individuals in the early

1990s (Mundy *et al.* 1992), based on recent rapid declines of 97% (94–99%) over 30 years estimated by Ogada *et al.* 2015b) the population 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 & 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 has 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 and Tanzania. 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 & Kemp 1998, Ferguson-Lees & Christie 2001, De Juana 2006). It has been suggested that the movement of Rüppell's Vulture across the Strait of Gibraltar into Europe in company with 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.

Ecology: A highly gregarious species that congregates at carrion, soaring in flocks and locating food by sight. Feeds on carrion and bone fragments of larger carcasses, mainly soft muscle and organ tissue. Rarely comes down to small carrion. Follows other vultures and migrant game or stock herds to locate much of its food (Del Hoyo *et al.* 1994). 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).

Major threats:

- Unintentional poisoning (especially east Africa) (Ogada & Keesing 2010, Otieno *et al.* 2010, Kendall & Virani 2012)
- Belief-based use (especially West and Central Africa) (Rondeau & Thiollay 2004, Nikolaus 2006, Buij *et al*. 2016)

Secondary threats:

- Declining wild ungulate populations (East Africa) (Western *et al.* 2009)
- Nest harvesting or disturbance by humans (Rondeau & Thiollay 2004, Bamford *et al.* 2009)

3.14 Griffon Vulture *Gyps fulvus*

Alternative names: Eurasian Griffon

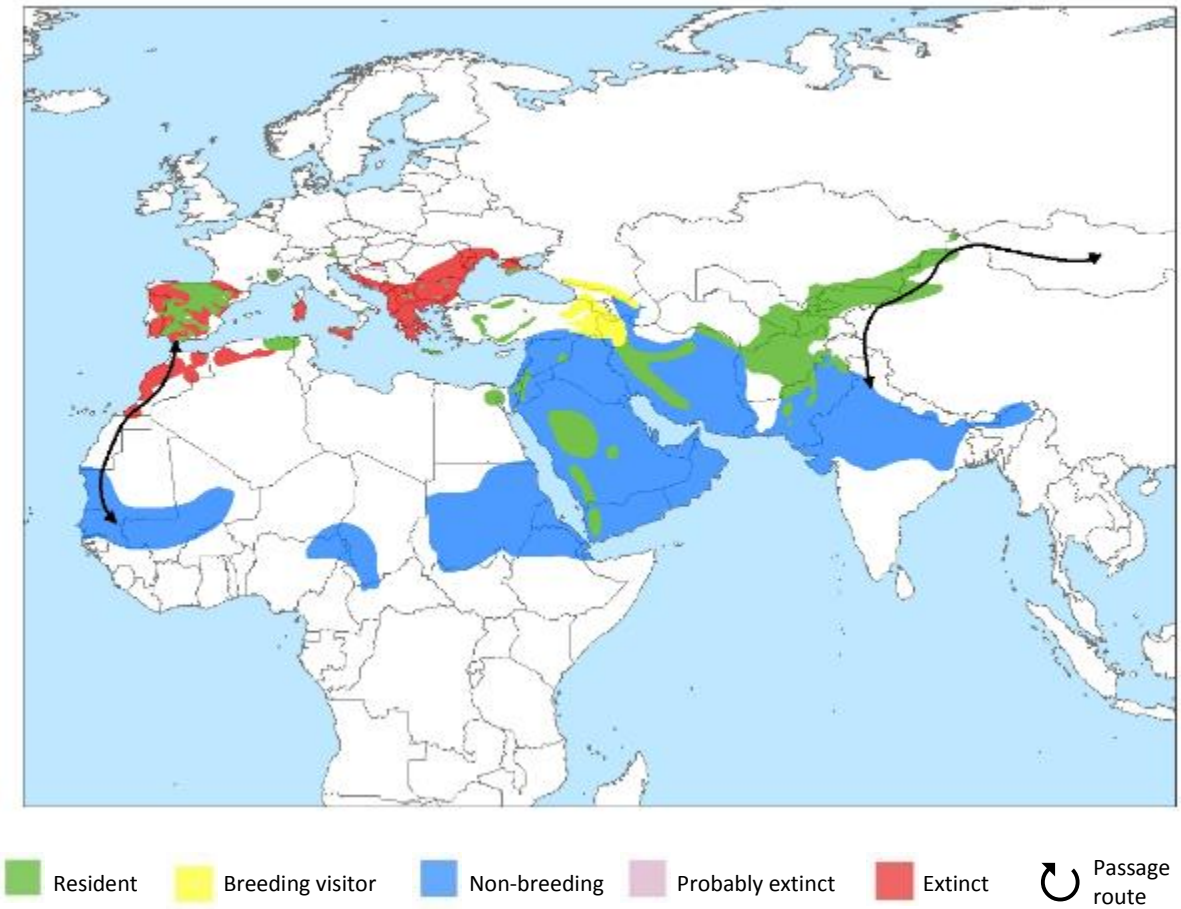
Red List Category: Least Concern (since 1988, last update in 2015)

Population size: 80,000-120,000 individuals

Population trend: Increasing

Distribution: Europe, Asia, Africa

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, Naxos, Cyprus and recently established in Mallorca). The range also includes Turkey, the Crimean Peninsula and the Caucasus (Katzner *et al*, 2004), and then from there 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 was estimated at 32,400–34,400 breeding pairs (BirdLife International 2017), according to the recently collected data from the European Region range countries (including Central Asia and the Middle East) can be estimated 31,986–32,644 pairs. Spain alone holds an estimated 25,000 pairs. The population in Europe is significantly increasing (c. 200% in the last 12 years), mainly thanks 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.

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

Habitat: Roosts and rests on large cliffs and soars over surrounding open countryside in search of food. Avoids woodlands. The landscape should support the formation of thermals (Mebs & Schmidt 2006) as the large vultures prefer the energy-saving gliding and soaring over active flight. Generally 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: 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). Nests in colonies of up to 100 pairs on large cliffs, walls of ravines, and precipices. 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 mayor threat to this species. Birds are normally poisoned from poisoned carcasses set for livestock predators (Snow and Perrins 1998, Ferguson-Lees and Christie 2001) are result of human predator conflicts (attacks to livestock or game animal).
- Electrocution on energy infrastructure it's a threat affecting the species in its entire range of distribution. It's one of the common raptor species at the list of electrocuted birds, especially in countries with abundant population. In Spain (*Ferrer 1993; Palacios 2003*), in Portugal (*Infante et al. 2005*). In the Middle East (Israel), electrocution is also identified as serious threat to the species (*Prinsen et al. 2011*).
- Decline of food availability due to declining wild and domestic ungulate populations (Asia and Eastern Europe). In some areas a reduction in available food supplies, arising from changes in livestock management practices (Ferguson-Lees and Christie 2001, Orta *et al.* 2015), but also the decline of wild ungulates is the cause of reduced food availability.
- Collision with energy infrastructure is considered as highly important threats especially caused by the wind energy development (Strix 2012), but also from electricity cables.

Secondary threats:

- Unintentional poisoning (NSAIDs) used for veterinary purposes pose a threat to this species. One case of suspected poisoning caused by flunixin, an NSAID, was recorded in this species

in 2012 in Spain (Zorrilla *et al*. 2015). Diclofenac, a similar NSAID, has caused severe declines in *Gyps* vulture species across Asia.

- Unintentional poisoning (lead) is another type of poisoning affecting the species. Several cases were recorded in the Iberian Peninsula (*Mateo 1997; Carneiro 2015*), where was also proven the origin of the lead is the hunting ammunition.
- Direct persecution (non-poison) was defiantly a serious threat to the species throughout the 19th–20th centuries in much of Europe, North Africa and the Middle East and one of the main reasons for population decline. Now it appears to be more relevant for the Eastern Europe and Central Asia and possibly for the Middle East.
- Habitat degradation
- Human disturbance

3.15 Cinereous Vulture *Aegypius monachus*

Alternative names: (Eurasian) Black Vulture, Monk Vulture

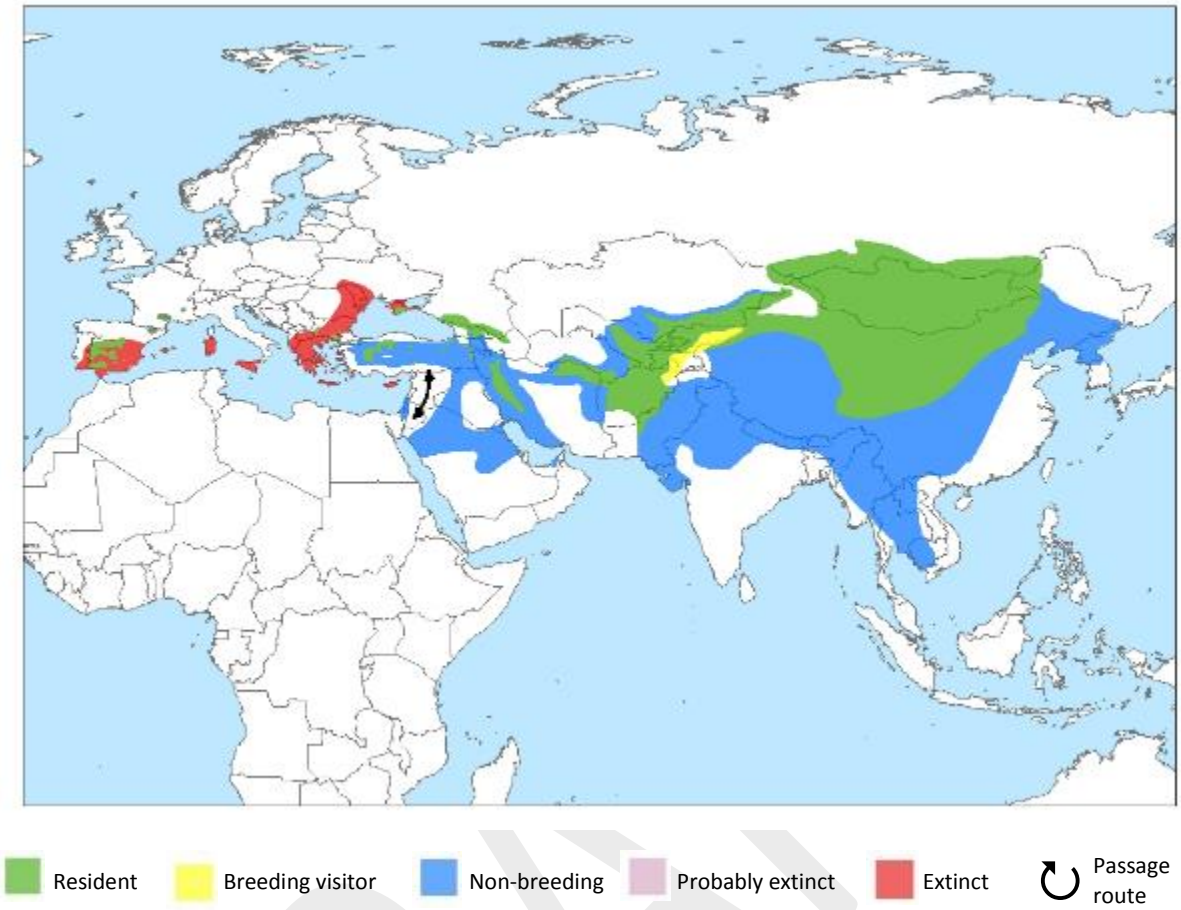
Red List Category: Near Threatened (since 2004)

Population size: 15,600-21,000 individuals

Population trend: Stable to slightly increasing

Distribution: Europe, Asia

Distribution: This species breeds in Spain, Greece, Turkey, Armenia, Azerbaijan, Georgia, Ukraine, Russia, Uzbekistan, Kazakhstan, Tajikistan, Turkmenistan, Kyrgyztan, Iran, Afghanistan, northern Pakistan (A. Khan, A. Parveen and R. Yasmeen *in litt*. 2005), Mongolia and mainland China, with a reintroduced population in France (Heredia 1996, Heredia *et al.* 1997, WWF Greece 1999, V. Galushin *in litt*. 1999). The wintering range includes additional states to the south of the breeding range, in Saudi Arabia, Israel, Jordan, 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).



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, Anon. 2004) and 5,500-8,000 pairs in Asia (Anon. 2004). Although quantified information is not available, the trend across Asia is believed to be an ongoing moderate decline. The population in Korea has been estimated at *c.* 50-10,000 wintering individuals (Brazil 2009). In Europe, the species occurs in Spain (2,068 breeding pairs in 2012–15 and increasing), Portugal (up to 18 pairs) and France (30 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 7,617–10,245 breeding pairs, with a stable or slightly increasing population trend.

Movements: Partial migrant (Bildstein 2006). Sedentary in some areas, but 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 which 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: Prefers arid hilly and montane habitat, including wooded areas and semi-desert, areas above treeline, and agricultural habitats with patches of forest. Spends much time soaring overhead in search of food. Perches more often on trees than on cliff faces or on the ground. Not numerous, but in places of abundant food, 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, including forest, 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 at carcasses deliberately laced with pesticides to kill stray dogs or wild carnivores across the species' range. This seems to be on the increase in areas such as Mongolia (Batbayar 2005).
- Food shortage due to declining wild and domestic ungulate populations in Asia and Eastern Europe. Numbers of livestock have substantially reduced in areas of the former USSR due to changed ahricultural practices and urbanisation. McGrady *et al* (2007) links 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 states that the species is dependent on supplementary feeding in South Korea due to the lack of available food in the environment.
- Electrocution and collision. Dixon *et al.* (2013) recorded Conereous Vultures among the species killed on power lines during a study in Mongolia. Although little substantive data of mortalities of this species are known, it is unlikely that such mortalities are undr-recorded.

Secondary threats:

- 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.
- Reduced breeding success due to low and fluctuating temperatures resulting in failure of eggs to hatch (Batbayar 2005) can possibly be attributed to climate change.
- Secondary poisoning by veterinary NSAID. Overwintering birds in northern India could be exposed to NSAIDS such as diclofenac which could severely impact this increasing population (Katzner 2005).

3.16 Lappet-faced Vulture *Torgos tracheliotos*

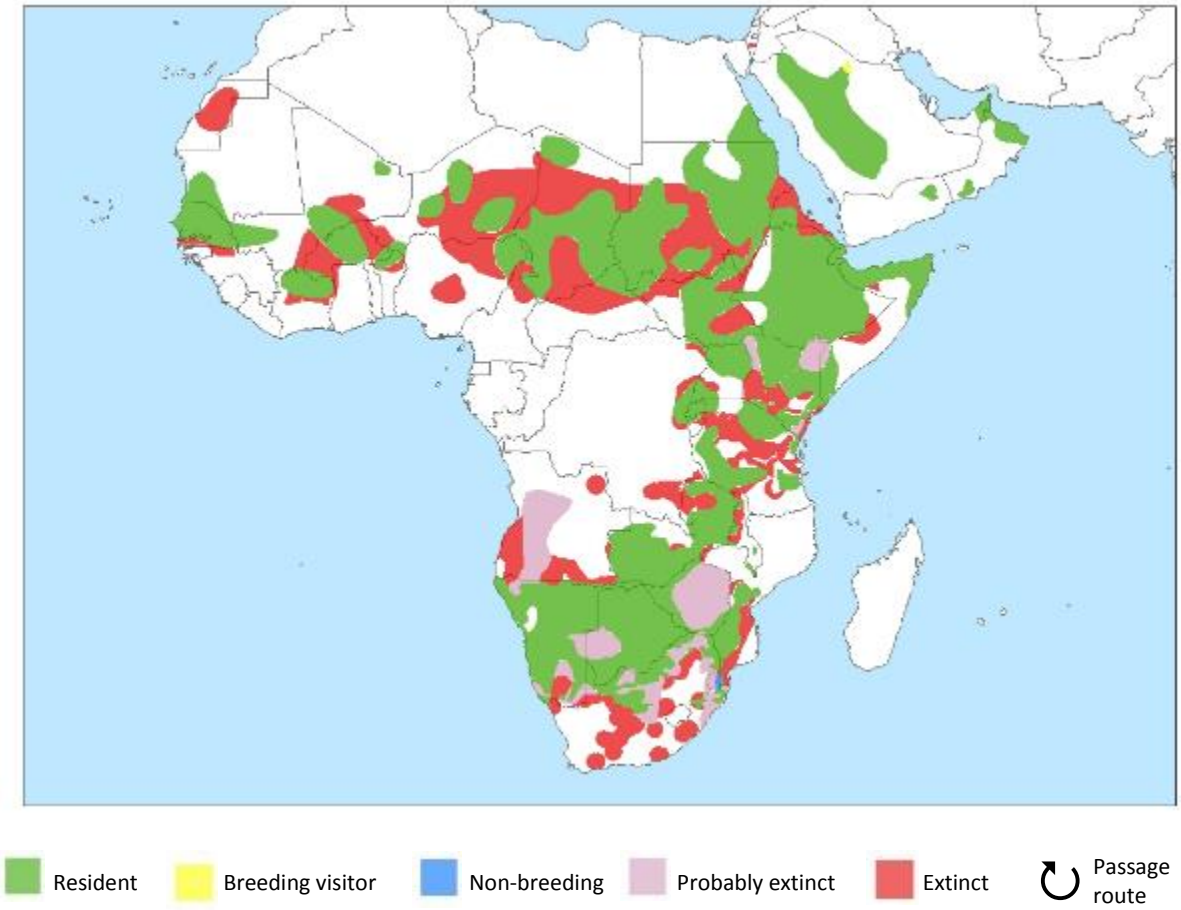
Red List Category: Endangered (LC in 1988, VU in 2000, EN in 2015)

Population size: 8,500 individuals

Population trend: Decreasing

Distribution: Africa, Middle East

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 (Saudi Arabia, Oman, Yemen and UAE).



Population size and trend: The African population has been estimated to be at least 8,000 individuals (Mundy 1992), and there maybe 500 in the Middle East. This gives a total population of at least 8,500 individuals, roughly equivalent to 5,700 mature individuals (BirdLife International 2016a). 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. 2017).

Movements: Lappet-faced Vultures are regarded as a partial migrant that makes significant movements in response to rainfall (Bildstein 2006). Recent satellite tracking studies have shown that immature birds can cover large areas, and this is consistent across the species' range. Tagged birds had an average home range size of 22,000 km^2 and moved between Kenya and Tanzania (UNEP/CMS 2015). Murn & Botha (in UNEP/CMS 2015) 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 km^2 and moved about 400 km before returning in the autumn. Vagrants reported in Morocco, southern Libya, Jordan and Spain (Ferguson-Lees & Christie 2001).

Habitat: The species inhabits dry savannah, arid plains, deserts and open mountain slopes (Shimelis *et al.* 2005), up to 3,500 m (A. Shimelis *in litt.* 2007). 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 (A. Shimelis *in litt.* 2007).

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* and *Terminalia* (Shimelis *et al.* 2005). They don't usually breed until at least six years old and fledge on average 0.4 young/pair/year (Mundy *et al.* 1992). Timing of breeding can vary significantly across its 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 thought to have fledged in mid-June (Wernery 2009).

Major threats:

- Unintentional poisoning at carcasses deliberately laced with pesticides to kill stray dogs or wild carnivores, especially in eastern and southern Africa. (Komen 2009, Otieno *et al.* 2010, Groom *et al*. 2012).
- Nest disturbance. Particularly significant on the Arabian Peninsula where low tree desnities result in people establishing dwelling under or near trees used by this species to breed in, causuing them to abandon nesting sites (Shimelis *et al*. 2005, Shobrak 2011). The same likely 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 & Botha, 2016).
- Belief-based use. (Rondeau & Thiollay 2004, McKean *et al*. 2013, Buij *et al*. 2016) During an incident of sentinel poisoning in the Gonarezhou National Park in Zimbabwe, most of the 15 Lappet-faced Vultures killed had the culmens removed, presumably for belief-based use (Groom *et al*. 2012). 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*, 2015).
- Sentinel poisoning in southern Africa (Ogada *et al*. 2015b). 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 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 are where this practise is prevalent, are susceptible to this threat. The 15 birds killed in Zimbabwe mentioned above was killed in an incident of sentinel poisoning. Simmons (2005)

also reported an incident of deliberate poisoning in Namibia that killed 86 individuals, but it is not clear whther this was an incident of sentinel poisoning.

Secondary threats:

- Declining wild ungulate populations. Rondeau & Thiollay (2004) believe that a 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 and collision with energy infrastructure, particularly power poles. (Shimelis *et al.* 2005)

4. Threats

In this section, the threats to vultures are described in narrative form, and a summary of their overall impact is presented (Table 4).

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 maintained on the major factors limiting or causing population declines.

Figure 3 reflects the most significant threats per region identified from feedback provided via the questionnaires and regional workshops. 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 4; Annex 3), and then to be presented with the most appropriate action 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.

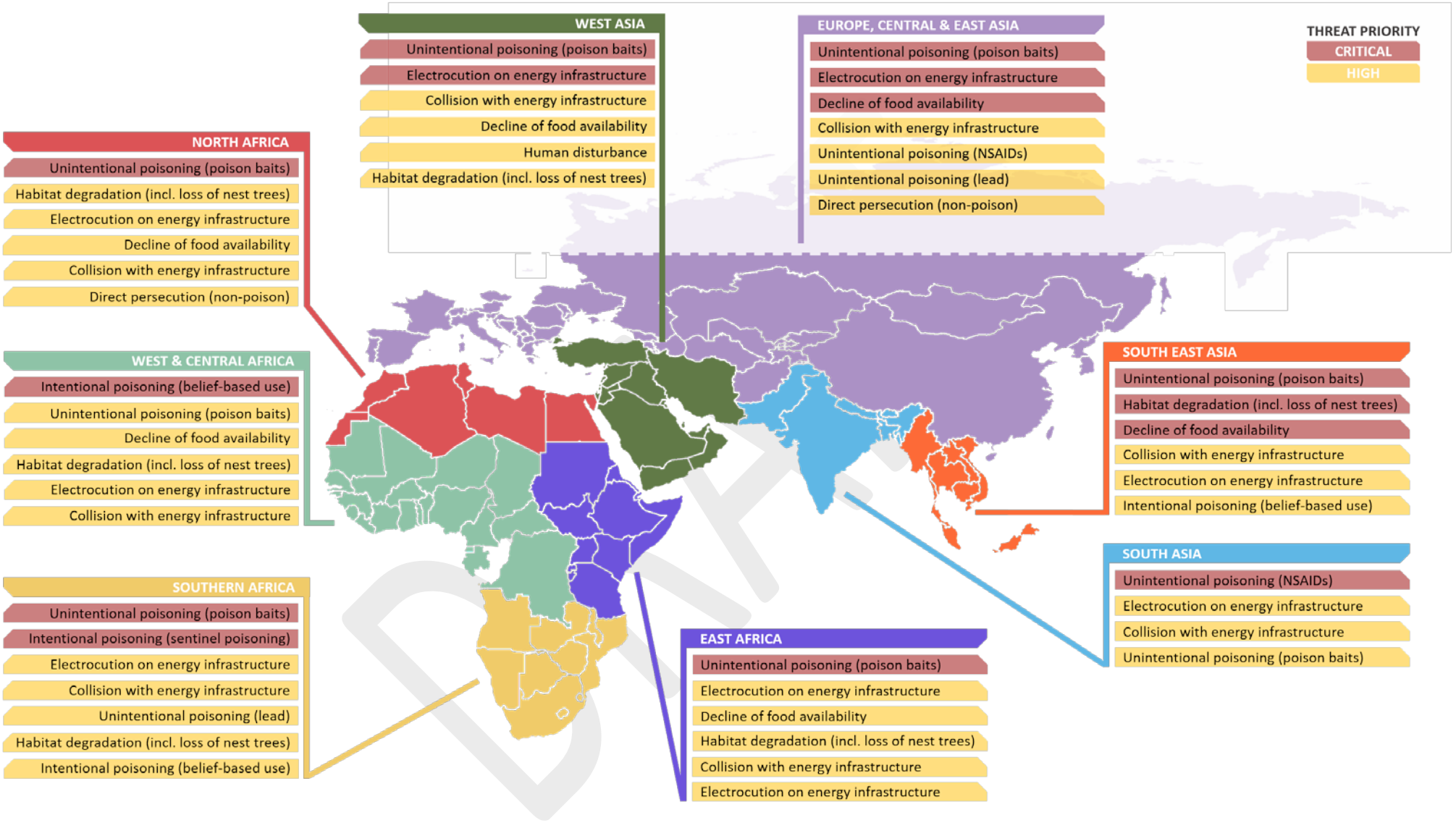


Fig. 3. Map indicating priority threats for the Vulture MsAP range. The Russian Federation is a Range State, but vultures are restricted to the North Caucasus and Altai-Sayan regions (the latter being near the borders of Mongolia and Kazakhstan). More northerly parts of the Federation are not shown.

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 intentionally kill wildlife 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 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 baited carcasses (Virani *et al.* 2011, Ogada *et al.* 2012 and Botha *et al.* 2012). Vultures, whose 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 8 species in these regions currently being listed as Critically Endangered.

In South Asia unintentional poisoning by veterinary Non-steroidal Anti-inflammatory Drugs (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 and 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 happens when an animal is poisoned by a toxic substance that was not intentionally used to kill it; in other words, the poison was intended for another species of animal but proves to be toxic to a vulture that consumes either the bait containing the poison or the animal killed by the poison. 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 fall prey to predators will occasionally resort to poisoning those animals to ‘take care’ of 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. Such use of pesticides is illegal in the vast majority of countries but implementation and enforcement of such regulations is often weak; consequently, poisoning has become the most widely used means of killing certain wildlife species. Poisoning using baited carcasses is indiscriminate can affect a wide-range of non-target species. Poisoning is also often ineffective in targeting the individual responsible for the damage: it is likely that it rarely kills the intended victim but instead kills a multitude of unintended species, including vultures.

In Europe, poison is almost never used to kill vultures deliberately; they are normally secondary or tertiary 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 as a quick "solution" for resolving conflicts with these predators. The main driver for such intensive use of poison is the concern of livestock breeders concerning predators, and of hunters protecting small game animals. Its widespread use has, as in Africa, been facilitated by poor implementation and 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 the 1940s and the 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 to 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 are detected annually, involving use of poison baits. In the period 1992–2013, about 185,000 animals were found poisoned, from which 34% were birds of prey (SEO/BirdLife and WWF/Adena 2016). In Spain, most of the cases involving use of poison baits to kill wildlife are related to the hunting activities. A total of 211 poisoning incidents were registered over the period 1990–2007 which killed 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 to control problem animals such as stray 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 incidental poisonings in urban environments are difficult to acquire, it is likely that poisoning of stray dogs and other pest species, such as rodents, 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, NE India (S. Ranade pers. comm.); in 2014 alone, 179 vultures were killed in seven separate incidents. Targets have typically been 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, incidental (non-target) poisoning is the biggest threat to vultures (Loveridge *et al*. in prep.). 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 deaths of 2, 11 and 3 (respectively) individuals of these species (Sum and Loveridge 2016, Loveridge *et al*. in prep.). 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 reason is 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 the 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 would cause kidney failure and death of 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.* 2008). This was the case over much of South Asia; after ingestion of livestock carcasses treated with diclofenac near to their death, vultures die as a result of visceral gout that is caused by kidney failure. Death of the vulture usually occurs within two days of exposure.

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 even after the statutary 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 most clear 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 (Taggart *et al.* 2007). Neither drug has yet been banned for 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.* 2015). 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.* 2015), 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 eleven Indian states in 2007-2010, NSAIDs containing twelve 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, nimelsulide, 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, so 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 the Pied Crow (*Corvus albus*), the Turkey Vulture (*Cathartes aura*), the domestic chicken (*Gallus domesticus*) and the American Kestrel (*Falco sparverius*) (Hutchinson *et al*. 2014), so 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 absorbtion (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 resources is another barrier to 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 ketprofen. In neither case were the tests commissioned and funded by pharmaceutical companies or government agencies. Both tests were funded by a conservation charity. 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 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 (C. Bowden *in litt.* 2007) 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 dicofenac is readily available as a veterinary drug in the United Arab Emirates and apparently used to treat camels.

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 authorized 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.

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 & 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* and this threat is considered the most significant in terms of its successful reintroduction in the wild with a number of released birds having been killed 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 only survive because they are recaptured and given remedial treatements. 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 been recently 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 the effects compounded by small and rapidly declining populations.

Lead poisoning is a well-known threat to vultures and other scavengers, which in critical cases can result in death, but often causes sub-lethal poisoning that has a number of other secondary effects (such as reduced mobility or increased risk of collision). 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 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.

4.1.2 Targeted vulture poisoning

Belief-based use and the bushmeat trade

Pesticides are increasingly used to acquire wild animals or their body parts for comsumption and commercial trade. Where vultures are concerned, a major driver of this trade is here referred to as belief-based use, in which wildlife parts and derivatives are used to treat of 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 African vulture species out of a group of nineteen conservation priority bird species that were recorded most frequently in markets in 25 countries surveyed. The term ‘traditional medicine’ is sometmies 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 supposedly increasing 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 harvesting methods (through highly toxic poisons) the 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 can be sold for either purpose. This suggests that belief-based use and the bushmeat trades are probably integrated and to some extent interdependent (Saidu & 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 some 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.

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 & 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.

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 parts for traditional juju practices (P. Hall *in litt.* 2011, BirdLife International 2016a). In South Africa, **White-backed Vulture** is one of the preferred 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 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 & Botha 2007).

McKean & 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 would 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 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 consequences 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 (Simmons & Brown *in litt.* 2006, BirdLife International 2016a), and in Zambia **White-headed Vultures** are known to be

poisoned for use in witchcraft (Roxburgh & McDougall 2012). In Mongolia, there is a recent growing demand for **Cinereous Vulture** feathers associated with contemporary religious practices (Batbayar, 2005).

Belief-based use of vultures (and their body parts) for 'traditional medicine' in South Asia is localised and not intense enough 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 use large quantities of toxic pesticides on carcasses because circling vultures attract those combatting poaching (Ogada 2014, Ogada *et al*. 2015b, Richards *et al*. 2017); vultures are killed because they play the role of sentinels. Between 2012 and 2014, Ogada *et al*. (2015a) 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.

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) and over 500 vultures were found dead in Bwabwata National Park, Namibia, in 2013 after feeding on a single poisoned elephant carcass (Ogada *et al*. 2015a). This phenomenon has also recently been recorded in South Africa, where two incidents resulted in the death of 154 **White-backed Vultures** after feeding from poisoned elephant carcasses in the Kruger National Park (Murn & 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 in 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 2016b).

Electrocution from powerlines is one of the key threats for **Cape Vultures** in South Africa (van Rooyen 2000, Boshoff & Anderson 2006, K. Hoogstad and L. Leeuwner), 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*. 2013), 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 approximely 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 distribution line running parallel to the previous one. In Morocco, a 24 km powerline in the SW is reported to have killed a significant number of raptors including threatened species, but no vultures to date (Godino *et al*. 2016). However, the impact of powerlines on vultures in the rest of Africa is poorly known.

Electrocution by power lines is among the main causes of vulture decline in Europe, significantly affecting the **Egyptian Vulture** population in Canary Islands (Donazár *et al.* 2002) and the **Griffon Vulture** population in Israel (Leshem *et al.* 1985).

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 in within these regions and its impact 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, and the threats from similar infrastructure elsewhere, well enough known, that this threat must be taken seriously in view of 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, and 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 very significant in old, poorly sited power lines. Under the current commitments to reduce carbon emissions, signatories to the United Nations Framework Convention on Climate Change (UNFCCC) are increasing their investments in renewable energy, particularly large wind farms. However, any other renewable energy installations, e.g. solar and geothermal generation facilities will inevitably lead to an expansion of the power-line 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 unware of obstructions in their direction of travel, so 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 Africa, 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 electrocutions, and this is probably one of the main factors that have caused declines of the species in South Africa (BirdLife International 2016a). An estimated minimum number of 80 vultures (**Cape and White-backed Vultures**) are killed annually by collision with powerlines in Eastern Cape Province (Boshoff *et al*. 2011). A controversial wind farm development in Maluti-Drakensberg, Lesotho, an important site for **Cape Vulture**, was given approval in 2014 (Anon. 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 & Krüger 2014) and

could lead to local extinctions. Shimelis (2005) highlights the threat of collisions with, as well as electrocution by, powerlines for the **Lappet-faced Vulture** with 49 individuals killed in South Africa between 1996 and 2003.

The **Griffon Vulture** is the species most frequently killed by wind turbines in Spain: between 1993 and 2003, 151 collisions were detected in two wind farms located at Tarifa in southern Spain, 73% of which were **Griffon Vultures** (De Lucas *et al.* 2008). **Egyptian Vulture** mortally caused by wind turbines is also recorded in Spain, where on average 2.5 individuals are killed per year (Hernandez *et al.* 2009).

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. Collisions 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 for elsewhere means that the threats of collision and electrocution 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, to feed on. Three 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 public health campaigns to reduce the number of rotting carcasses. Second, competition for food with feral dogs and other scavengers may reduce food available to vultures; an example of this is the increase in feral dog populations in India (Cunningham *et al.* 2001, Markandya *et al.* 2008) because of the decline in vultures due to poisoning by NSAIDS. Third, reduced wild ungulate populations would diminish food availability for vultures where these are more important than livestock.

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) showed that wildlife declines in National Parks and Protected Areas have declined at similar rates to the wider countryside. BirdLife International (2016a) cite declining ungulate populations as a threat for five of the African endemic vultures.

In contrast, livestock populations have more than doubled since the 1960s, and vultures would probably 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 practices in butchering animals, change in livestock management and improved sanitation at slaughterhouses may offset the increased numbers of livestock as a 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, as in West Africa. Improved sanitation is likely to have impacted **Hooded Vultures** more than other African species due their strong association with human settlement in at least part of their range (Thiollay 2006, Ogada & Buij 2011). **Hooded Vultures** at five slaughterhouses visited in northern Cameroon were competing for scraps with domestic dogs.

Based on expert opinion, Boshoff & Anderson (2006) rank a lack of carrion as the most significant threat to the **Cape Vulture**, although acknowledge there is 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 reliance of supplementary food due to declining natural food (Wolter *et al.* 2007). Provision of food at vulture restaurants also has the potential to guarantee poison-free food (but this must be demonstrated), and can modify the birds' behaviour, encouraging them to forage only in safe areas and minimising their foraging movements to areas where poisoned baits may be used.

One of the main reasons for the decrease or even extinction of several vulture species in Europe was and still is a significant reduction in food resources (Donázar *et al.* 2009, Ogada *et al*. 2012). A lack of natural food was the result of strong restrictive veterinary sanitary regulations in most of the European countries, a decline in the extensive keeping of domestic animals, and sometimes a reduction or even extinction of wild mammals (ungulates and lagomorphs). By contrast, in some countries, notably Spain, vultures 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 to be dependent on small scale farming practices in contrast with the land management intensification under EU Common Agricultural Policy (Oppel *et al*. 2017).

Different methods of supplementary feeding for vultures and other endangered birds have been developed with the aims to rescue and restore endangered vulture 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 a method to determine whether supplementary feeding is necessary among other alternative actions for conservation. It was evidenced that food shortage in **Egyptian Vulture** in the Balkans is not related to the negative trend of the population (Dobrev *et al*. 2015), as well the supplementary feeding does not increase the productivity or survival (Oppel *et al*. 2016).

Evidence does not suggest that food shortage accounts for the vulture population crash across the Indian sub-continent, although a gradual reduction in available food is taking place; however, this does appear to be a threat in other parts of Asia. Across the Indian sub-continent, evidence suggests that food availability for vultures has remained high. A study in India (Prakash in prep.) 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 of (around 20 times) the actual number present, suggesting that other factors were the cause of the low population.

In the South-East Asian range of vultures, given the continued presence of large areas of suitable habitat for vultures, 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 because of uncontrolled hunting and habitat loss (Srikosamatara & 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 with increased mechanisation.

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. More specifically, cliff or tree-nesting vultures have specific breeding site requirements, which are easily affected by human activities such as: quarrying; building 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 played roles in the dramatic declines of large vultures (**Hooded, Rüppell's, White-backed, White-headed** and **Lappet-faced**) outside protected areas in West Africa (Thiollay 2006, Ogada *et al.* 2011), with the root cause being the rapid increase, and associated development, 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) show 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, reserve) with declines largest outside the reserve area. Virani *et al.* (2011) also acknowledge that the magnitude of the declines can't be explained wholly by land-use change and that poisoning is a more significant threat. Land-use changes in southern Africa are varied and include degradation by intensive agriculture, cultivation, urbanization, roads, dams, mines, desertification, bush encroachment, afforestation and alien vegetation. Which are most important for the **Cape Vulture**, or indeed any of the African vulture species, needs further quantitative research.

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. 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. 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 & Thiollay 2004).

Lappet-faced Vultures are especially sensitive to nest disturbance (Steyn 1982). The impact may be growing with an increase in 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 Tayma, 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 noted as causing 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.

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 found 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 has produced no indication that any are associated with serious pathology (L. Oaks, South Asian Vulture Recovery Plan 2004). Avian malaria parasites have been found in vultures in India (Poharkar *et al.* 2009), but such parasites are widespread and this finding does not imply that these parasites are pathogenic to the vultures (Ishtiaq 2009). No information on the prevalence of disease in wild vultures in other parts of Asia is known. However, across the vultures' range, introduction of or exposure to new pathogens, such as poultry disease (e.g. influenza/NDV), is a potential risk.

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 affected any of the sampled individuals; only very low concentrations of Newcastle Disease were detected in most samples and in some a 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 & 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 like fires or storms.

Very little work has been done or 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 & Jenkins, 2007). 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.

4.8 Other threats

A range of additional threats affect vulture populations throughout their African and Eurasian ranges, but these are often more species-specific with more localised effects than the threats 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 80s.
    - *Trains* (N India) kill numbers of vultures and are a cause of mortality at least on a local scale.
    - *Kite strings* (NW 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; Sudan Wildlife Society *in litt*.).

Table 4. Threats affecting each species of vulture, and their overall severity across their range

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															
Problem animal control															

Poisoning from environmental contamination	
Lead from ammunition	
Industrial pollution	
Poisoning from Pharmaceutical products	
Veterinary Drugs (NSAIDs, tranquilisation, livestock dips and euthanasia)	
Targeted Vulture Poisoning	
Belief-based use and bushmeat	
Sentinel Poisoning	
Direct Persecution	
Electrocution	
Powerlines	
Collisions with infrastructure & vehicles	
Powerlines	
Wind turbines	
Communication Towers	
Decline of Food Availability	
Reduced availability of livestock carcasses	
Decline of wild ungulates	
Changes in carcass disposal	
Improved sanitation (Abbatoirs)	
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															
Other collisions															
Vehicle Collisions															
Aircraft Collisions															
Kite strings															
Indirect threat - missing or ineffective policies, laws and enforcement															
Lack of appropriate legislation															
Lack of or limitations to enforcement															

*Threats are colour-coded as follows:

Critical	High	Medium	Low	Unknown	Not applicable

Ranking of threats is based on scope, severity and irreversibility. Based on outcomes from Regional Workshops and Questionnaires.

5. Stakeholders and potential collaborators

A very wide range of stakeholders are involved with or influence vulture conservation action (Table 5), mainly as a result of the birds' wide distribution across Africa and Eurasia, their very great 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, and 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 who may not concern themselves directly with vultures have priorities that are affected by the same threats as 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 human-associated problems on their own, and so it is vital that they engage with the stakeholders identified here and aim to develop strategic alliances to achieve shared goals.

Table 5. Stakeholders in vulture conservation, and the activity types and threats of most relevance to each.

Stakeholder	Activity type addressed				Threat (and hence Vulture MSAP Objective) addressed											
	Research and Monitoring	Conservation action	Policy & Legislation	Education & Awareness	1 Poisoning (human widlife conffict)	1 Poisoning (problem animal control)	2 Poisoning (NSAIDS)	3 Poisoning (lead)	4 Belief-based use and bushmeat	5 Sentinel poisoning	6 Electrocution with energy infrastructure	7 Collision with energy infrastructure	8 Decline of food availability	9 Habitat loss & degradation	10 Direct persecution and disturbance	11 Cross-cutting aspects
Convention on Migratory Species (including Raptors MoU, Preventing Poisoning Working Group and Energy Task Force)			X		x	X	X	X	X	X	X	X				X
Convention on Biological Diversity			X		X	X	X	X	X	X	X	X	X	X	X	X
CITES			X						X	X						X
UNCCD	X		X										X	X		X

Rotterdam and Stockholm Conventions (relating to importation of hazardous chemicals, and persistent organic pollutants)			X		X	X	X	X	X	X						X
IUCN SCC Vulture Specialist Group	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
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
Research institutions, universities and academics	X				X	X	X	X	X	X	X	X	X	X	X	X
Regional and subregional economic commissions, e.g. EAC, SADC, IGAD, ECOWAS, AMCEN, UN, African Union			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
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
Govt (national and local) ministries or authorities: wildlife	X	X	X	X	X	X	X		X	X	X	X	X	X	X	X
Govt (national and local) ministries or authorities: agriculture			X		X	X										X
Govt (national and local) ministries or authorities: livestock and veterinary services/animal health			X			X	X						X	X		X
Govt (national and local) ministries or authorities: health			X		X	X		X	X							X
Govt (national and local) ministries or authorities: tourism			X	X										X	X	X
Govt (national and local) ministries or authorities: energy			X					X			X	X				X
Other national authorities, e.g. heads of state, embassies			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
Local communities: grassroots groups and individuals		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
Traditional healers/medicine practitioners		X		X			X		X	X						X
Media				X	X	X		X	X	X	X		X	X	X	X
Celebrities				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
Hunters		X	X	X				X	X	X						X

6. Policies, legislation and Action Plans relevant for management

A number of international conventions and other intergovernmental policy frameworks exist that provide a framework 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 Migratory Species (CMS) and the associated agreements and task forces on poisoning, grid collision and infrastructure, provide little or no reference to vultures, even in the national plans of Parties (e.g. the Convention on Biological Diversity (CBD) and the International Union for the Conservation of Nature (IUCN)). This section will briefly outline the obligations that international conventions and goals of relevance 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 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 forums is presented at the end of this section (Table 6).

6.1 Multilateral Environmental Agreements (MEAs) and Goals

6.1.1 Convention on Biological Diversity and the Aichi Targets

In 2010, *the Convention on Biological Diversity (CBD)* produced the 20 Aichi Biodiversity Targets, framed under 5 strategic goals to be translated into action through national biodiversity strategies and action plans (NBSAPs) with the mission 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 (Secretariat of the Convention on Biological Diversity undated) which adopt IUCN classifications as their metric. Indeed Target 12 explicitly states: “Though some extinctions are the result of natural processes, human action 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 National Action Plans 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 the mainstreaming of biodiversity into areas such as agriculture. The Cancun Declaration (Parties to the Convention on Biological Diversity 2016) from COP13 in December 2016 specifically calls for:

- the prevention of agricultural pollution, and the efficient, safe and sustainable use of agrochemicals, fertilizers and other agricultural inputs.
- the 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 (SEA) and Environmental Impact Assessments (EIA) 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).

6.1.2 United Nations Sustainable Development Goals

The *United Nations Sustainable Development Goals (SDGs)* were adopted in September 2015 by 193 member states 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 organizing principle for global cooperation through the 17 Goals. These Goals reflect the Agendas 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 Target, but it is the cross cutting nature of the SDGs that provides the opportunity to engage across sectors and to highlight the role of 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 legally binding; there is an emphasis on "national ownership" of the goals, and 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.

6.1.3 United Nations Environment Assembly (UNEA)

The Assembly represents the world's highest-level decision-making body on the environment which can culminate in resolutions and a global call to action to address critical global environmental challenges. UNEA enjoys the universal membership of all 193 UN Member States and the full involvement of major groups and stakeholders.

UNEA has already begun to recognize 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 issues of NSAIDs and poison baits and the continuation of lead shot (despite almost all other industrial and consumer products being now mandated as lead-free) is to be tackled. UNEA has already adopted resolutions that have relevance to this issue (see below), but a resolution that addresses poisoning more explicitly can be important in accelerating political action:

- UNEA Resolution 2/7 Sound management of chemicals and waste, which recognises 'the significant 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 identify interlinkages between these crimes and to report thereon to the United Nations Environment Assembly at its next session;"
- The vulture crisis was highlighted at 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 the 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.

6.1.4 Convention on Migratory Species

The Convention on Migratory Species (CMS) provides a number of resolutions, Memorandum of Understanding (MoUs), agreements and task forces 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*, 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) 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 developments 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 11.15 on Preventing Poisoning of Migratory Birds (Convention on Migratory Species 2014a): see Section 2.
- Resolution 11.16 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).

A UNEP/GEF funded flyway project is in place which started in 2009 and is implemented by BirdLife International. This BirdLife project on the conservation of migratory soaring birds pays attention to the problems of electrocution by, and collision with power line transects, as well as poisoning.

6.1.5 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. It is an international agreement to which States adhere voluntarily, but is legally binding on the Parties, providing a framework under which each Party adopts its own domestic legislation to ensure implementation at the 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 utilization 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 but 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 wider damage to the environment.

The *Rotterdam Convention* entered into force in 2004 and in January 2017 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;
- 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 chemicals and currently regulates 43 chemicals, including 32 pesticides and applies to:

- Banned or severely restricted chemicals; and
- 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 Convention on Migratory Species 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 have application to the need to promote wildlife/vulture-friendly testing on non-steroidal anti-inflammatory drugs (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 in Tunisia (2013) recommendation 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 COP 11 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 development of future NSAIDs, nor the retrospective assessment of existing products, is wildlife-friendly. General guidance only references the broader environment.

The regulatory approval given by the governments in South Asia of diclofenac was a result of an assessment error – arising from the fact that the assessments relied on acute, single species testing (Enick & 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 is authorized independently in each Member State, and despite the toxicity tests needed, it is clear that environmental risks, in particular the risk to necrophagous species had not been properly considered in, at least, Spain and Italy.

In response to pressure, in August 2014, the European Commission opened a public consultation and asked the European Medicines Agency's (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, and 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 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, and a Regional Steering Committee was also created which has met more than annually since then, and has also established 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” with its substantive guidelines which request the phasing out of lead ammunition across all habitats.

Annex II of CMS Resolution 11.15 on Preventing Poisoning of Migratory Birds 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 a regime of an Environmental Impact Assessment (EIA), 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 even 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 as 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 necessary mitigation and compensation measures, such measures 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 impact assessment as an important tool to ensure that development is planned and implemented taking biodiversity considerations into account. The 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.

The most effective way to detect and avoid severe environmental impacts of wind energy developments is to perform Strategic Environmental Assessments (SEAs) on large spatial scales. SEAs enable strategic planning and siting of wind energy developments in areas with least environmental and social impact whilst maintinaing 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 risk for birds.

Wind farm developments need to take account of:

- 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 not be negatively impacted on;
- The location of turbines/blades so that they are not 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 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 promoted to prevent or reduce the known negative impact of current wind turbine designs on vultures and other soaring birds.

Comprehensive Environmental Impact Assessments (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.

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 effectively, compared to current wind-turbine technology, should be a priority.

6.3.2 Transmission lines

The most significant intervention to reduce the risk of electrocution energy infrastructure is proper planning and routing of networks and the use of infrastucture designs that minimise the risk of this threat. This applies to exisiting and future networks and is the most effective over the long term. Where appropriate, re-routing or retrofitting of existing networks should be implemented.

Electrocution

Mitigation for electrocution is more straightforward that 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.

Specific mitigation measures can include:

- Erecting power poles that are specifically designed to be 'bird safe'
- Add-on mitigation or retrofitting
- Insulation
- 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 infrastucture designs that minimise the risk of this threat. This applies to exisiting and future networks and is the most effective over 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 that are 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. 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 addressing 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 (2016c): *Mitigating the effects of Wind Farms and Power Lines.*

There 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).
- Budapest Declaration, adopted in 2011 after a special European Conference on power lines and bird mortality. The 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 is also highlighted to strictly apply the SEA and EIA procedures if it comes to the planning of new power lines. The conference called on all interested parties to undertake all possible actions which can lead 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 reintroduction

IUCN, through the Species Survival Commission, 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 process:

1. conduct a review of the species's 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 and Griffon Vultures.

The source of birds for reintroduction may be from conservation breeding (captive breeding) networks, 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 lead to their initial demise have been effectively addressed.

Table 7. Country involvement in international processes and forums.

Country	Convention on Biological Diversity	Convention on Migratory Species	Raptors MoU	CITES	African Convention (ACCNNR)	Rotterdam Convention	African Union	African Ministerial Conference on the Environment	All vultures 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	✓	✓	✗	✓	✗	✓	✗	✗	✓	✓	✗	✗	✗	✗	✗	✗	✗
Albania	✓	✓	✗	✓	✗	✓	✗	✗	✓	✗	✗	✗	✗	✗	✗	✗	✗
Algeria	✓	✓	✗	✓	✓	✗	✓	✓	✗	✓	✓	✗	✗	✗	✗	✗	✗
Andorra	✓	✗	✗	✓	✗	✓	✗	✗	✓	✗	✗	✗	✗	✗	✗	✗	✗
Angola	✓	✓	✓	✓	✓	✓	✓	✓	✗	✓	✗	✓	✗	✓	✗	✗	✗
Armenia	✓	✓	✓	✓	✗	✓	✗	✗	✓	✗	✗	✗	✗	✗	✗	✗	✗
Austria	✓	✓	✗	✓	✗	✓	✗	✗	✓	✗	✗	✗	✗	✗	✗	✗	✓
Azerbaijan	✓	✓	✗	✓	✗	✗	✗	✗	✓	✗	✗	✗	✗	✗	✗	✗	✗
Bahrain	✓	✓	✗	✓	✗	✓	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗
Bangladesh	✓	✓	✗	✓	✗	✗	✗	✗	✓	✓	✗	✗	✗	✗	✗	✗	✗
Benin	✓	✓	✗	✓	✓	✓	✓	✓	✗	✓	✗	✗	✓	✗	✗	✓	✗
Bhutan	✓	✗	✗	✓	✗	✗	✗	✗	✗	✓	✗	✗	✗	✗	✗	✗	✗
Bosnia and Herzegovina	✓	✗	✗	✓	✗	✓	✗	✗	✓	✗	✗	✗	✗	✗	✗	✗	✗
Botswana	✓	✗	✗	✓	✓	✓	✓	✓	✓	✓	✗	✗	✗	✓	✗	✗	✗
Brunei Darussalam	✓	✗	✗	✓	✗	✗	✗	✗	✗	✓	✗	✗	✗	✗	✗	✗	✓
Bulgaria	✓	✓	✗	✓	✗	✓	✗	✗	✓	✗	✗	✗	✗	✗	✗	✗	✓
Burkina Faso	✓	✓	✗	✓	✓	✓	✓	✓	✓	✓	✗	✗	✓	✗	✗	✗	✗
Burundi	✓	✓	✓	✓	✓	✓	✓	✓	✗	✓	✗	✓	✗	✗	✓	✗	✗
Cape Verde	✓	✓	✗	✓	✗	✓	✓	✓	✗	✓	✗	✗	✓	✗	✗	✗	✗
Cambodia	✓	✗	✗	✓	✗	✓	✗	✗	✓	✓	✗	✗	✗	✗	✗	✗	✓

Central African Republic	✓	✗	✗	✓	✓	✗	✓	✓	✗	✓	✗	✓	✗	✗	✗	✗	✗
Chad	✓	✓	✓	✓	✓	✓	✓	✓	✗	✓	✗	✓	✗	✗	✗	✗	✗
Croatia	✓	✓	✓	✓	✗	✓	✗	✗	✓	✗	✗	✗	✗	✗	✗	✗	✓
Cyprus	✓	✓	✗	✓	✗	✓	✗	✗	✓	✗	✗	✗	✗	✗	✗	✗	✓
Djibouti	✓	✓	✓	✓	✓	✓	✓	✓	✗	✓	✗	✗	✗	✗	✗	✗	✗
DR of the Congo	✓	✓	✓	✓	✓	✓	✓	✓	✗	✓	✗	✓	✗	✓	✗	✗	✗
DPR China	✓	✗	✗	✓	✗	✓	✗	✗	✓	✓	✗	✗	✗	✗	✗	✗	✗
DPR Korea	✗	✗	✗	✗	✗	✓	✗	✗	✗	✓	✗	✗	✗	✗	✗	✗	✗
Egypt	✓	✓	✓	✓	✓	✗	✓	✓	✓	✓	✗	✗	✗	✗	✗	✗	✗
Equatorial Guinea	✓	✓	✓	✓	✓	✓	✓	✓	✗	✓	✗	✓	✗	✗	✗	✗	✗
Eritrea	✓	✓	✗	✓	✗	✓	✓	✓	✗	✓	✗	✗	✗	✗	✗	✗	✗
Ethiopia	✓	✓	✗	✓	✓	✓	✓	✓	✗	✓	✗	✗	✗	✗	✗	✗	✗
France	✓	✓	✓	✓	✗	✓	✗	✗	✓	✗	✗	✗	✗	✗	✗	✗	✓
Gabon	✓	✓	✗	✓	✓	✓	✓	✓	✗	✓	✗	✓	✗	✗	✗	✗	✗
Gambia	✓	✓	✗	✓	✓	✓	✓	✓	✗	✓	✗	✗	✓	✗	✗	✗	✗
Georgia	✓	✓	✗	✓	✗	✓	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗
Ghana	✓	✓	✓	✓	✓	✓	✓	✓	✗	✓	✗	✗	✓	✗	✗	✗	✗
Greece	✓	✓	✗	✓	✗	✓	✗	✗	✓	✗	✗	✗	✗	✗	✗	✗	✓
Guinea	✓	✓	✓	✓	✓	✓	✓	✓	✗	✓	✗	✗	✓	✗	✗	✗	✗
Guinea-Bissau	✓	✓	✗	✓	✓	✓	✓	✓	✗	✓	✗	✗	✓	✗	✗	✗	✗
Hungary	✓	✓	✓	✓	✗	✓	✗	✗	✓	✗	✗	✗	✗	✗	✗	✗	✓
India	✓	✓	✓	✓	✗	✓	✗	✗	✓	✓	✗	✗	✗	✗	✗	✓	✗
Islamic Republic of Iran	✓	✓	✓	✓	✗	✓	✗	✗	✓	✓	✗	✗	✗	✗	✗	✗	✓
Iraq	✓	✓	✗	✓	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗
Ireland	✓	✓	✗	✓	✗	✓	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✓
Israel	✓	✓	✓	✓	✗	✓	✗	✗	✓	✗	✗	✗	✗	✗	✗	✗	✗
Italy	✓	✓	✓	✓	✗	✓	✗	✗	✓	✗	✗	✗	✗	✗	✗	✗	✓
Ivory Coast	✓	✓	✗	✓	✓	✓	✓	✓	✗	✓	✗	✗	✓	✗	✗	✗	✗
Jordan	✓	✓	✗	✓	✗	✓	✗	✗	✓	✗	✗	✗	✗	✗	✗	✗	✗
Kazakhstan	✓	✓	✗	✓	✗	✓	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗
Kenya	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✗	✗	✗	✗	✓	✗	✗
Kuwait	✓	✗	✗	✓	✗	✓	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗
Kyrgyzstan	✓	✓	✗	✓	✗	✓	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗
Lao PDR	✓	✗	✗	✓	✗	✓	✗	✗	✗	✓	✗	✗	✗	✗	✗	✗	✓
Lebanon	✓	✓	✓	✓	✗	✓	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗
Lesotho	✓	✗	✗	✓	✓	✓	✓	✓	✗	✓	✗	✗	✗	✓	✗	✗	✗
Liberia	✓	✓	✗	✓	✓	✓	✓	✓	✗	✓	✗	✗	✓	✗	✗	✗	✗
Libya	✓	✓	✓	✓	✓	✓	✓	✓	✗	✗	✓	✗	✗	✗	✗	✗	✗
Malawi	✓	✗	✗	✓	✓	✓	✓	✓	✗	✓	✗	✗	✗	✓	✗	✗	✗
Malaysia	✓	✗	✗	✓	✗	✓	✗	✗	✗	✓	✗	✗	✗	✗	✗	✗	✓
Mali	✓	✓	✓	✓	✓	✓	✓	✓	✗	✓	✗	✗	✓	✗	✗	✗	✗

Malta	✓	✓	✗	✓	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✓
Mauritania	✓	✓	✗	✓	✓	✓	✓	✓	✗	✓	✓	✗	✗	✗	✗	✗	✗
Mongolia	✓	✓	✓	✓	✗	✓	✗	✗	✗	✓	✗	✗	✗	✗	✗	✗	✗
Montenegro	✓	✓	✗	✓	✗	✓	✗	✗	✓	✗	✗	✗	✗	✗	✗	✗	✗
Morocco	✓	✓	✓	✓	✗	✓	✗	✓	✓	✓	✓	✗	✗	✗	✗	✗	✗
Mozambique	✓	✓	✗	✓	✓	✓	✓	✓	✗	✓	✗	✗	✗	✓	✗	✗	✗
Myanmar	✓	✗	✗	✓	✗	✗	✗	✗	✓	✓	✗	✗	✗	✗	✗	✗	✓
Namibia	✓	✗	✗	✓	✗	✓	✓	✓	✗	✓	✗	✗	✗	✓	✗	✗	✗
Nepal	✓	✗	✓	✓	✗	✓	✗	✗	✓	✓	✗	✗	✗	✗	✗	✓	✗
Niger	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✗	✗	✓	✗	✗	✗	✗
Nigeria	✓	✓	✗	✓	✓	✓	✓	✓	✓	✓	✗	✗	✓	✗	✗	✗	✗
Oman	✓	✗	✗	✓	✗	✓	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗
Pakistan	✓	✓	✓	✓	✗	✓	✗	✗	✓	✓	✗	✗	✗	✗	✗	✓	✗
Poland	✓	✓	✗	✓	✗	✓	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✓
Portugal	✓	✓	✓	✓	✗	✓	✗	✗	✓	✗	✗	✗	✗	✗	✗	✗	✓
Qatar	✓	✗	✗	✓	✗	✓	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗
Republic of the Congo	✓	✗	✗	✗	✓	✓	✓	✓	✗	✓	✗	✓	✗	✗	✗	✗	✗
Republic of Korea	✓	✗	✗	✓	✗	✓	✗	✗	✗	✓	✗	✗	✗	✗	✗	✗	✗
Romania	✓	✓	✓	✓	✗	✓	✗	✗	✓	✗	✗	✗	✗	✗	✗	✗	✓
Russia	✓	✗	✗	✓	✗	✓	✗	✗	✓	✗	✗	✗	✗	✗	✗	✗	✗
Rwanda	✓	✓	✗	✓	✓	✓	✓	✓	✓	✓	✗	✓	✗	✗	✓	✗	✗
Saudi Arabia	✓	✓	✗	✓	✗	✓	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗
Senegal	✓	✓	✓	✓	✓	✓	✓	✓	✗	✓	✗	✗	✓	✗	✗	✗	✗
Serbia	✓	✓	✗	✓	✗	✓	✗	✗	✓	✗	✗	✗	✗	✗	✗	✗	✗
Sierra Leone	✓	✗	✗	✓	✓	✓	✓	✓	✗	✓	✗	✗	✓	✗	✗	✗	✗
Singapore	✓	✗	✗	✓	✗	✓	✗	✗	✗	✓	✗	✗	✗	✗	✗	✗	✓
Slovenia	✓	✓	✗	✓	✗	✓	✗	✗	✓	✗	✗	✗	✗	✗	✗	✗	✓
Somalia	✓	✓	✓	✓	✗	✓	✗	✗	✗	✓	✗	✗	✗	✗	✗	✗	✗
South Africa	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✗	✗	✗	✓	✗	✗	✗
South Sudan	✓	✗	✗	✗	✓	✗	✓	✓	✗	✓	✗	✗	✗	✗	✓	✗	✗
Spain	✓	✓	✓	✓	✗	✓	✗	✗	✓	✗	✗	✗	✗	✗	✗	✗	✓
Sudan	✗	✗	✓	✓	✓	✓	✓	✓	✗	✓	✗	✗	✗	✗	✗	✗	✗
Swaziland	✓	✓	✗	✓	✓	✓	✓	✓	✗	✓	✗	✗	✗	✓	✗	✗	✗
Switzerland	✓	✓	✗	✓	✗	✓	✗	✗	✓	✗	✗	✗	✗	✗	✗	✗	✗
Syrian Arab Republic	✓	✓	✓	✓	✗	✓	✗	✗	✓	✗	✗	✗	✗	✗	✗	✗	✗
Tajikistan	✓	✓	✗	✓	✗	✗	✗	✗	✓	✗	✗	✗	✗	✗	✗	✗	✗
Tanzania	✓	✓	✗	✓	✓	✓	✓	✓	✗	✓	✗	✗	✗	✓	✓	✗	✗
Thailand	✓	✗	✗	✓	✗	✓	✗	✗	✗	✓	✗	✗	✗	✗	✗	✗	✓
The FYR Macedonia	✓	✓	✗	✓	✗	✓	✗	✗	✓	✗	✗	✗	✗	✗	✗	✗	✗
Togo	✓	✓	✓	✓	✓	✓	✓	✓	✗	✓	✗	✗	✓	✗	✗	✗	✗
Tunisia	✓	✓	✓	✓	✓	✓	✓	✓	✗	✓	✓	✗	✗	✗	✗	✗	✗
Turkey	✓	✗	✗	✓	✗	✗	✗	✗	✓	✗	✗	✗	✗	✗	✗	✗	✗

Turkmenistan	✓	✗	✗	✓	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗
Uganda	✓	✓	✗	✓	✓	✓	✓	✓	✗	✓	✗	✗	✗	✗	✓	✗	✗
Ukraine - Crimea	✓	✓	✗	✓	✗	✓	✗	✗	✓	✗	✗	✗	✗	✗	✗	✗	✗
United Arab Emirates	✓	✓	✓	✓	✗	✓	✗	✗	✓	✗	✗	✗	✗	✗	✗	✗	✗
Uzbekistan	✓	✓	✗	✓	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗
Vietnam	✓	✗	✗	✓	✗	✓	✗	✗	✗	✓	✗	✗	✗	✗	✗	✗	✓
Western Sahara	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗
Yemen	✓	✓	✓	✓	✗	✓	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗
Zambia	✓	✗	✗	✓	✓	✓	✓	✓	✗	✓	✗	✗	✗	✓	✗	✗	✗
Zimbabwe	✓	✓	✗	✓	✗	✓	✓	✓	✗	✓	✗	✗	✗	✓	✗	✗	✗

7. Framework for action

7.1. Goal

To restore the populations of each of 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 eduction 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*.** Mortality of vultures by NSAIDs and occurrence and threat of toxic NSAIDs recognised and minimised 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 that 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 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 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 transmission and generation 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. Ensure availability of suitable habitat for vultures to nest, roost and forage
Indicator: All major breeding, roosting and foraging 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: Substantiallly 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: Support vulture conservation through cross-cutting policies, legislation and actions to enable mitigation of most or all of the most serious threats.
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.

7.4. Actions, priorities, timescale and responsibilities

Table 8 reflects the results and actions for each objective reviewed during the Regional Workshops and also supported primarily by the 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 also provides an overall priority for each action, a suggested timeframe for its implementation as well as an indication of the relevant sub-regions in which the action is required, as highlighted in the overarching threats map (Fig. 3).

Table 8. Framework of conservation actions for African-Eurasian vultures

Results	Actions	Category	Time-frame	Priority	Stakeholders	North Africa	West Africa	East Africa	Southern Africa	Europe/Central Asia	Middle East	South Asia	East Asia	SE Asia
Objective 1. Achieve a significant reduction in mortality of vultures caused unintentionally by toxic substances used 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 yr	High	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	7-12 yr	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 yr	High	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	Action	1-3 yr	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, judiciary) to rapidly respond to poisoning incidents including sharing of best practices	Action	1-6 yr	High	Government and NGOs	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), encouraging local communities to form or join local wildlife stewardship programmes	Action	1-12 yr	High	National and local authorities	x	x	x	x	x	x			x
	1.2.4. Use supplementary feeding sites ('vulture restaurants') to provide poison-free food in safe areas	Action	1-12 yr	Medium	NGO, national and local authorities	x	x	x	x	x	x			x

	1.2.5. Review, improve and implement compensation and/or livestock insurance schemes where appropriate for vulnerable local communities in response to depredation of livestock by wildlife	Action	1-6 yr	Medium	Park or Protected Area Management Authorities, pastoral and farming communities	x	x	x	x	x	x			x
	1.2.6. Improve benefit-sharing of conservation revenue from protected areas with local communities to increase the benefits derived from wildlife and therefore discourage poisoning	Action	1-6 yr	Medium	Park or Protected Area Management Authorities, Communities	x	x	x	x	x	x			x
	1.2.7.Increase capacity and resources of local wildlife and law enforcement authorities to respond to human-wildlife conflict incidents rapidly and effectively	Action	1-3 yr	High	National government, local wildlife authorities	x	x	x	x	x	x			x
	1.2.8. Engage positively with agrochemical producers to investigate methods to repel non-target species from consuming poisons	Action	1-6 yr	Medium	NGO, national and local authorities, agro-chemical companies	x	x	x	x	x	x			
	1.2.9. Investigate and promote vulture-safe protocols and guidelines for vertebrate control for 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 yr	Medium	Government and NGOs, PPWG	x	x	x	x	x	x	x		x
Result 1.3 Legal and policy measures respond to causes and impact of unintentional	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 yr	Medium	National and local authorities, PPWG	x	x	x	x	x	x	x	x	x

poisoning directed at vertebrate control	1.3.2. Review, introduce and enforce strict penalties for illegal wildlife poisoning acts, sufficient to deter future poisoning	Policy & Legislation	1-6 yr	High	National and local authorities, PPWG	x	x	x	x	x	x	x	x	x
	1.3.3. Implement environmental Agreements, resolutions and mandates (CMS + Bern-Tunis Action Plan, CBD)	Policy & Legislation	1-3 years	High	Governments	x	x	x	x	x	x	x	x	x
Objective 2. Mortality of vultures by NSAIDS, occurrence of toxic NSAIDS and threat of NSAIDS recognised and minimised in the MsAP range															
esult 2.1 Awareness raising and regulation of veterinary NSAID use at national levels is adequate and according to Resolution 15 (CMS CoP 11)	2.1.1. Situation analysis and publication of results regarding availability and use of NSAIDs in all MsAP range states (including analysis of national lab capacity to detect NSAIDs either in country or through external links)	Research & Monitoring	1-6 yr	High	Govt (Health & Envt Ministries), NGOs, RSC, SAVE.	x	x	x	x	x	x	x	x	x
	2.1.2. Uphold existing ban (achieve total removal from markets) of multi-dose vials of diclofenac intended for human medicine in India	Policy & Legislation	1-6 yr	High	Govt (Health & Envt Ministries), NGOs, RSC, SAVE.							x		
	2.1.3. Prohibit the use of vet diclofenac for the treatment of livestock and substitute it with readily available safe alternatives, such as meloxicam in all MsAP range states	Policy & Legislation	1-6 yr	High	Govt (Health & Envt Ministries), NGOs, RSC, SAVE.	x	x	x	x	x	x	x	x	x
	2.1.4. Secure bans on veterinary use of ketoprofen and aceclofenac in all Vulture MsAP range states	Policy & Legislation	1-6 yr	High	Govt (Health & Envt Ministries), NGOs, RSC, SAVE.	x	x	x	x	x	x	x	x	x
	2.1.5. Establish government-backed alert system to identify potentially dangerous veterinary drugs already in use, based on use levels from pharmacy surveys, cattle carcass analysis and drug safety testing results	Action	1-6 yr	High	NGOs, Govt (IVRI), SAVE	x	x	x	x	x	x	x	x	x

	2.1.6. Carry out robust and mandatory safety testing on vultures and develop a formalised approval process before market authorisation is granted for veterinary NSAIDS. (strong focus is to identify NSAIDS and other veterinary pharmaceuticals that are safe for vultures)	Action	1-12 yr	High	NGOs, Govt (IVRI), SAVE					x	x	x		
	2.1.7. Understanding requirements and Improve availability of more effective meloxicam formulations to facilitate stronger uptake by veterinary practitioners and livestock owners	Action	1-12 yr	Medium	Pharma Industry, NGOs, Govt (Livestock)							x		
	2.1.8. Monitor sales of veterinary drugs at key sites	Research & Monitoring	1-12 yr	High	NGOs, Govt, SAVE							x		
	2.1.9. Awareness raising - veterinarians and potential consumers across the VMsAP range	Education & Awareness	1-3 years	High	NGOs	x	x	x	x	x	x	x	x	x
	2.1.10. Government and donor assisted veterinary drug procurement of vulture-safe NSAIDs only	Education & Awareness	1-12 yr	Medium	Govt & NGOs	x	x	x	x	x	x	x	x	x
Result 2.2 Vulture populations are maintained and/or restored in NSAID free Vulture Safe Zones while toxic NSAIDS are banned or illegal use is eradicated	2.2.1. Maintain and review network of VSZs (with emphais in 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	Action	1-6 yr	Medium	NGOs, regional Govts, SAVE							x		
	2.2.2. Promote development and implemenation of new VSZs through identification, development of guidelines selection of provisional Vulture Safe Zones (pVSZs) , with a view of conversion to 'full' VSZs	Education & Awareness	1-6 yr	Medium	SAVE							x		
	2.2.3. Undertake capacity-building and local advocacy for pVSZs and VSZs	Education & Awareness	1-6 yr	Medium	NGOs, SAVE							x		
	2.2.4. Continue conservation breeding of Endangered *Gyps* vultures at recognised breeding stations in S Asia	Action	1-12 yr	High	Govt, (Federal & State, CZA) NGOs, SAVE							x		

	2.2.5. Release captive-bred, and where appropriate (Nepal) wild-taken, vultures into VSZs ensuring strong post-release monitoring protocols are in place (eg satellite tagging and close monitoring of released birds – see 2.3 below)	Action	1-12 yr	High	Govt, (Federal & State, CZA) NGOs, SAVE							x		
	2.2.6. Carry out livestock management and husbandry training and offer free veterinary camps in pVSZs and VSZs	Action	1-6 yr	Medium	NGO, Provincial Govt.							x		
	2.2.7. Support or develop community-led vulture-based tourism in pVSZs and VSZs in Nepal and Cambodia (and in Pakistan for local tourists only)	Education & Awareness	1-6 yr	Medium	NGOs, Private tourism enterprise							x		x
	2.2.8. Monitor availability of NSAIDs for veterinary use in pVSZs and VSZs across S Asia and more widely	Research & Monitoring	1-12 yr	High	NGO, state Govt, SAVE							x		
Result 2.3 Monitor Vulture Safe Zones	2.3.1. Monitor wild vulture populations and breeding success in pVSZs and VSZs across S Asia	Research & Monitoring	1-12 yr	High	NGO, state Govt, SAVE							x		
	2.3.2. Monitor survival and causes of death of wild and released vultures with satellite tags (GPS PTTs) in pVSZs and VSZs across S Asia	Research & Monitoring	1-12 yr	High	NGO, State Govt, SAVE							x		
	2.3.3. Develop method for satellite tracking of vultures and corpse recovery and ensure trained teams are place to recover mortalities	Research & Monitoring	1-3 yr	High	NGOs, SAVE							x		
	2.3.4. Continue vulture population monitoring in S Asia through road transect surveys and other approaches	Research & Monitoring	1-12 yr	High	NGOs, Govt, SAVE							x		
Objective 3. To ensure that policies on the phasing out the use of lead ammunition is implemented throughout the Vulture MsAP range														
Result 3.1. Mitigation measures in place to reduce the impact of lead poiosning 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 yr	Medium	NGOs, Universities, Research Institutions, Government	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 yr	Medium	NGOs, Universities, Research Institutions, Government	x		x	x	x	x			
	3.1.3. Awareness raising among relevant stakeholders, especially decision makers	Education & Awareness	1-3 years	High	NGO/Hunters	x		x	x	x	x		x	x
	3.1.4. Promote the implementaton of CMS Resolution 11.5 by all CMS parties	Policy & Legislation	1-3 years	High	CMS parties/Governments	x		x	x	x	x	x	x	x
	3.1.5. Promote voluntary lead ammunition bans in Vulture MsAP range states which are not CMS parties	Policy & Legislation	1-3 years	High	Governements	x		x	x		x		x	x
	3.1.6. Promote best practices and cost effective alternatives to lead ammunition	Education & Awareness	1-3 years	High	NGOs/Hunters	x		x	x	x	x	x	x	x
Objective 4. Reduce and eventually 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	Research & Monitoring	1-6 yr	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 yr	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 yr	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 yr	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	Action	1-3 yr	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 yr	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 stakeholder 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 yr	High	NGOs, Universities, Research Institutions, Government, religious leaders, conventional medical community, local leaders, traditional healers, consumers		x	x	x					
	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 yr	High	National and Local Government, NGOs		x	x	x					
Result 4.3 All appropriate policy instruments and legal measures are	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	Action	1-6 yr	High	Government, NGOs		x	x	x					

established and/or aligned to reduce belief-based use of vulture body parts	4.3.2. Engage with CITES and put forward a proposal to uplist all threatened African vulture species to Appendix I of CITES	Policy & Legislation	1-6 yr	Medium	Government		x	x	x					
Objective 5. To halt declines in vulture populations associated with 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 yr	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 and appropriate	Research & Monitoring	1-12 yr	High	NGOs, Universities, Research Institutions, Government; IUCN SSC VSG			x	x					
	5.2.2. Confirm or identify poaching hotspots (especially of elephants)	Research & Monitoring	1-3 yr	Medium	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 yr	High	Government, Wildlife Authorities, NGOs			x	x					
Result 5.4 Conservation authorities, communities and others take collaborative action to respond to or prevent poisoning	5.4.1. Expand poisoning response training programmes to support conservation staff to rapidly respond to poisoning incidents	Action	1-12 yr	High	NGOs, national and local government			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)	Action	1-6 yr	Medium	Government, NGOs			x	x					

incidents	5.4.3. Enhance capacity to sample and analyse poisons used in elephant and bushmeat poaching among relevant national institutions	Action	1-6 yr	Medium	Government, Laboratories, research institutions and NGOs			x	x					
	5.4.4.Increase capacity and resources for effective law enforcement to tackle elephant and bushmeat poaching within Protected Areas	Action	1-12 yr	High	Wildlife authorities, Police service			x	x					
	5.4.5. Enhance networking and coordination between initiatives on vulture conservation and preventing elephant poaching between conservation practitioners, researchers, Governments and elephant anti-poaching groups	Action	1-12 yr	High	NGOs, Government, IUCN, linkage to MIKE, IUCN SSG Elephant, Rhino and Vulture Specialist Groups, CITES.			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 yr	High	Government			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 yr	Medium	Government			x	x					
	5.5.3. Work with CITES Secretariat and Parties to propose listing vultures on CITES Appendix I	Policy & Legislation	1-6 yr	Medium	CITES, Government, NGOs			x	x					

Objective 6. To substantially reduce vulture mortality caused by electrocutions linked to energy transmission and generation infrastructure														
Result 6.1 Current vulture mortality and sensitivity in relation to electrocution is understood, including population impacts and hotspots	6.1.1. Determine baseline impact of electrocution on energy infrastructure at appropriate levels (e.g. total population, subregion, country or subnational) for each species within the Vulture MsAP range using standard monitoring protocols	Research & Monitoring	1-12 yr	High	NGOs, Universities, Research Institutions	x	x	x	x	x	x	x	x	x
	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 yr	High	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 yr	High	Private sector, national or local government, NGO's, Utilities	x	x	x	x	x	x			
Result 6.2 Public and private sector support and promote 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 yr	High	Donors, NGOs, Government, Utilities	x	x	x	x	x	x	x	x	x
	6.2.2. Develop a Pan-African Energy Task Force probably as a subgroup 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	Action	1-3 yr	High	CMS Energy Task Force, CMS Government focal points and 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 yr	High	Donors, NGOs, Government, Utilities	x	x	x	x	x	x			
	6.2.4. Advocate adoption of correct 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 yr	High	NGOs, Government, 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 yr	High	Energy companies, government, 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 yr	High	Government, Utilities, NGO's, 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 years	High	Governments /public bodies, Utilities, NGO's	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 years	High	Utilities, Donors, NGO's, 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 years	Medium	Public officials and ideally companies	x	x	x	x	x	x	x	x	x

	6.3.5. Ensure the monitoring and maintenance of anti-electrocution measures and replacement when necessary	Policy & Legislation	4-6 years	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 & monitoring	Education & Awareness	1-6 yr	Medium	Government, energy companies, NGO's, 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 Current vulture mortality and sensitivity in relation to collision understood, including population impacts, hotspots and improved designs	7.1.1. Determine baseline impact of collision on energy infrastructure at appropriate levels (e.g. total population, subregion, country or subnational) for each species within the Vulture MsAP range, using standard monitoring protocols	Research & Monitoring	1-12 yr	High	NGOs, Universities, Research Institutions	x	x	x	x	x	x	x	x	x
	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 yr	High	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 yr	High	Private sector, national or local government, NGO's, 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. Explore methods to better capture collision data.	Research & Monitoring	1-12 yr	High	Private sector, national or local government, Utilities	x	x	x	x	x	x		x	

Result 7.2 Public and private sector support and promote 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, 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 yr	High	Donors, NGOs, Government, Utilities	x	x	x	x	x	x	x	x	x
	7.2.2. Develop a Pan-African Energy Task Force probably as a subgroup 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	Action	1-3 yr	High	CMS Energy Task Force, CMS Government focal points and energy developers, NGOs	x	x	x	x					
	7.2.3. 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 yr	High	Donors, NGOs, Government, Utilities	x	x	x	x	x	x	x	x	x
	7.2.4. 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 yr	High	NGOs, Government, Donors, Utilities, Developers, Designers	x	x	x	x	x	x	x	x	x
	7.2.4. 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 yr	High	Energy companies, government, 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 by phasing out energy infrastructure designs that pose collision and electrocution risk to vultures and other birds, and advocate retro-fitting with known bird-friendly designs within current maintenance schedules	Policy & Legislation	1-12 yr	High	Government, Utilities, NGO's, 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 infrastructure adopts bird-friendly technologies and designs	Policy & Legislation	1-12 yr	High	NGOs, Government, 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 years	High	Governments /public bodies, Utilities, NGO's	x	x	x	x	x	x	x	x	x
	7.3.4. Improve planning of routing and construction of new power lines and promote the use of undergound options where appropriate.	Policy & Legislation	1-6 years	High	Utilities, Donors, NGO's, Governments	x	x	x	x	x	x	x	x	x
	7.3.5. Assess the effectiveness and durability of mitigation measures to prevent electrocution	Research & Monitoring	4-6 years	Medium	Public officials and ideally companies	x	x	x	x	x	x	x	x	x
	7.3.6. Ensure the monitoring and maintenance of anti-electrocution measures and replacement when necessary	Policy & Legislation	4-6 years	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 & monitoring	Education & Awareness	1-6 yr	Medium	Government, energy companies, NGO's, CMS	x	x	x	x	x	x			

Objective 8. To ensure or increase availability of poison-free food and water for vultures to sustain populations														
Result 8.1 Increase understanding of role of food availability in vulture declines	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 yr	Medium	Research Institutions, Universities and 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 yr	High	Research Institutions, Universities and NGOs	x	x	x	x	x	x	x	x	x
Result 8.2 Where appropriate, develop and implement country-specific or more local strategies to ensure food availability	8.2.1. Identify and promote existing and/or develop and apply scavenger-friendly vet/sanitary regulations (re carcass disposal) and waste managment practices and make sure that the food provided is poison-free (pesticides and NSAIDs).	Action	4-6 years	High	Veterinary and conservation/ environmental authorities	x	x	x	x	x	x	x		x
	8.2.2. Participate in or promote measures to restore wildlife populations in protected areas, with special attention to benefiting vultures by conserving existing wild ungulate populations and maintaining protected area networks	Action	1-12 yr	Medium	Government, NGOs, Wildlife authorities	x	x	x	x	x	x			x
	8.2.3. Develop clear goals and science-based guidance and methods to support any supplementary feeding strategies (e.g. vulture restaurants) and ensure resources to cover operational costs for sites for 5-12 years	Action	1-3 yr	High	Government, NGOs, Wildlife authorities and vet authorities	x	x	x	x	x	x			
	8.2.4. Training & capacity building in the management of sites (food sustainability, both natural and supplementary)	Education & Awareness	4-6 years	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 sites used by vultures conserved	9.1.1. Investigate and identify key nesting and roosting areas (where not known) and assess availability in relation to nesting habitat destruction – working with local communities to show importance and impact to vulture populations	Research & Monitoring	1-6 yr	Low	Research Institutions, Universities and NGOs	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 (establish new protected areas)	Policy & Legislation	4-6 yr	Medium	Government, NGOs, Wildlife authorities, local communities	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 wood	Action	1-12 yr	Low	Government, NGOs, Wildlife authorities		x	x	x	x	x			
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 rangelands for vultures e.g. cattle grazing rotation to reduce degradation	Education & Awareness	1-12 yr	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, Protected Areas etc.	Action	1-12 yr	Medium	NGOs working with landowners/associations	x	x	x	x	x	x			
	9.2.3. Limit damaging access to key/sensitive/vulnerable areas for vultures	Action	1-3 yr	High	Protected Area Managers, Land owners, Wildlife Authorities, Local Communities	x	x	x	x	x	x			

	9.2.4. Make vultures part of biodiversity planning and indicator systems in conservation and/or development (e.g. mining) projects	Action	1-12 yr	Medium	Universities, NGOs, government, private sector e.g. mining	x	x	x	x	x	x	x	x	x
Objective 10: To reduce direct persecution and disturbance caused by human activities														
Result 10.1 Reduced mortality caused by direct persecution	10.1.1. Improvement of species protection legislation and policies to protect species from persecution and disturbance	Policy & Legislation	7-12 years	High	International and local authorities	**x**	**x**	**x**	**x**	**x**	**x**			
	10.1.2. Increase public awareness of the drivers (relevant authorities, hunters, local communities) by public campaigns	Education & Awareness	1-12 years	High	NGO/media / livestock breeders / hunting assoc.	**x**	**x**	**x**	**x**	**x**	**x**		**x**	**x**
	10.1.3. Improve capacity and effective implementation in law enforcement in terms of relevant legislation	Education & Awareness	7-12 years	High	NGOs, national and international authorities	**x**	**x**	**x**	**x**	**x**	**x**	**x**	**x**	**x**
Result 10.2 Increase breeding success by reducing disturbance	10.2.1. Implement public awareness campaigns to increase awareness of the activities that cause disturbance to vultures and how to avoid disturbance at breeding sites	Education & Awareness	1-12 years	High	International and local authorities, NGO's	x	x	x	x	x	x		x	x
	10.2.2. Promote the establishment of sensitivity zones around breeding cliffs and clusters (tree-nesting vultures) to reduce disturbance and prevent development	Action	7-12 years	High	National and local authorities/NGO/media / livestock breeders / hunting assoc.	x	x	x	x	x	x		x	x
	10.2.3. Improve control of development at or near breeding sites (EIA's and other relevant studies)	Action	7-12 years	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 may contribute to mitigation of most or all threats														
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 MsAP range	Research & Monitoring	1-12 years	High	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 yr	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	Research & Monitoring	1-3 yr	High	Research Institutions and 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 MsAP range. This includes the movement of samples between countries where capacity is lacking to facilities than can do the relevant analysis.	Action	1-12 yr	High	Governments, NGOs, Universities, Research Institutions, CITES	x	x	x	x	x	x	x	x	x
	11.1.5. Long-term monitoring of feeding site management and use and information exchange between sites	Research & Monitoring	1-12 years	High	Conservation and vet authorities				x	x	x			
	11.1.6. Conduct a detailed assessment on the scale and impact of legal and illegal trade in live birds and eggs across the range of the Vulture MsAP	Research & Monitoring	1-6 yr	Medium	Universities, Environmental Agencies, CITES	x	x	x	x	x	x		x	
Result 11.2 Vulture populations restored where extinct and supplemented where	11.2.1. Assess all vulture MsAP species considered for captive breeding and reintroduction programmes using IUCN guidelines	Research & Monitoring	1-12 yr	Medium	NGOs, Universities, Research Institutions	x	x	x	x	x	x	x	x	x

there is danger of extinction	11.2.2. Develop captive breeding programs for critically endangered and endangered species (where translocation or extraction of native population is not an option)	Action	1-12 yr	Medium	Governments, NGO's. Environmental Agencies, Research Institutions, Captive Breeding Facilities	x	x	x	x	x	x	x		
	11.2.3. Follow IUCN guidelines and criteria for reintroduction of species	Action	1-12 yr	Medium	Governments, NGO's. Environmental Agencies, Research Institutions, Captive Breeding Facilities	x	x	x	x	x	x	x		
Result 11.3 Environmental and socio-economic values of vultures is 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 eco-tourism attraction.	Research & Monitoring	1-3 yr	High	NGOs, Universities, Research Institutions	x	x	x	x	x	x	x	x	x
	11.3.2. Develop and implement a communications strategy and tools to promote the conservation of vultures across the flyway in a range of languages	Education & Awareness	1-3 yr	High	CMS, NGO's, Governments, Media	x	x	x	x	x	x	x	x	x
	11.3.3. Use and support existing events such as International Vulture Awareness Day to promote the conservation of vultures globally	Education & Awareness	1-12 yr	High	CMS, NGO's, Governments, Media	x	x	x	x	x	x	x	x	x
	11.3.4. Establish a repository for all awareness materials, other pubications and protocols produced and shared by Vulture MsAP stakeholders	Education & Awareness	1-3 yr	High	CMS, NGO's, Governments, Media	x	x	x	x	x	x	x	x	x

Result 11.4 Promote enhanced protection of African-Eurasian Vultures in national and international legislation	11.4.1. Engage with range states and put forward a proposal to uplist all endangered and critically endangered African-Eurasian vulture species to CMS Appendix I	Policy & Legislation	1 year	High	CMS parties, CMS CU	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 yr	High	Governments	x	x	x	x	x	x	x	x	x
	11.4.3. Provide guidelines for and promote the drafting of National Action Plans for Vulture Conservation by all range states	Policy & Legislation	1-6 yr	High	Governments	x	x	x	x	x	x	x	x	x
	2.2.2. Develop VSZ criteria for application as an approach in addressing all critical threats across the Vulture MsAP range and initiate implementation where appropriate	Action	1-12 yr	Medium	NGO's	x	x	x	x	x	x	x	x	x

7.5. Results and Action per Range Country

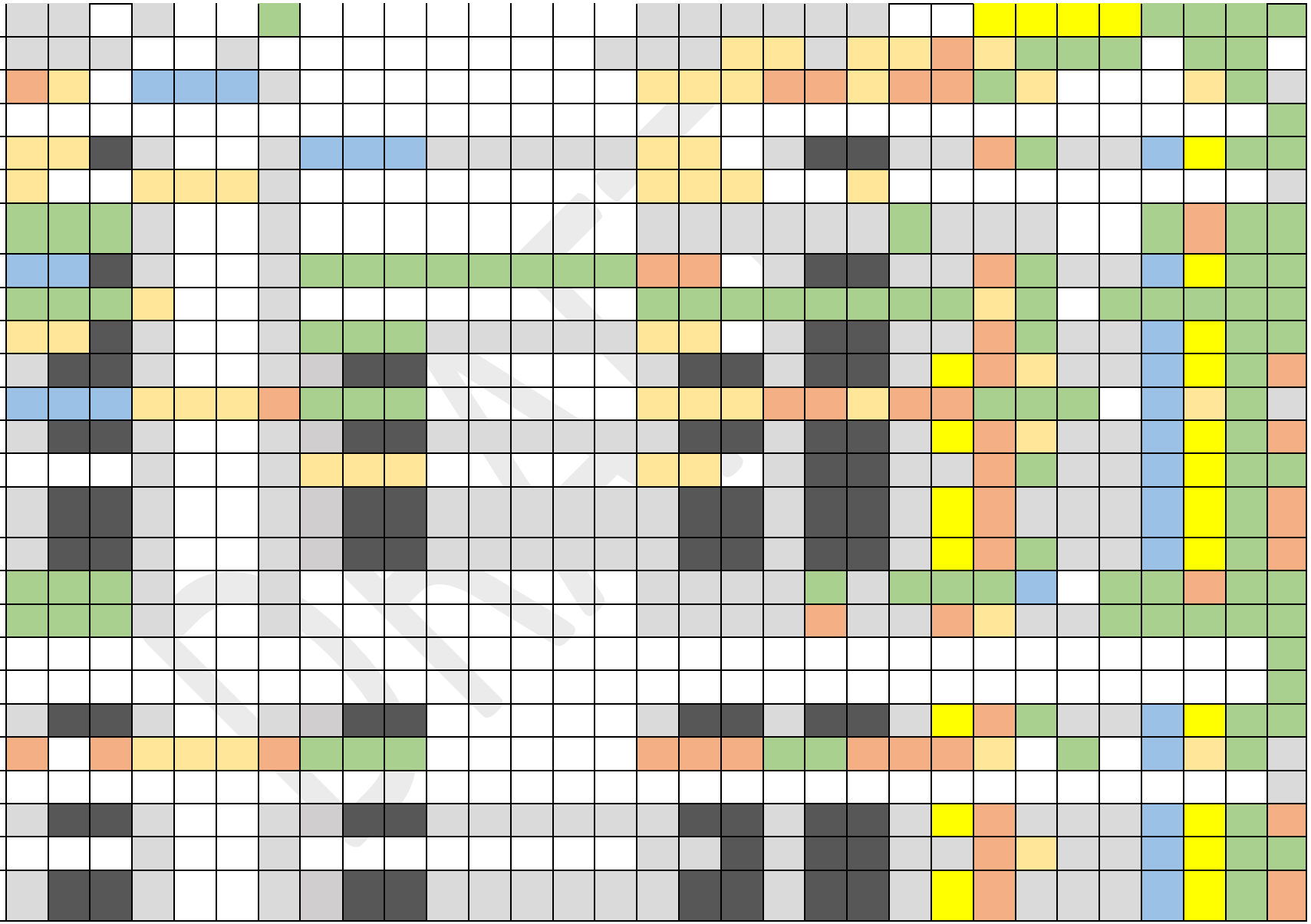
To further guide decision-making by range countries in terms of the implementation of appropriate actions from Table 8, the following (Table 9) gives an indication of results that would be appropriate to pursue per country based on available information obtained from the questionnaires and regional workshops.

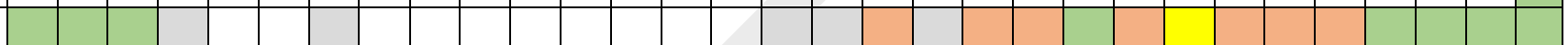
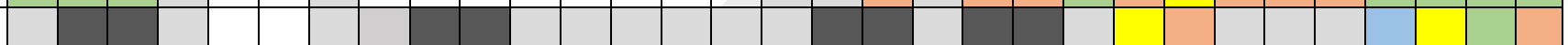
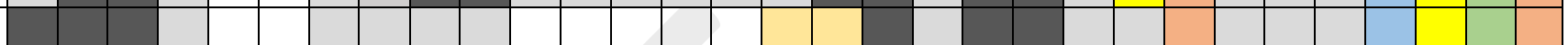
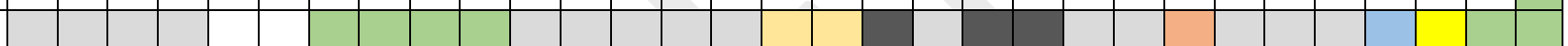
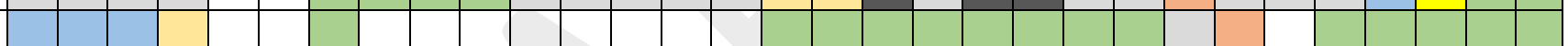
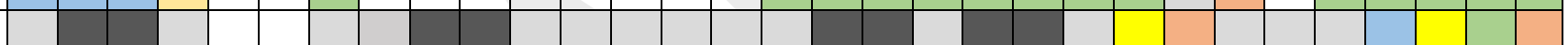
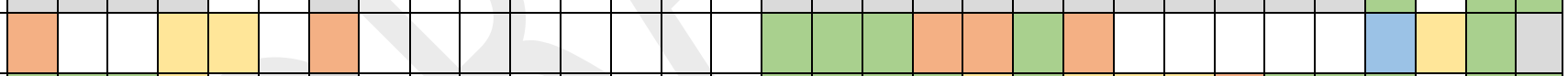
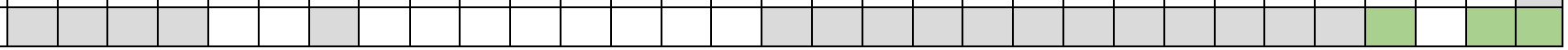
Table 9. Suggested priority Results and Actions per range country

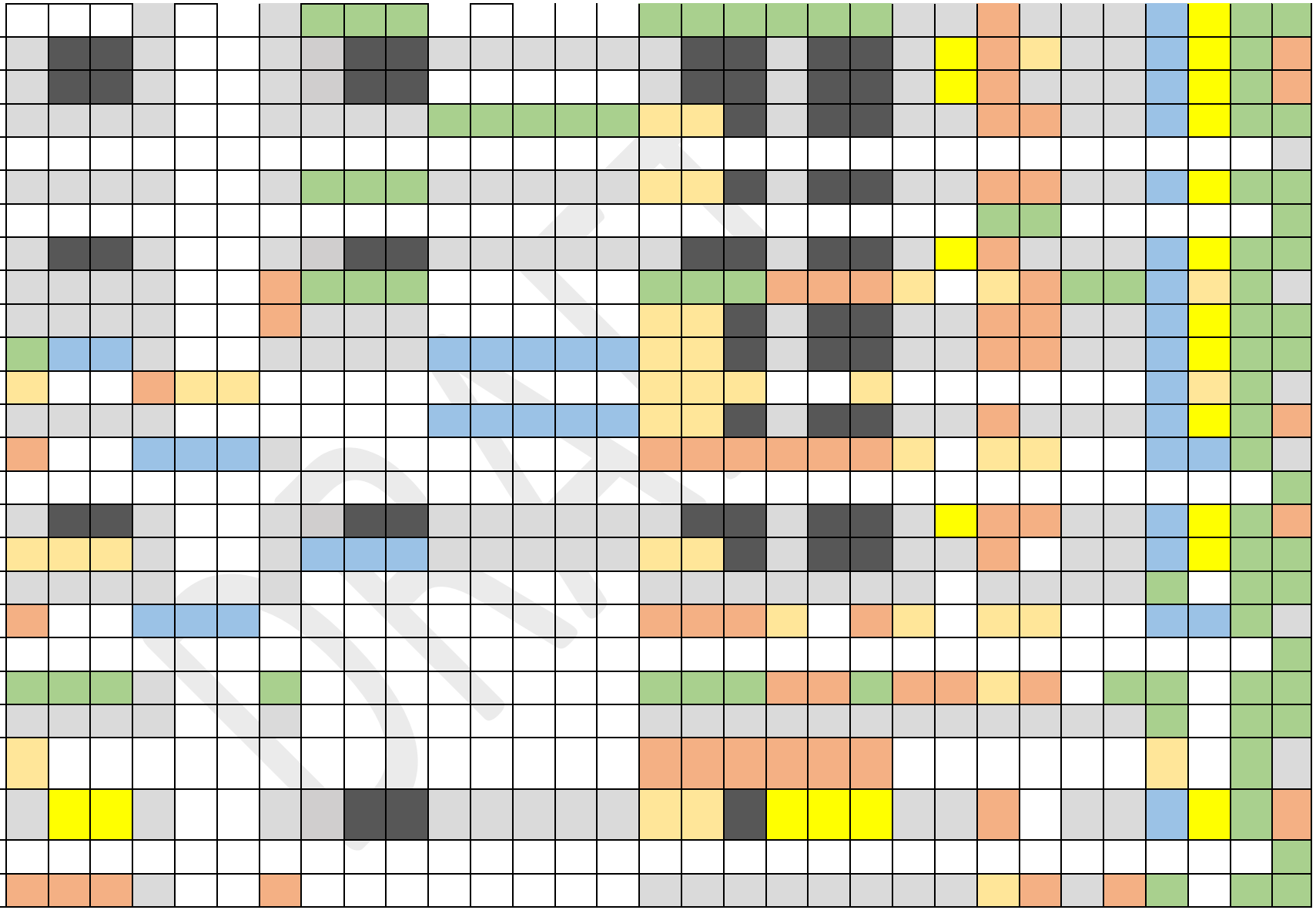
Key:	
Not relevant	
Not known	
No information	
Needs to be assessed	
Low priority	
Medium priority	
High priority	
Critical priority	

Objectives and Results - Relevance per Range State

Country	Region	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
Afghanistan	AS																														
Albania	EU																														
Algeria	AF																														
Andorra	EU																														
Angola	AF																														
Armenia	EU																														

Austria	EU	
Azerbaijan	EU	
Bangladesh	AS	
Belgium	EU	
Benin	AF	
Bhutan	AS	
Bosnia and Herzegovina	EU	
Botswana	AF	
Bulgaria	EU	
Burkina Faso	AF	
Burundi	AF	
Cambodia	AS	
Cameroon	AF	
Cape Verde	AF	
Central African Republic	AF	
Chad	AF	
Croatia	EU	
Cyprus	EU	
Czech Republic	EU	
Denmark	EU	
Djibouti	AF	
DPR China	AS	
DPR Korea	AS	
DR Congo	AF	
Egypt	AF	
Equatorial Guinea	AF	

Eritrea	AF	
Estonia	EU	
Ethiopia	AF	
Finland	EU	
France	EU	
Gabon	AF	
Gambia	AF	
Georgia	EU	
Germany	EU	
Ghana	AF	
Greece	EU	
Guinea	AF	
Guinea-Bissau	AF	
Hungary	EU	
India	AS	
Iraq	AS	
Islamic Republic of Iran	AS	
Israel	ME	
Italy	EU	
Ivory Coast	AF	
Jordan	ME	
Kazakhstan	EU	
Kenya	AF	
Kuwait	ME	
Kyrgyzstan	EU	
Lao PDR	AS	
Lebanon	ME	

Lesotho	AF	
Liberia	AF	
Libya	AF	
Malawi	AF	
Malaysia	AS	
Mali	AF	
Malta	EU	
Mauritania	AF	
Mongolia	AS	
Morocco	AF	
Mozambique	AF	
Myanmar	AS	
Namibia	AF	
Nepal	AS	
Netherlands	EU	
Niger	AF	
Nigeria	AF	
Oman	ME	
Pakistan	AS	
Poland	EU	
Portugal	EU	
Qatar	ME	
Republic of Korea	AS	
Republic of the Congo	AF	
Romania	EU	
Russia	EU	

Rwanda	**AF**																														
Saudi Arabia	**ME**																														
Senegal	**AF**																														
Serbia	**EU**																														
Sierra Leone	**AF**																														
Singapore	**AS**																														
Slovakia	**EU**																														
Slovenia	**EU**																														
Somalia	**AF**																														
South Africa	**AF**																														
South Sudan	**AF**																														
Spain	**EU**																														
Sudan	**AF**																														
Swaziland	**AF**																														
Switzerland	**EU**																														
Syrian Arab Republic	**ME**																														
Tajikistan	**EU**																														
Tanzania	**AF**																														
Thailand	**AS**																														
The FYR of Macedonia	**EU**																														
Togo	**AF**																														
Tunisia	**AF**																														
Turkey	**EU**																														
Turkmenistan	**EU**																														
Uganda	**AF**																														
Ukraine	**EU**																														

United Arab Emirates	**EU**																														
United Kingdom	**EU**																														
Uzbekistan	**EU**																														
Vietnam	**AS**																														
Western Sahara	**AF**																														
Yemen	**ME**																														
Zambia	**AF**																														
Zimbabwe	**AF**																														

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 an effective communications strategy.

Implementation of the Vulture MsAP was one of the key issues considered during the Overarching Workshop which was held in Toledo, Spain from the 16th-18th of 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 CMS Conference of Parties in October 2017. The proposed coordination structure for the implementation of the Vulture MsAP is reflected in Fig. 4. It follows closely the organisation 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 Coordinators – It is considered essential for an Overarching Coordinator be appointed to take responsibility for, and oversee the day-to-day implementation of, the Vulture MsAP throughout the African-Eurasian range. This person should report directly to the Coordinating Unit of the CMS Raptors MoU. The appointment of full-time Overarching Coordinator is seen as a vital step towards successful implementation of the Vulture MsAP so finding the necessary resources to fund this position is a priority.

Regoinal 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 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 in response to a call issued by the Coordinating Unit to all Range States covered by the Vulture MsAP. 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 this can be open-ended because it is anticipated that the VWG will function solely by means of electronic communications. However, in addition, VWG members will be automatically 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, two 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 intersessional between CMS COPs.

Regional Vulture Committees (RVCs) - Due to the immense geographic scope of the Vulture MsAP, it is anticipated that RVCs may be established by the Regional Coordinators to facilitate communications within the 3-4 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 127 Range States covered by the plan. However, it is anticipated that each national government will 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. Ideally, these NVCSs should be developed to compliment 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 established to support the implementation of this particular plan. Potential synergies with existing initiatives such as International Vulture Awareness Day (IVAD) could assist in making this possible without requiring substantial additional resources.

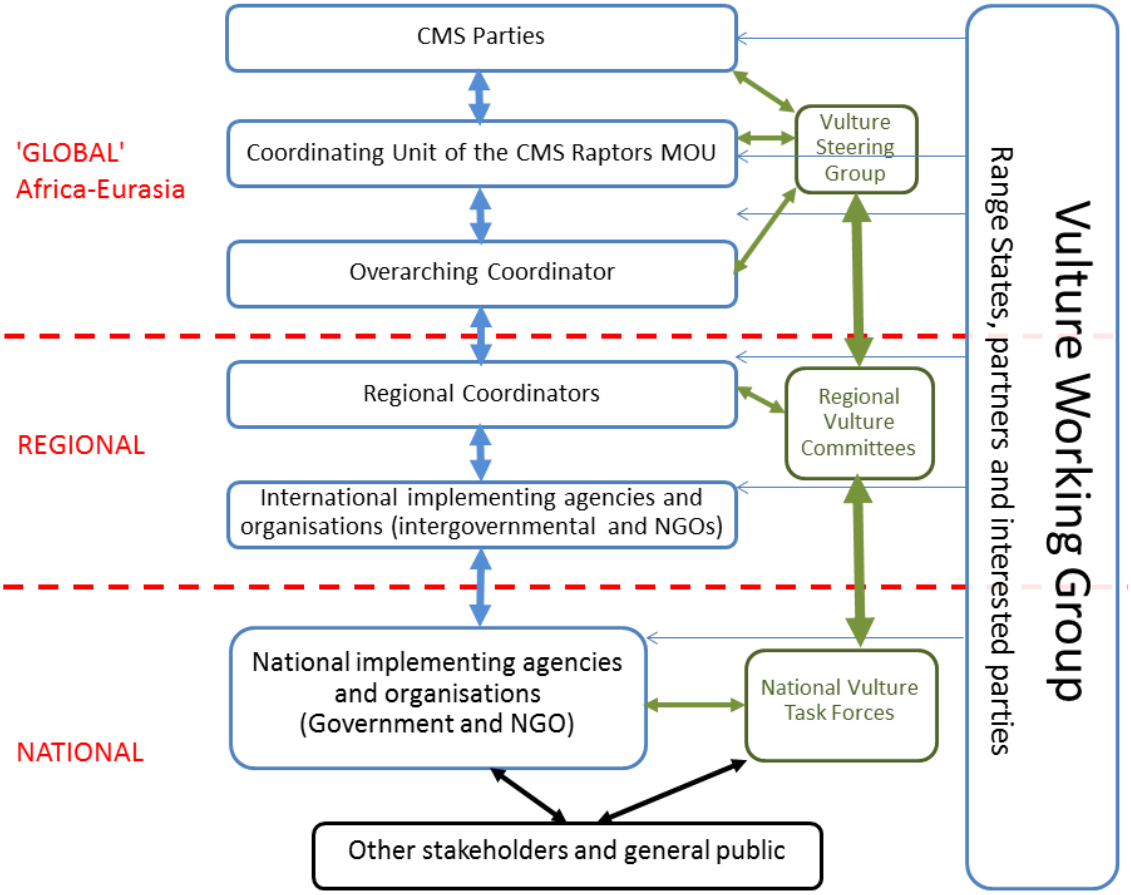


Fig. 4. Proposed coordination framework to oversee implementation of the Vulture MsAP. Arrows indicate reporting or supervision/advisory relationships. Green arrows and boxes indicate primarily advisory structures; blue arrows and boxes primarily concern implementation and reporting.

8.3. Monitoring and Evaluation

To avoid placing 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, by means of 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 again take the lead in gathering the information via the Regional Coordinators and other established networks, which may differ between regions. This process should contribute to not just assessing progress in terms of existing objectives, but should also inform and guide decisions in terms of actions that may need to be amended according to changing circumstances and emerging threats that may not have be evident during the initial drafting of the Vulture MsAP.

8.3.3 Full-term Final Report

A Final Report on implementation of the Vulture MsAP is anticipated to be prepared in 2029 in time for consideration by CMS COP16. Prepared by the Overarching Coordinator, this report will review and assess overall performance in terms of the implementation of the Vulture MsAP and the overall impact on the populations of all 15 species within their respective ranges. Range States will 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 need to 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 will sit alongside the Vulture MsAP. They 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 the 12th Conference of Parties to the CMS. 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 will 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);
- 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 to: (1) rapidly halt current population declines in all the 15 African-Eurasian vulture species it includes; (2) bring the conservation status of each species back to a favourable level; and, (3) 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 and 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; these may provide opportunities for side-events which can attract strong interest;
- International Vulture Awareness Day, marked annually, provides a 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;

- 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 agriculatural) 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 in 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, 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 linkages 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

A comprehensive budget and fundraising plan is beyond the scope of the 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 8). 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 allow for 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 Commitees and for engagement with appropriate CMS Task Forces, Working Groups and other technical or capacity building gatherings that may be required. Regular meetings of 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, ideally in advance of the anticipated adoption of the Vulture MsAP at CMS COP12, or as soon as possible thereafter. Recruitment of the 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 forward. As a step towards this, support is needed to develop fundraising and communications plans which will include lists of agreed priority projects to fundraise for 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 Government, 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 encourageing 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 effectively implement the Vulture MsAP. Fundraising, in line (with the advocacy necessary to effective 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 a 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, 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 (Chapter 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. In-kind support, 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 concept could potentially be applicable in any of the Range States and be led by small NGOs, community groups or even highly motivated individuals. National networks of Vulture Safe Zones has the potential to offer a realistic, achievable and effective bottom-up approach to vulture conservation.

9. References

Abebe, Y. D. (2013) Mass dog poisoning operation in Addis Ababa can have severe repercussions on vulture populations. *Vulture News* 64: 74–76.

Acharya, R., Cuthbert, R., Baral, H.S., and Shah, K.B. (2009) Rapid population declines of Himalayan Griffon *Gyps himalayensis* in Upper Mustang, Nepal. *Bird Conservation International* 19: 99-107.

Al Fazari, M.J. and McGrady, M.J. 2016. Counts of Egyptian Vultures *Neophron percnopterus* and other avian scavengers at Muscat's municipal landfill, Oman, November 2013–March 2015. *Sandgrouse* 38:99-105.

Anderson, M. D. and Hohne, P. (2007) African white-backed vultures nesting on electricity pylons in the Kimberley area, Northern Cape and Free State province, South Africa. *Vulture News* 5: 44–50

Anderson, M. D. and Kruger, R. (1995) Powerline electrocution of eighteen African white-backed vultures. *Vulture News* 32: 16–18.

Anderson, M. D., Maritz, A. W. A. and Oosthuysen, E. (1999) Raptors drowning in farm reservoirs in South Africa. *Ostrich* 70: 139-144

Anderson, MD (1999) Africa's Hooded Vulture: a dichotomy of lifestyle. *Vulture News* 41: 3-5

Andevski, J. 2013. Summary. In J. Andevski (ed.). Vulture Conservation in the Balkan Peninsula and Adjacent Regions: 10 years of research and conservation: 36–37. Skopje: Vulture Conservation Foundation and Frankfurt Zoological Society.

Andevski, J. and Delgado, I. Z. (2015). Toxicological and parasitological analysis of Egyptian vulture samples from Bulgaria and Greece. Technical report under action A1 of the LIFE+ project "The Return of the Neophron" (LIFE10 NAT/BG/000152). VCF and CAD, Spain. 29.

Angelov, I., Hashim, I. and Oppel, S. 2013. Persistent electrocution mortality of Egyptian Vultures *Neophron percnopterus* over 28 years in East Africa. *Bird Conservation International* 23:1-6.

Anon. (2014) Controversial wind farm in Lesotho gets the go-ahead. BirdLife International online news story http://www.birdlife.org/africa/news/controversial-wind-farm-lesotho-gets-go-ahead

Arkumarev, V., Dobrev, V., Abebe, Y.D., Popgeorgiev, G. and Nikolov, S.C. (2014) Congregations of wintering Egyptian Vultures Neophron percnopterus in Afar, Ethiopia: present status and implications for conservation. *Ostrich* 85: 139-145.

Bamford, A. J., Monadjem, A., Hardy, I. C. W. (2009) Nesting habitat preference of the African White-backed Vulture *Gyps africanus* and the effects of anthopogenic disturbance. *Ibis* 151: 51-62.

Batbayar N., Tseveenmyadag, N., Kee, P.W. Lee, H. 2005. *Conservation and Research of Cinereous Vultures in central Mongolia.* Ministry of the nature and Environment of Mongolia, Korean Cultural Heritage Administration.

Batbayar, N., Reading, R.P., Kenny, D.E. and Paek, W.K. 2008. Migration and movement patterns of cinereous vultures in Mongolia. *Falco* 32: 5-7.

Bildstein, K.L. (2006) *Migrating raptors of the world: their ecology and conservation*. Cornell University Press, Ithaca, NY.

BirdLife Botswana (2008) *The status of globally and nationally threatened birds in Botswana, 2008*. Gaborone, Botswana.

BirdLife International (2016a) BirdLife/IUCN Red List for birds. Downloaded from http://www.birdlife.org, Accessed in December 2016

BirdLife International (2016b) Migratory soaring birds project: energy. Downloaded from http://migratorysoaringbirds.undp.birdlife.org/en/sectors/energy. Accessed in November 2016

BirdLife International (2016c) Mitigating the effects of Wind Farms and Power Lines. Downloaded from http://www.birdlife.org/worldwide/policy/mitigating-effects-wind-farms-and-power-lines, Accessed in December 2016.

BirdLife International and NABU (2003) *Protecting Birds from Powerlines: a practical guide on the risks to birds from electricity transmission facilities and how to minimise any such adverse effects*. Report T-PVS/Inf (2003) 15 to the Standing Committee of the Convention on the Conservation of European Wildlife and Natural Habitats.

Borello, W. D. and Borello, R. M. (2002) The breeding status and colony dynamics of Cape Vulture (*Gyps coprotheres*) in Botswana. *Bird Conservation International* 12: 79-97.

Boshoff, A. F. and Anderson, M. D. (2006) *Towards a conservation plan for the Cape Griffon* Gyps coprotheres*: identifying priorities for research and conservation action*. African Conservation Ecology, Report 55.

Boshoff, A. F., Minnie, J. C., Tambling, C. J., and Michael, M. D. (2011) The impact of power line-related mortality on the Cape Vulture *Gyps coprotheres* in a part of its range, with an emphasis on electrocution. *Bird Conservation International* 21: 311–327.

Boshoff, A., Piper, S. and Michael, M. (2009) On the distribution and breeding status of the Cape Griffon *Gyps coprotheres* in the Eastern Cape Province, South Africa. *Ostrich* 80: 85-92.

Botha, A. J., Ogada, D. L. and Virani, M. (2012) Proceedings of the Pan-African Vulture Summit 2012. Unpublished report, Endangered Wildlife Trust and The Peregrine Fund.

Bowden, C.G.R, Galligan, T.H, Prakash, V, Paudel, K, Cuthbert, R and Green R.E. (2016). An overview of recent advances and priorities for vulture conservation in the South Asia region. Proceedings of Regional Vulture Conservation Symposium, 30 May 2016, Karachi, Pakistan (10-14).

Bougain, C. and Oppel, S. (2016) Identification of important migration concentration areas of Egyptian vultures *Neophron percnopterus* from the Balkan population tracked by satellite telemetry. Training report under action A2 of the LIFE+ project "The Return of the Neophron" (LIFE10 NAT/BG/000152). BSPB and University of Strasbourg, Strasbourg. 22 p.

Bounas, A., Ganoti, M., Giannakaki, E., Akrivos, A., Vavylis, D., Zorrilla, I., Saravia, V. (2016) First confirmed case of lead poisoning in the endangered Egyptian Vulture (*Neophron percnopterus*) in the Balkans. *Vulture News* 70: 22-29.

Bulgarian Society for the Protection of Birds. (2014) British egg collector convicted in Bulgaria. Downloaded from: http://www.lifeneophron.eu/en/news-view/288.html. Accessed in December 2016.

Buij, R., Nikolaus, G., Whytock, R., Ingram, D. J. and Ogada, D. (2016) Trade of threatened vultures and other raptors for fetish and bushmeat in West and Central Africa. *Oryx* 50: 606-616.

Carette, M., Grande, J., Tella, J, Sanches-Zapata, J., Donázar, J., Diaz-Delgado, R. and Romo, A. (2007) Habitat, human pressure and social behavior: Partialling out factors affecting large-scale territory extinction in an endangered vulture. *Biological Conservation* 136: 143-154.

Carrete M., Sánchez-Zapata, J. A., Benítez, J. R., Lobónc, M. and Donázar, J. A. (2009) Large-scale risk-assesment of wind-farms on population viability of a globally-endangered long-lived raptor. *Biological Conservation* 142: 2954-2961.

Carneiro, M., Colaço, B., Brandão, R., Azorín B., Nicolas, O., Colaço, J., João Pires, M., Agustí, S., Casas-Díaz, E., Lavin, S., and Oliveira, P. (2015) Assessment of the exposure to heavy metals in Griffon vultures (Gyps fulvus) from the Iberian Peninsula. *Ecotoxicology and Environmental Safety* 113: 295-301.

Convention on Migratory Species Preventing Poisoning Working Group (2013) *Guidelines to Prevent the Risk of Poisoning to Migratory Birds*. UNEP/CMS/COP11/Doc.23.1.2/Annex 2: Guidelines. Downloaded from http://www.cms.int/sites/default/files/document/Guidelines%20to%20prevent%20the%20risk%20of%20poisoning%20to%20migratory%20birds.pdf. Accessed in December 2016.

Chaudhary A, Subedi TS, Giri JB, Baral HS, Bidari B, Subedi, H., Chaudhary, B., Chaudhary, I., Paudel, K. and Cuthbert, R. J. (2012) Population trends of critically endangered Gyps vultures in the lowlands of Nepal. *Bird Conservation International* 22: 1–9.

Clements, T., Gilbert, M., Rainey, H. J., Cuthbert, R., Eames, J. C., Bunnat, P., Teak, S., Chansocheat, S. and Setha, T. (2012) Vultures in Cambodia: population, threats and conservation. *Bird Conservation International* 23: 7–24.

Convention on Migratory Species (2014a) UNEP/CMS/Resolution 11.15 on Preventing Poisoning of Migratory Birds. Downloaded from http://www.cms.int/sites/default/files/document/Res_11_15_Preventing_Bird_Poisoning_of_Birds_E_0.pdf. Accessed in December 2016.

Convention on Migratory Species (2014b) UNEP/CMS/Resolution 11.16 on The Prevention of Illegal Killing, Taking and Trade of Migratory Birds. Downloaded from http://www.cms.int/sites/default/files/document/Res_11_16_Illegal_Killing_Migratory_Birds_En.pdf. Accessed in December 2016.

Cortés-Avizanda, A., Selva, N., Carrete, M., Serrano, D. and Donázar, J.A. 2009: Carcasses increase the probability of predation of groundnesting birds: a caveat regarding the conservation value of vulture restaurants. - *Animal Conservation* 12: 85-88.

Council of Europe (2010). *Implementation of Recommendation No. 110/2004 on minimising adverse effects of above-ground electricity transmission facilities (power lines) on birds. Report by the Governments*. T-PVS/Files (2010) 11. Downloaded from https://wcd.coe.int/com.instranet.InstraServlet?command=com.instranet.CmdBlobGetandInstranetImage=1947910andSecMode=1andDocId=1639206andUsage=2. Accessed in December 2016.

Craigie, I.D., Baillie, J.E.M., Balmford, A., Carbone, C., Collen, B., Green, R.E. and Hutton, J.M. (2010) Large mammal population declines in Africa's protected areas. *Biological Conservation* 143: 2221-2228.

Cuthbert, R., Green, R. E., Ranade, S., Saravanan, S., Pain, D. ., Prakash, V. and Cunningham, A. A. (2006) Rapid population declines of Egyptian Vulture (*Neophron percnopterus*) and Red-headed Vulture (*Sarcogyps calvus*) in India. *Animal Conservation* 9: 349-354.

Cuthbert R., Pain D. J., Green R. E., Swan G., and Swarup D. (2007) Comparative toxicity studies of NSAIDs in birds: A criticism of Reddy *et al. Environmental Toxicology and Pharmacology* 23: 254–255.

Cuthbert, R., Taggart, M.A., Prakash, V., Saini, M., Swarup, D., Upreti, S., Mateo, R., Chakraborty, S.S., Deori, P. and Green, R.E. (2011) Effectiveness of Action in India to Reduce Exposure of *Gyps* Vultures to the Toxic Veterinary Drug Diclofenac. *PLoS ONE* 6(5): e19069.

Cuthbert, R.J., Taggart, M.A., Prakash, V., Chakraborty, S.S., Deori, P., Galligan, T., Kulkarni, M., Ranade, S., Saini, M., Sharma, A.K., Shringarpure, R. and Green, R.E. (2014) Avian scavengers and the threat from veterinary pharmaceuticals. *Philosophical Transactions of the Royal Society B* 369, 20130574.

Cuthbert, R.J., Taggart, M.A., Mohini, S., Sharma, A., Das, A., Kulkarni, M.D., Deori, P., Ranade, S., Shringarpure, R.N., Galligan, T.H. and Green, R.E. (2016) Continuing mortality of vultures in India associated with illegal veterinary use of diclofenac and a potential threat from nimesulide. *Oryx* 50: 104-112.

Das, D., Cuthbert, R. J., Jakati, R. D. and Prakash, V. (2011). Diclofenac is toxic to the Himalayan Vulture *Gyps himalayensis*. *Bird Conservation International* 21:72-75.

De Juana, E. (2006) *Aves raras de España: un catálogo de las especies de presentación ocasional*. Barcelona: Lynx Edicions.

De Lucas, M., Janss, G.F.E., Whitfield, D.P., Ferrer, M., 2008. Collision fatality of raptors in wind farms does not depend on raptor abundance. *Journal of Applied Ecology* 45: 1695–1703.

De Swardt, D.H. (2013) White-backed Vultures nesting on electricity pylons in the Boshof area, Free State, South Africa. *Vulture News* 65: 48.

Del Hoyo, J., Elliot, A. and Sargatal, J. (1994) *Handbook of the Birds of the World. Volume 2, New World Vultures to Guineafowl*. Lynx Edicions, Barcelona.

Delahay, R. J. and Spray, C. J., eds. (2015) Proceedings of the Oxford Lead Symposium. Lead ammunition: understanding and minimising the risks to human and environmental health. Edward Grey Institute, The University of Oxford, UK.

Diekmann, M. and Strachan, A. (2006) Saving Namibia's most endangered bird. *WAZA Magazine*: 16-19

Ding Li, Y. and Kasorndorkbua, C. (2008) The status of the Himalayan Griffon *Gyps himalayensis* in South-East Asia. *Forktail* 24: 57–62.

Dobrev, V., Boev, Z., Oppel, S., Arkumarev, V., Dobrev, D., Kret, E., Vavylis, D., Saravia, V., T., Bounas, A. and Nikolov, S.C. (2015) Diet of the Egyptian vulture (*Neophron percnopterus*) in Bulgaria and Greece (2005-2013). Technical report under action A5 of the LIFE+ project "The Return of the Neophron" (LIFE10 NAT/BG/000152). BSPB, Sofia. 28 p.

Dobrev, V., Boev, Z., Arkumarev, V., Dobrev, D., Kret, E., Saravia, V., Bounas, A., Vavylis, D., Nikolov S. C. and Oppel, S. (2016) Diet is not related to productivity but to territory occupancy in a declining population of Egyptian vulture *Neophron percnopterus*. *Bird Conservation International* 26(3): 273-285

Donázar, J. A. (1993) *Los buitres ibericos: biologia y conservacion*. Ed. Reyero, Madrid.

Donázar, J.A., Negro, J.J., Palacios, C.J., Gangoso, L., Godoy, J.A., Ceballos, O., Hiraldo, F. and Capote, N. (2002) Description of a new subspecies of the Egyptian vulture (Accipitridae: Neophron percnopterus) from the Canary Islands. *Journal of Raptor Research* 36: 17-23.

Donázar, J., Margalida, A., Carrete, M.and Sánchez-Zapata, J. A. (2009) Too sanitary for vultures. *Science* 326: 664.

Donázar J.A., Cortes-Avizanda A. and Carrete M. (2010) Dietary shifts in two vultures after the demise of supplementary feeding stations: consequences of the EU sanitary legislation.

Ducatez MF, Olinger CM, Owoade AA, Tarnagda Z, Tahita MC, Sow A, De Landtsheer S, Ammerlaan W, Ouedraogo JB, Osterhaus AD, Fouchier RA, Muller CP. 2007. Molecular and antigenic evolution and geographical spread of H5N1 highly pathogenic avian influenza viruses in western Africa. *Journal of General Virology* 88:2297-306.

Duckworth, J. W., Salter, R. E., and Khounboline, K. (compilers) (1999) *Wildlife in Lao PDR: 1999 status report*. Vientiane, Laos: IUCN The World Conservation Union, Wildlife Conservation Society, and Centre for Protected Areas and Watershed Management.

Eames, J.C. (2007a) Cambodian national vulture census 2007. *The Babbler: BirdLife in Indochina*: 33-34.

Eames, J.C. (2007b) Mega transect counts vultures across Myanmar. *The Babbler: BirdLife in Indochina*: 30

Ewen, J. G., Walker, L., Canessa, S. and Groombridge, J. J. (2015) Improving supplementary feeding in species conservation. *Conservation Biology* 29: 341-349.

Ferguson-Lees, I. J. and Christie, D. A. (2001) *Raptors of the World*. Princeton: Princeton University Press.

Ferrer, M., De La Riva, M. and Castroviejo, J. (1991) Electrocution of raptors on power lines on southwestern Spain. *Journal of Field Ornithology* 62: 181–190.

Fielding, D., Newey, S., Van der Wal, R, and Irvine, R. J. (2014) Carcass provisioning to support scavengers, evaluating a controversial nature conservation practice. *Ambio* 43: 810–819.

Finkelstein, M. E., Doakb, D. F., Georgec, D., Burnett, J., Brandt, J., Church, M., Grantham, J. and Smith, D. R. 2012. Lead poisoning and the deceptive recovery of the critically endangered California condor. *Proceedings of the National Academy of Sciences* doi: 10.1073/pnas.1203141109

Galligan, T. H., Taggart, M. A., Cuthbert, R. J., Svobodova, D., Chipangura, J., Alderson, D., Prakash, V. M. and Naidoo, V. (2016) Metabolism of aceclofenac in cattle to vulture-killing diclofenac*. Conservation Biology* 30: 1122-1127.

Galligan, T. H., Amano, T., Prakash, V. M., Kulkarni, M., Shringarpure, R., Prakash, N., Ranade, S., Green, R. E. and Cuthbert, R. J. (2014) Have population declines in Egyptian Vulture and Red-headed Vulture in India slowed since the 2006 ban on veterinary diclofenac? *Bird Conservation International* 24: 1-10.

Gavashelishvili, A., M.J. McGrady, and Z. Javakhishvili. 2006. Planning the conservation of the breeding population of Cinereous Vultures *Aegypius monachus* in the Republic of Georgia. *Oryx* 40:76-83

Gilbert, M., Virani, M., Watson, R.T., Oaks, J.L., Benson, P., Khan, A.A., Ahmed, S., Chaudhry, J., Arshad, M., Mahmood, S., and Shah, Q.A. (2002) Breeding and mortality of Oriental White-backed Vulture *Gyps bengalensis* in Punjab Province, Pakistan. *Bird Conservation International* 12: 311-326.

Gilbert, M., Watson, R.T., Ahmed, S., Asim, M. and Johnson J.A. (2007) Vulture restaurants and their role in reducing diclofenac exposure in Asian vultures. *Bird Conservation International* 17: 63–77.

Godino, A., Garrido, J.R., El Khamlichi, R., Burón, D., Machado, C., Amezian, M., Irizi, A., Numa, C. and Barrios, V. (2016) *Identificación de mortalidad por electrocución de aves rapaces en el sudoeste de Marruecos / Identification de la mortalité des rapaces par électrocution dans le sud-ouest du Maroc*. Málaga, Spain: IUCN.

Goodman, S. M. and Meininger, P. L. (1989) *The Birds of Egypt*. Oxford University Press, Oxford, UK.

Green, R.E., Newton, I., Shultz, S., Cunningham, A.A., Gilbert, M., Pain, D.J. and Prakash, V. (2004) Diclofenac poisoning as a cause of vulture population declines across the Indian subcontinent. *Journal of Applied Ecology* 41: 793-800.

Green, R. E., Taggart, M. A., Das, D., Pain, D. J., Sashi Kumar, C., Cunningham, A. A. and Cuthbert, R. (2006) Collapse of Asian vulture populations: risk of mortality from residues of the veterinary drug diclofenac in carcasses of treated cattle. *Journal of Applied Ecology* 43: 949–956.

Green, R.E., Taggart, M.A., Senacha, K.R., Raghavan, B., Pain, D.J., Jhala, Y., and Cuthbert, R. (2007). Rate of decline of the oriental white-backed vulture population in India estimated from a survey of diclofenac residues in carcasses of ungulates. *PloS ONE* 2: e686. doi:10.1371/journal.pone.000068

Green, R.E., Hunt, W.G., Parish, C.N. and Newton, I. (2008). Effectiveness of action to reduce exposure of free-ranging California condors in Arizona and Utah to lead from spent ammunition. *PLoS ONE* 3: e4022. doi:10.1371/journal.pone.0004022

Green, R.E., Donázar, J.A., Sánchez-Zapata, J.A. and Margalida, A. 2016. Potential threat to griffon vultures in Spain from veterinary use of the drug diclofenac. *Journal of Applied Ecology* 53: 993–1003.

Groom, R.J., Gandiwa, E. and van der Westhuizen, H.J. (2013) A mass poisoning of White-backed and Lappet-faced Vultures in Gonarezhou National Park. *Honeyguide* 59(1): 5-9.

Gutiérrez, R. (2003) Occurrence of Rüppell's Griffon Vulture in Europe. *Dutch Birding* 25: 289-303.

Harness, R. E., Juvaddi, P. R. and Dwyer, J. F. (2013) Avian Electrocutions in Western Rajasthan, India. *Journal of Raptor Research* 47: 352-364.

Heredia, B. 1996. Action plan for the Cinereous Vulture (Aegypius monachus) in Europe. BirdLife international.

Heredia, B., Parr, S.J. and Murat, Y. 1997. A baseline survey of the Black Vulture *Aegypius monachus* in western Turkey. *Sandgrouse* 19(2).

Hernández, M. and Margalida, A. 2009: Poison-related mortality effects in the endangered Egyptian vulture Neophron percnopterus population in Spain. *European Journal of Wildlife Research* 55: 415-423.

Infante, S., Neves, J., Ministro, J. and Brandão, R., 2005. Impact of distribution and transmission power lines on birds in Portugal (in Portuguese). Quercus, ICN and SPEA, Castelo Branco. Unpublished report.

IUCN (2000) *IUCN Red List of Threatened Species*. Gland, Switzerland, and Cambridge, U.K.: IUCN/SSC.

IUCN/SSC (2013). *Guidelines for Reintroductions and Other Conservation Translocations*. Version 1.0. Gland, Switzerland: IUCN Species Survival Commission.

IUCN/SSC (2014). *Guidelines on the Use of Ex Situ Management for Species Conservation*. Version 2.0. Gland, Switzerland: IUCN Species Survival Commission.

Hla, H.T., Shwe, N.M., Htun, T.W., Zaw, S.M., Mahood, S., Eames, J.C. and Pilgrim, J. (2011) Historical and current status of vultures in Myanmar. *Bird Conservation International* 21: 376-387.

Houston, D.C. (1985) Indian white-backed vulture (*G. bengalensis*). In: Newton, I., Chancellor, R.D. (Eds.), *Conservation Studies on Raptors*. International Council for Bird Preservation Technical Publication No. 5. ICBP, Cambridge, pp. 465–466.

Inskipp, C., Inskipp, T. and Baral, H.S. (2013) *National Red Data Book of Birds of Nepal*.

Ishtiaq, F. (2009) Avian malaria and decline of the White-backed Vulture population. *Current Science* 97: 134-135.

Jenkins, A.R., Smallie, J.J. and Diamond, M. (2010) Avian collisions with power lines: a global review of causes and mitigation with a South African perspective. *Bird Conservation International* 20: 263-278

Katzner, T., Gavashelishvili, A., Sklyarenko, S., McGrady, M., Shergalin, J., and Bildstein, K. (2004) Population and conservation status of griffon vultures in the former Soviet Union. *Raptors Worldwide.* Proceedings of the WWGBP, 2004. Budapest, Hungary.

Kendall, C. and Virani, M. 2012. Assessing mortality of African vultures using wing tags and GSM-GPS transmitters. *Journal of Raptor Research* 46: 135-140.

Kemp, A. and Kemp, M. 1998. *Birds of Prey of Africa and its Islands.* New Holland, London.

Kenny, D., Reading, R., Maudea, G., Hancock, P., Garbett, B. (2015) Blood lead levels in White-backed Vultures (*Gyps africanus*) from Botswana, Africa. *Vulture News* 68: 25-31.

Khan, M. M. H. (2013) Population, breeding and threats to the White-rumped Vulture *Gyps bengalensis* in Bangladesh. *Forktail* 29: 52-56.

Komen, L. (2009) Namibia - vultures killed deliberately and accidentally. *African Raptors* 2: 13.

Krüger, S.C. (2014) *A study of the decline in the Bearded Vulture* Gypaetus barbatus meridionalis *in southern Africa*. PhD thesis, University of Cape Town.

Krüger, S.C., Allan, D.G., Jenkins, A.R. and Amar, A. (2014). Trends in territory occupancy, distribution and density of the Bearded Vulture *Gypaetus barbatus meridionalis* in southern Africa. *Bird Conservation International* 24: 162-177.

Kumar, S. R., Samsoor Ali, A. M. and Arun, P. R. (2012) Impact of wind turbines on birds: a case study from Gujarat, India. *Scientific Journal of Environmental Sciences* 1: 9-20.

Lee, K. S., Lau, M. W.-N., Fellowes, J. R. and Chan, B. P. L. (2006) Forest bird fauna of South China: notes on current distribution and status. *Forktail* 22: 23-38.

Loveridge *et al.* in prep. Pick your poison: Cambodia's vulture populations are in decline, diclofenac is absent, but carbofuran poisoning confirmed. Manuscript submitted 2016.

Ma M., Xu G.H. and Wu D.N. (2017) *Vultures in Xinjiang*. Beijing: Science Press.

Margalida, A. (2002). Late egg-laying and fledgling in a polyandrous trio of Bearded Vultures (Gypaetus barbatus) in the Pyrenees. *Revista Catalana d'Ornitologia* 19: 35-37.

Margalida, A., Perez-Garcia, J.M., Afonso, I. and Noreno-Opo, R. (2016). Spatial and temporal movements in Pyrenean bearded vultures (*Gypaetus barbatus*): Integrating movement ecology into conservation practice. *Scientific Reports* 6:35746.

Markandya, A., Taylor, T., Longo, A., Murty , M. N., Murty S. and Dhavala K. (2008) Counting the cost of vulture decline – an appraisal of the human health and other benefits of vultures in India. *Ecological Economics*. 67: 194–204.

Martin, G. R., Portugal, S. J. and Murn, C. P. (2012) Visual fields, foraging and collision vulnerability in *Gyps* vultures. *Ibis* 154: 626-631.

Mateo R, Molina R, Grifols J, Guitart R. (1997) Lead poisoning in a free ranging griffon vulture (*Gyps fulvus*). *Veterinary Record* 140: 47–48.

McGrady, M., Rayaleh, H., Abdillahi, E. and Darar, A. (2013) Field report on migration counts at Ras Siyyan - Bab el Manded strait, Djibouti, 2-10 March 2013 and fitting of GPS PTT to Egyptian vulture at Tadjoura, Djibouti, 11-12 March 2013. Technical report.

McKean, S. and Botha, A. (2007) *Traditional medicine demand threatens vultures in Southern Africa*. Media release for Ezemvelo KZN Wildlife, Endangered Wildlife Trust and Future Works.

McKean, S., Mander, M., Diederichs, N., Ntuli, L., Mavundla, K., Williams, V. and Wakelin, J. (2013) The impact of traditional use on vultures in South Africa. *Vulture News* 65: 15-36.

Meyburg, B.U., Gallardo, M., Meyburg, C. and Dimitrova, E. (2004) Migrations and sejourn in Africa of Egyptian vultures (*Neophron percnopterus*) tracked by satellite. *Journal of Ornithology* 145: 273-280.

Monadjem, A., Botha, A. and Murn, C. (2013) Survival of the African White-backed Vulture *Gyps africanus* in north-east South Africa. *African Journal of Ecology* 51: 87-93.

Moreno-Opo, R., Guzman, J.M., Martin, M. and Higuero, R. (2009) Factor that determine the presence of Cinereous Vulture *Aegypus monachus* at carcasses. *Munibe Suplemento* – Gehariggia 29.2009.

Mundy, P., Butchart, D., Ledger, J. and Piper, S. (1992) *The vultures of Africa*. Academic Press, London

Murn, C. and Botha, A.J. (2017) A clear and present danger - impacts of poisoning on a vulture population and the effect of poison response activities. *Oryx* doi: 10.1017/S0030605316001137

Murn, C. and Holloway, G. J. (2014) Breeding biology of the White-headed Vulture *Trigonoceps occipitalis* in Kruger National Park, South Africa. *Ostrich* 85: 125-130.

Murn, C., Mundy, P., Virani, M.Z., Borello, W.D., Holloway, G.J. and Thiollay, J.-M. (2015) Using Africa's protected area network to estimate the global population of a threatened and declining species: a case study of the Critically Endangered White-headed Vulture *Trigonoceps occipitalis*. *Ecology and Evolution* doi: 10.1002/ece3.1931

Nadeem, M.S., Asif, M., Mahmood, T. and Mujtaba, G. (2007) Reappearance of Red-headed Vulture *Sarcogyps calvus* in Tharparker, Southeast Pakistan. *Podoces* 2: 146-147.

Naidoo V, Wolter K, Cuthbert R, Duncan N (2009) Veterinary diclofenac threatens Africa's endangered vulture species. *Regulatory Toxicology and Pharmacology* 53:205–208.

Naidoo V, Wolter K, Cromarty D, Diekmann M, Duncan N, Meharg AA, Taggart MA, Venter L, Cuthbert R (2010) Toxicity of non- steroidal anti-inXammatory drugs to *Gyps* vultures: a new threat from ketoprofen. *Biology Letters*. doi:10.1098/rsbl.2009.0818

Naidoo, V., Wolter, K. and Botha, C.J. (2017) Lead ingestion as a potential contributing factor to the decline in vulture populations in southern Africa. *Environmental Research* 152: 150-156.

Naoroji, R. (2006) *Birds of Prey of the Indian Subcontinent*. Christopher Helm, London.

Niel, C. and Lebreton, J. D. (2005) Using Demographic Invariants to Detect Overharvested Bird Populations from Incomplete Data. *Conservation Biology* 19: 826-835.

Nikolaus, G. (1987). Distribution atlas of Sudan's birds with notes on habitat and status. *Bonner zoologische Monographien* 25: 1-322.

Nikolaus, G. (2006) Commentary: where have the African vultures gone? *Vulture News*: 65-67.

Oaks, J.L., Gilbert, M., Virani, M.Z., Watson, R.T., Meteyer, C.U., Rideout, B.A., Shivaprasad, H.L., Ahmed, S., Chaudhry, M.J.I., Arshad, M., Mahmood, S., Ali, A. and Khan, A.A. (2004) Diclofenac residues as the cause of vulture population decline in Pakistan. *Nature* 427(6975): 630-633.

Ogada, D.L. (2014) The power of poison: pesticide poisoning of Africa's wildlife. *Annals of the New York Academy of Sciences* 1322: 1–20.

Ogada, D.L. and Buij, R. (2011) Large declines of the Hooded Vulture *Necrosyrtes monachus* across its African range. *Ostrich* 82: 101-113.

Ogada, D. and Kessing, F. (2010) Decline of Raptors over a Three-Year Period in Laikipia, Central Kenya. *Journal of Raptor Research* 44 (2): 129-135

Ogada, D.L., Keesing, F. and Virani, M. Z. (2012) Dropping dead: causes and consequences of vulture population declines worldwide. *Annals of the New York Academy of Sciences* 1249: 57–71.

Ogada, D., Botha, A. and Shaw, P. (2015a) Ivory poachers and poison; drivers of Africa's declining vulture populations. *Oryx* 50: 593-596

Ogada, D., Shaw, P., Beyers, R.L., Buij, R., Murn, C., Thiollay, J.M., Beale, C.M., Holdo, R.M., Pomeroy, D., Baker, N., Krüger, S.C., Botha, A., Virani, M.Z., Monadjem, A. and Sinclair, A.R.E. (2015b) Another Continental Vulture Crisis: Africa's Vultures Collapsing toward Extinction. *Conservation Letters* 9: 89–97.

Oppel, S., Iankov, P., Mumun, S., Gerdzhikov, G., Iliev, M., Isfendiyaroglu, S., Yeniyurt, C. and Tabur, E. (2014) Identification of the best sites around the gulf of Iskenderun, Turkey, for monitoring the autumn migration of Egyptian Vultures and other diurnal raptors. *Sandgrouse* 36: 240-249.

Oppel, S., Dobrev, V., Arkumarev, V., Saravia, V., Bounas, A., Kret, E., Velevski, M., Stoychev, S., Nikolov, S.C. (2015) High juvenile mortality during migration in a declining population of a long-distance migratory raptor. *Ibis* 157: 545-557.

Oppel, S., Dobrev, V., Arkumarev, V., Saravia, V., Bounas, A., Kret, E., Skartsi, T., Velevski, M., Stoychev, S., Nikolov, S. C. (2016) Assessing the effectiveness of intensive conservation actions: Does guarding and feeding increase productivity and survival of Egyptian Vultures in the Balkans? *Biological Conservation* 198: 157-164.

Oppel, S., Dobrev, V., Arkumarev, V., Saravia, V., Bounas, A., Manolopoulos, A., Kret, E., Velevski, M., Popgeorgiev, G. S. and Nikolov, S. C. (2017) Landscape factors affecting territory occupancy and breeding

success of Egyptian Vultures on the Balkan Peninsula. *Journal of Ornithology*: in press, DOI 10.1007/s10336-016-1410-y

Orta, J., Kirwan, G.M., Boesman, P. and Garcia, E.F.J. 2015. Griffon Vulture (*Gyps fulvus*). In: del Hoyo, J., Elliott, A., Sargatal, J., Christie, D.A. and de Juana, E. (eds), *Handbook of the Birds of the World Alive*, Lynx Edicions, Barcelona.

Oschadleus, D. (2002) Report on southern African vulture recoveries. *Vulture News* 46: 16–18.

Otieno, P. O., Lalah, J. O., Virani, M., Jondiko, I. O., Schramm, K. (2010) Carbofuran and its toxic metabolites provide forensic evidence for Furadan exposure in vultures (Gyps africanus) in Kenya. *Bulletin of Environmental Contamination and Toxicology* 84: 536-544.

Pain , D. J., Cunningham, A. A., Donald, P. F., Duckworth, J. W., Houston, D. C., Katzner, T., Parry-Jones, J., Poole, C., Prakash, V., Round, P. and Timmins, R. (2003) *Gyps* vulture declines in Asia: temperospatial trends, causes and impacts. *Conservation Biology* 17: 661-671.

Palacios, M.J, García-Baquero, M.J., 2003. Power lines in Extremadura: conservation and protection of BirdLife (in Spanish). *Proceedings of the 4th technical session on power lines and the environment*, Red Eléctrica de España, Madrid.

Parties to the Convention on Biological Diversity (2016) *Cancun declaration on mainstreaming the conservation and sustainable use of biodiversity for well-being*. Downloaded from https://www.cbd.int/cop/cop-13/hls/cancun%20declaration-en.pdf. Accessed in December 2016.

Paudel, K., Amano, T., Charya, R., Chaudhary, A., Baral, H.S., Bhusal, K.P., Chaudhary, I.P., Green, R.E., Cuthbert, R.J. and Galligan, T.H. (2015) Population trends in Himalayan Griffon in Upper Mustang, Nepal, before and after the ban on diclofenac. *Bird Conservation International* 26: 286-292.

Parker, V. (2005) *The atlas of the birds of central Mozambique*. Endangered Wildlife Trust and Avian Demography Unit, Johannesburg, South Africa.

Phipps, W.L., Willis, S. G., Wolter, K. and Naidoo, V. (2013a) Foraging ranges of immature African White-backed Vultures (*Gyps africanus*) and their use of protected areas in Southern Africa. *PLoS ONE* 8(1): 1-11.

Phipps W.L., Wolter K., Michael, M. D., MacTavish, L.M., Yarnell, R. W. (2013b) Do Power Lines and Protected Areas Present a Catch-22 Situation for Cape Vultures (*Gyps coprotheres*)? *PLoS ONE* 8(10): 1-10

Pikula J, Hajkova P, Bandouchova H, Bednarova I, Adam V, Beklova M, Kral J, Ondracek K, Osickova J, Pohanka M, Sedlackova J, Skochova, H, Sobotka, Treml F, Kizek R (2013) Lead toxicosis of captive vultures: case description and responses to chelation therapy. *BMC Veterinary Research* 9: 11

Piper, S.E., Boshoff, A.F. and Scott, H.A. (1999) Modelling survival rates in the Cape Griffon *Gyps coprotheres*, with emphasis on the effects of supplementary feeding. *Bird Study* 46(suppl.): S230–238.

Poharkar, A., Reddy, P.A., Gadge, V.A., Kolte, S., Nurkure, N. and Shivaji, S. (2009) Is malaria the cause for decline of the Indian White-backed Vulture (*Gyps bengalensis*)? *Current Science* 96: 553-558.

Prakash, V. (1999). Status of vultures in Keoladeo National Park, Bharatpur, Rajasthan, with special reference to population crash in *Gyps* species. *Journal of the Bombay Natural History Society* 96: 365-378.

Prakash, V., Bishwakarma, M.C., Chaudhary, A., Cuthbert, R., Dave, R., Kulkarni, M., Kumar, S., Paudel, K., Ranade, S., Shringarpure, R. and Green, R.E. (2012) The Population Decline of *Gyps* Vultures in India and Nepal Has Slowed since Veterinary Use of Diclofenac was Banned. *PLoS One* 7(11).

Prakash, V., Green, R.E., Pain, D.J., Ranade, S.P., Saravanan, S. and Prakash, N. (2007) Recent changes in populations of resident *Gyps* vultures in India. *Journal of the Bombay Natural History Society* 104: 127-133

Prakash, V., Pain, D.J., Cunningham, A.A., Donald, P.F., Prakash, N., Verma, A., Gargi, R., Sivakumar, S. and Rahmani, A.R. (2003) Catastrophic collapse of Indian white-backed *Gyps bengalensis* and long-billed *Gyps indicus* vulture populations. *Biological Conservation* 109: 381–390.

Prakash, V., Pain, D.J., Shultz, S. and Cunningham, A.A. (2004) Saving Asia's *Gyps* Vultures: The "Vulture Rescue" Team's Conservation Programme. *Raptors Worldwide*. World Working Group on Birds of Prey, Budapest, Hungary.

Prakash, V., Shultz, S., Pain, D.J, Cunningham, A.A., Saravanan, S., Renade, S., and Green, R. (in prep) Recent population trends of *Gyps bengalensis*, *Gyps indicus* and *Gyps tenuirostris* in India.

Praveen, J., Nameer, P.O., Karuthedathu, D., Ramaiah, C., Balakrishnan, B., Rao, K. M., Shurpali, S., Puttaswamaiah, R. and Tavcar, I. (2014) On the vagrancy of the Himalayan Vulture *Gyps himalayensis* to southern India. *Indian Birds* 9 (1): 19–22.

Prinsen, H. A. M., Smallie, J. J., Boere, G. C. and Píres, N. (compilers) (2012). *Guidelines on How to Avoid or Mitigate Impact of Electricity Power Grids on Migratory Birds in the African-Eurasian Region*. AEWA Conservation Guidelines No. 14, CMS Technical Series No. 29, AEWA Technical Series No. 50, CMS Raptors MOU Technical Series No. 3, Bonn, Germany.

Ramírez, J., Muñoz, A. R., Onrubia, A., de la Cruz, A., Cuenca D., González, J. M. and Arroyo, G. M. (2011) Spring movements of Rüppell's Vulture *Gyps rueppelli* across the Strait of Gibraltar. *Ostrich* 82: 71–73.

Rasmussen, P.C. and Parry, S.J. (2001) The taxonomic status of the Long-billed Vultures *Gyps indicus indicus*. *Vulture News* 44:18-21.

Razin, M. (2015) Le saturnisme chez les rapaces nécrophages des Pyrénées françaises. Life gyphelp - Symposium Saturnisme-Annecy (74) - / LPO. Razin, M. (2016) Circulaire Réseau Casseur d'os n° 72. MR/LPO.

Republic of the Union of Myanmar (2015) *National Biodiversity Strategy and Action Plan (2015-2020)*. Downloaded from https://www.cbd.int/doc/world/mm/mm-nbsap-v2-en.pdf. Accessed in December 2016.

Richards, N., Ogada, D., Buij, R. and Botha, A. (2017) The Killing Fields: The Use of Pesticides and Other Contaminants to Poison Wildlife in Africa. *Encyclopedia of the Anthropocene* 1-8.

Rondeau, G and Thiollay, J.-M. (2004) West African vulture decline. *Vulture News* 51: 13-33

Rondeau, G., Pilard, P., Ahon, B. and Condé, M. (2006) Tree-nesting Rüppell's Griffon Vultures. *Vulture News* 55: 14-22.

Roxburgh, L. and McDougall, R. (2012) Vulture poisoning incidents and the status of vultures in Zambia and Malawi. *Vulture News* 62: 33-39.

Rushworth, I. and Krüger, S. (2014) Wind farms threaten southern Africa's cliff-nesting vultures. *Ostrich* 85: 13-23

Saidu, Y. and Buij. R. (2013) Traditional medicine trade in vulture parts in northern Nigeria. *Vulture News* 65: 4-14.

Sanz-Aguilar A, Sánchez-Zapata JA, Carrete M (2015) Action on multiple fronts, illegal poisoning and windfarm planning, is required to recerse the decline of the Egyptian Vulture in southern Spain. *Biological Conserv*ation 187:10-18.

Saravia, V., Kret, E., Dobrev, V. and Nikolov S. C. (2016) Assessment of mortality causes for the Egyptian Vulture (*Neophron percnopterus*) in Bulgaria and Greece (1997-2015). Fact sheet under action A1 of the LIFE+ project "The Return of the Neophron" (LIFE10 NAT/BG/000152). HOS, Athens. 9 p.

Schultz, P. (2007) Does bush encroachment impact foraging success of the critically endangered Namibian population of the Cape Vulture *Gyps coprotheres*? *Vulture News*: 109. Ref

Secretariat of the Convention on Biological Diversity, Netherlands Commission for Environmental Assessment (2006). *Biodiversity in Impact Assessment.* Background Document to CBD Decision VIII/28: Voluntary Guidelines on Biodiversity-Inclusive Impact Assessment, Montreal, Canada.

Secretariat of the Convention on Biological Diversity (undated) Quick guide to the Aichi Biodiversity Targets. Downloaded from https://www.cbd.int/nbsap/training/quick-guides/. Accessed in December 2016.

Shimelis, A., Sande, E., Evans, S. and Mundy, P. (Eds.) (2005) *International Species Action Plan for the Lappet-faced Vulture Torgos tracheliotus.* BirdLife International, Nairobi, Kenya and Royal Society for the Protection of Birds, Sandy, UK

Shobrak, M. (2011) Changes in the number of breeding pairs, nest distribution and nesting trees used by the Lappet-faced Vulture *Torgos tracheliotus* in the Mahazat As-Sayd Protected Area, Saudi Arabia. *Journal of the Bombay Natural History Society* 108: 114-119.

Shobrak, M. (2014) Satellite tracking of the Lappet-faced Vulture *Torgos tracheliotos* in Saudi Arabia. *Jordan Journal of Natural History* 1: 131-141.

Shultz, S., Baral, H.S., Charman, S., Cunningham, A.A., Das, D., Ghalasi, G.R., Goudar, M.S., Green, R.E., Jones, A., Nighot, P., Pain, D.J., and Prakash, V. (2004) Diclofenac poisoning is widespread in declining vulture populations across the Indian subcontinent. *Proceedings of the Royal Society of London Series B* 271: S458-S460. doi 10.1098/rsbl.2004.0223

Simmons, R. (1986) Delayed breeding and the non-adaptive significance of delayed maturity in vultures: a fruit fly perspective. *Vulture News* 15:13-18.

Simmons, R. E. and Jenkins, A. (2007) Is climate change influencing the decline of Cape and Bearded Vultures in southern Africa? *Vulture News* 56: 41-51.

Simmons, R.E., Brown, C.J. and Kemper, J. (2015) *Birds to watch in Namibia: red, rare and endemic species.* Ministry of Environment and Tourism and Namibia Nature Foundation, Windhoek.

Skartsi T., Dobrev V., Oppel S., Kafetzis A., Kret E., Karampatsa R., Saravia V., Bounas T., Vavylis D., Sidiropoulos L., Arkumarev V., Dyulgerova S. and Nikolov S. C. (2014) Assessment of the illegal use of poison in Natura 2000 sites for the Egyptian Vulture in Greece and Bulgaria during the period 2003-2012. Technical report under action A3 of the LIFE+ project "The Return of the Neophron" (LIFE10 NAT/BG/000152). WWF Greece, Athens. 75 p.

Snow, D. W., Perrins, C. M., and Gillmor, R. (1998). *The birds of the western palaearctic. Vol. 1, Non-passerines*. Oxford University Press.

Srikosamatara, S. and Suteethorn, V. (1995) Populations of Gaur and Banteng and their management in Thailand. *Natural History Bulletin Siam Society* 43: 55-83.

Steyn, P. (1982) *Birds of prey of southern Africa*. David Philip, Cape Town

STRIX. 2012. Developing and testing the methodology for assessing and mapping the sensitivity of migratory birds to wind energy development. BirdLife International, Cambridge.

Sum, P. and Loveridge, R. (2016) *Cambodia vulture action plan 2016-2025*. Phnom Penh, Cambodia.

Swan, G., Naidoo, V., Cuthbert, R., Green, R.E., Pain, D.J., Swarup, D., Prakash, V., Taggart, M., Bekker, L., Das, D., Diekmann, J., Diekmann, M., Killian, E., Meharg, A., Patra, R.C., Saini, M. and Wolter, K. (2006) Removing the threat of diclofenac to critically endangered Asian vultures. *PLoS Biology*: e66, or 4(3): 395-402.

Swarup, D., Patra, R. C., Prakash, V., Cuthbert, R., Das, D., Avari, P., Pain, D. J., Green, R. E., Sharma, A. K., Saini, M., Das, D. and Taggart, M. (2007) Safety of meloxicam to critically endangered Gyps vultures and other scavenging birds in India. *Animal Conservation* 10(2): 192-198.

Taggart, M.A., Senacha, K.R., Green, R.E., Jhala, Y.V., Raghavan, B., Rahmani, A.R., Cuthbert, R., Pain, D.J. and Meharg, A.A. (2007) Diclofenac residues in carcasses of domestic ungulates available to vultures in India. *Environment International* 33: 759-765.

Taylor, M., Peacock, F. and Wanless, R. M. (2015) *Eskom Red Data Book of Birds of South Africa, Lesotho and Swaziland.* Johannesburg, South Africa: BirdLife South Africa, University of Cape Town and South African National Biodiversity Institute.

Thiollay, J.-M. (2006) Severe declines of large birds in the northern Sahel of West Africa: a long-term assessment. *Bird Conservation International* 16: 353-365

Tucker, G. and Treweek, J. (2008) *Guidelines on how to avoid, minimise or mitigate the impact of infrastructure developments and related disturbance affecting waterbirds*. AEWA Conservation Guidelines No. 11, AEWA Technical Series No. 26, Bonn, Germany.

UNEP/CMS (2015) Proposals for amendments to the Raptors MOU and/or its annexes: list of African-Eurasian migratory birds of prey (Annex 1). Report UNEP/CMS/Raptors/MoS2/13/Rev.1.

van der Winden, J., van Vliet, F., Patterson, A., and Lane, B. (2014) *Renewable Energy Technologies and Migratory Species: Guidelines for sustainable deployment*. UNEP/CMS/ScC18/Doc.10.2.2/Annex: Guidelines.

Van Rooyen , C. S . (2000) An overview of vulture electrocutions in South Africa . *Vulture News* 43 : 5–22.

Virani, M., Gilbert, M., Watson, R., Oaks, L., Benson, P. Khan, A. A. and Baral, H-S. (2001). Asian Vulture Crisis Project: Field results from Pakistan and Nepal for the 2000-2001 field season. In *Reports from the workshop on Indian* Gyps *vultures.* Katzner, T. and Parry-Jones, J. (Eds). 4th Eurasian Congress on Raptors, p 133, Seville, Spain. Estación Biológica Donaña, Raptor Research Foundation

Virani, M.Z., Kendall, C., Njoroge, P. and Thomsett, S. (2011) Major declines in the abundance of vultures and other scavenging raptors in and around the Masai Mara ecosystem, Kenya. *Biological Conservation* 144: 746–752.

Watson, R.T., Fuller, M., Pokras, M. and Hunt, W. (Eds.) (2009) Proceedings of the conference on ingestion of lead from spent ammunition: implications for wildlife and humans. The Peregrine Fund, Boise, ID, USA.

Wernery, U. 2009. A Lappet-faced Vulture nest in eastern Arabia. *Phoenix*: 15.

Western, D., Russell, S. and Cuthill, I. (2009) The Status of Wildlife in Protected Areas Compared to Non-Protected Areas of Kenya. *PLoS One* 4(7): e6140

Williams, V.L., Cunningham, A.B., Kemp, A.C. and Bruyns, R.K. (2014) Risks to birds traded for African traditional medicine: a quantitative assessment. *PLoS ONE* 9(8): e105397

Wolter, K., Naidoo, V., Whittington-Jones, C., Bartels, P. (2007). Does the presence of vulture restaurants influence the movement of Cape Vultures (*Gyps coprotheres*) in the Magaliesberg? Unpublished report to SAWMA, Didima, South Africa.

Zorrilla, I., Martinez, R., Taggart, M.A. and Richards, N. 2014. Suspected flunixin poisoning of a wild Eurasian Griffon Vulture from Spain. *Conservation Biology* 29: 587–592.

10. ANNEXES

Annex 1: Workshop Participants and Other Contributors

In all tables, the Country column primarily indicates the specialist area of knowledge of the participant, but in certain cases their country of residence.

Participants – Africa Regional Workshop: Dakar, Senegal, 18–21 October 2016:

Name	Affiliation	Country
Alfonso Godino	AMUS-Acción por el Mundo Salvaje	Spain
Wilfried Adjakpa	Centre for Ornithology and Environment	Benin
Arjun Amar	Percy Fitzpatrick Institute of Field Ornithology, University of Cape Town	South Africa
Andre Botha	IUCN SSC Vulture Specialist Group	South Africa
Ara Monadjem	University of Swaziland	Swaziland
Alvaro Camiña	IFG-WBG	Spain
Bakary Magassouba	Office Guinéen des Parcs et Réserves, Ministère de l'Environnement	Guinea
Beckie Garbett	Raptors Botswana	Botswana
Campbell Murn	The Hawk Conservancy Trust	UK
Chris Bowden	SAVE & RSPB	India/UK
Chris Kelly	Wildlife Act	South Africa
Clément Daboné	Universite de Ouagadougou	Burkina Faso
Corinne Kendall	North Carolina Zoo	USA/Tanzania
Darcy Ogada	The Peregrine Fund	Kenya
Dipali Mukherjee	BirdLife International	Ghana
Evan Buechley	University of Utah	Ethiopia
Fadzai Matsvimbo	BirdLife Zimbabwe	Zimbabwe
Glyn Maude	Raptors Botswana	Botswana
Humbu Mafumo	Department of Environmental Affairs	South Africa
Ian Rushworth	KwaZulu-Natal Wildlife/Bearded Vulture Task Force	South Africa
Japheth Roberts	Ghana Wildlife Society	Ghana
Jean Marc Thiollay	Ligue pour la Protection des Oiseaux	France
Justus Deikumah	University of Cape Coast	Ghana
Joseph Onoja	Nigerian Conservation Foundation	Nigeria

Name	Affiliation	Country
Kariuki Ndanganga	BirdLife International	Kenya
Keith Bildstein	Hawk Mountain Sanctuary	USA
Kerri Wolter	VulPro	South Africa
Lizanne Roxburgh	Endangered Wildlife Trust	South Africa
Romaric Serge Lokossou	Centre d'Etudes de Recherches et de Formation Forestière/Environment Ministry	Benin
Louis Phipps	Nottingham Trent University	UK
Lourens Leeuwner	Endangered Wildlife Trust	South Africa
Lindy Thompson	University of Kwazulu Natal	South Africa
Maggie Hirschauer	VulPro	South Africa
Masumi Gudka	BirdLife International	Kenya
Micheal Kibuule	Makerere University	Uganda
Miguel Xavier	National Institute of Biodiversity and Protected Areas Management	Angola
Mike McGrady	independent	Djibouti
Mohamed Amezian	GREPOM/BirdLife Morocco	Morocco
Mohamed Henriques	Institute of Biodiversity and Protected Areas	Guinea-Bissau
Nick P. Williams	Coordination Unit, CMS Raptors MoU	UAE
Nonofo Ntsima	Government of Botswana	Botswana
Nicomyila Gilbent	ACNR- Birdlife Rwanda	Rwanda
Ouni Ridha	Tunisia Wildlife Conservation Society	Tunisia
Paul Gacheru	Nature Kenya	Kenya
Patrick Benson	University of Maryland	South Africa
Ralph Buij	Alterra, Wageningen University	Netherlands
Roger Safford	BirdLife International	UK
Robert Thomson	Percy Fitzpatrick Institute of Field Ornithology, University of Cape Town	South Africa
Sonja Krüger	KwaZulu-Natal Wildlife/Bearded Vulture Task Force	South Africa
Simon Gear	BirdLife South Africa	South Africa
Imad Cherkaoui	AEWA-Tc	Morocco
Thomas Rabeil	Sahara Conservation Fund	Niger/Chad
Volker Salewski	NABU	Germany
Yilma Abebe	Ethiopian Wildlife and Natural History Society	Ethiopia

Participants – Europen Regional Workshop: Monfragüe, Spain, 26-28 October 2016:

Name	Affiliation	Country
Taulant Bino	Albanian Ornithological Society	Albania
Sevak Baloyan	Management Agency- Ministry for Nature Protection	Armenia
Philippe Helsen	KMDA / European Black Vulture EEP	Belgium
Boris Barov	BirdLife International	Belgium
Noelia Vallejo-Pedregal	European Comission	Belgium
Dobromir Dobrev	Bulgarian society for the protection of birds/ Birdlife Bulgaria	Bulgaria
Stoycho Stoychev	Bulgarian Society for the Protection of Birds	Bulgaria
Hristo Peshev	Fund for Wild Flora and Fauna	Bulgaria
Goran Sušić	Ornithological station Rijeka Institute of Ornithology CASA	Croatia
Mohamed Habib	Red Sea Association for environment and water sports	Egypt
Osama Elgebaly	Egyptian Environmental Affairs Agency	Egypt
Olivier Patrimonio	Ministry of environment - France	France
Raphaël Néouze	L.P.O. Birdlife France	France
Borja Heredia	UNEP/Convention on Migratory Species	Germany
Stavros Xirouchakis	Natural History Museum of Crete – University of Crete	Greece
Elzbieta Kret	World Wildlife Fund	Greece
Victoria Saravia	Hellenic Ornithological Society	Greece
Miklós Dudás	Hortobágy National Park Directorate	Hungary
Szilvia Gőri	Hortobágy National Park Directorate	Hungary
Ohad Hatzofe	Nature and Parks Authority	Israel
Guido Ceccolini	Association CERM Endangered Raptors Centre	Italy
Anna Cenerini	Association CERM Endangered Raptors Centre	Italy
Alessandro Andreotti	Istituto Superiore per la Protezione e la Ricerca Ambientale	Italy
Fiammetta Berlinguer	University of Sassari	Italy
Filvio Genero	Vulture Conservation Foundation	Italy
Laith El-Moghrabi	ECO Consult	Jordan
Tareq Qaneer	The Royal Society for the Conservation of Nature	Jordan

Name	Affiliation	Country
Tuguldur Enkhtsetseg	The Nature Conservancy	Mongolia
Eduardo Santos	LPN – Liga para a Protecção da Natureza	Portugal
Joaquim Teodósio	Society for the Study of Birds - BirdLife Portugal	Portugal
Julieta Costa	Society for the Study of Birds - BirdLife Portugal	Portugal
Alice Gama	Vulture Conservation Foundation	Portugal
Elena Shnayder	Sibecocenter, LLC	Russia
Mohammed Shobrak	Saudi Wildlife Authority & Taif University	Saudi Arabia
Bratislv Grubac	Institute for Nature Conservation of Serbia	Serbia
Uros Pantovic	Bird Protection and Study Society of Serbia	Serbia
Sasa Marinkovic	Birds of Prey protection Foundation	Serbia
Andre Bota	Endengared Wildlife Trust	South Africa
Eduardo Soto Largo	CBD Habitat	Spain
Joan Real	University of Barcelona	Spain
Helena Tauler-Ametller	University of Barcelona	Spain
Antonio Hernádez-Matías	University of Barcelona	Spain
Alvaro Camiña	IFC World Bank Group / Vulture Conservation Foundation	Spain
Rubén Moreno-Opo	Ministry of Agriculture, Food an Environment of Spain	Spain
Pascal López-López	University of Valencia	Spain
Ernesto Álvarez Xusto	Grupo de Rehabilitación de la Fauna Autóctona y su Hábitat	Spain
Émilie Delepoulle	Grupo de Rehabilitación de la Fauna Autóctona y su Hábitat	Spain
Ana Heredia		Spain
Jovan Andevski	Vulture Conservation Foundation	Spain
David Izquierdo	Vulture Conservation Foundation	Spain
Juan Carlos Atienza	Sociedad Española de Ornitologia - BirdLife-Spain	Spain
David de la Bodega	Sociedad Española de Ornitologia - BirdLife-Spain	Spain
Vanesa Palacios	Dirección General de Turismo - Junta de Extremadura	Spain
José Antonio Mateos Martín	Dirección General de Medio Ambiente - Junta de Extremadura	Spain
Ángel Sánchez	Dirección General de Medio Ambiente - Junta de Extremadura	Spain
Ángel Rodríguez Martín	National Park Monfragüe	Spain
Andrés Rodríguez	National Park Monfragüe	Spain

Name	Affiliation	Country
José Mª Abad Gomez-Pantoja	Dirección General de Medio Ambiente - Junta de Extremadura	Spain
Carlos González Villalba	Dirección General de Medio Ambiente - Junta de Extremadura	Spain
Emilio Jiménez Díaz	Dirección General de Medio Ambiente - Junta de Extremadura	Spain
Raquel Burdalo	Diputación de Cáceres	Spain
Fernando Javier Grande Cano	Diputación de Cáceres	Spain
Daniel Hegglin	Vulture Conservation Foundation (VCF)	Switzerland
Itri Levent Erkol	Doğa Derneği - BirdLife Turkey	Turkey
İlker Özbahar	Turkish Nature Research Society	Turkey
José Tavares	Vulture Conservation Foundation	Turkey
Nick P. Wiliams	Coordinating Unit, CMS Raptors MoU	United Arab Emirates
Shakeel Ahmed	Environment Agency – Abu Dhabi	United Arab Emirates
Iván Ramírez	BirdLife International	United Kingdom
Roman Kashkarov	Uzbekistan Society for the Protection of Birds	Uzbekistan

Participants – Asian Regional Workshop: Mumbai, India, 29-30 November 2016:

Name	Affiliation	Country*
M. Monirul Khan	University of Dhaka	Bangladesh
Sarowar Alam	IUCN Bangladesh	Bangladesh
Shamim Ahmed	Prokriti O Jibon Foundation	Bangladesh
Phearun Sum	BirdLife International Cambodia Programme	Cambodia
Masphal Kry	Cambodia Forest Department	Cambodia
Ung Sam Oeun	Cambodia Ministry of Environment	Cambodia
Vibhu Prakash	Bombay Natural History Society	India
Sachin Ranade	Bombay Natural History Society	India
Mandar Kulkarni	Bombay Natural History Society	India
Rohan Shringarpure	Bombay Natural History Society	India
Bharathidasan Subbaiah	Arulagam,Tamil Nadu	India

Name	Affiliation	Country*
Satya Prakash	Neohuman Foundation, Jharkhand	India
Kedar Gore	Corbett Foundation	India
Mohini Saini	Indian Veterinary Research Institute	India
Amita Kanaujia	Lucknow University	India
Daulal Bohara	Vulture biologist, Rajasthan	India
Shivangi Mishra	Lucknow University	India
Nikita Prakash	Bombay Natural History Society	India
Kiran Srivastava	Asian Raptor Foundation	India
S M Satheesan	raptor biologist	India
Kartik Shastri	Vulture biologist, Gujarat	India
Suresh Kumar	Wildlife Institute of India	India
Hamid Amini Tareh	Department of Environment Tareh, Government of Iran	Iran
Alireza Hashemi	Tarlan Birdwatching and Ornithological Group	Iran
Tulsi Subedi	Himalayan Nature	Nepal
Krishna Bhusal	Bird Conservation Nepal	Nepal
Kaset Sutasha	Bird Conservation Society of Thailand	Thailand
Munir Virani	The Peregrine Fund	Kenya/S Asia
Chris Bowden	SAVE/Royal Society for the Protection of Birds	UK/S Asia
Campbell Murn	Hawk Conservancy Trust	UK/Pakistan
Toby Galligan	Royal Society for the Protection of Birds	UK/S Asia
Jemima Parry-Jones	International Centre for Birds of Prey	UK/S Asia
Rhys Green	University of Cambridge/Royal Society for the Protection of Birds	UK/S Asia
Nick P. Williams	Coordination Unit, CMS Raptors MoU	UAE
Andre Botha	IUCN SSC Vulture Specialist Group	South Africa
Jose Tavares	Vulture Conservation Foundation	Turkey
Jovan Andevski	Vulture Conservation Foundation	Macedonia

Participants – Middle East Regional Workshop: Sharjah, UAE, 6-9 February 2017:

Name	Affiliation	Country
Mike McGrady	International Avian Research	Austria
Mubarak Al Dosery	Environment C.	Bahrain
Stoyan Nikolov	Bulgarian Society for the Protection of Birds	Bulgaria
Osama El-Gebaly	Environmental Agency	Egypt
Sadegh Sadeghi Zadegan	Department of Environment	Iran
Mostafa Ahmed	Kuwait Zoo	Kuwait
Salah Behbehani	The Scientific Center Kuwait	Kuwait
Mostafa Mahmoud	Kuwait Zoo	Kuwait
Mansoor Al Jadhami	Diwan of Royal Court	Oman
Ahmad Al-Razem	Al Wabra Wildlife Preserve	Qatar
Cramell Purchase	Al Wabra Wildlife Preserve	Qatar
Ahi Ahfaqih		Saudi Arabia
Hamad Alqahtani	Saudi Wildlife Authority	Saudi Arabia
Monif AlRoshidi	University of Hail	Saudi Arabia
Mohammed Shobrak	University of Taif	Saudi Arabia
André Botha	Endangered Wildlife Trust	South Africa
Jovan Andevski	Vulture Conservation Foundation	Spain
José Tavares	Vulture Conservation Foundation	Turkey
Obaid Al Shamsi	Ministry of Climate Change and Environment	UAE
Maria Pesci	Environment Agency - Abu Dhabi	UAE
Esmat Elhassan	Dubai Municipality	UAE
Mohamed Eltayeb	Dubai Municipality	UAE
Sharmshad Alam	Dubai Municipality	UAE
Junid Shah	Dubai Municipality	UAE
Giulio Russo	Breeding Centre for Endangered Arabian Wildlife	UAE
Gerry Whitehouse-Tedd	Environment and Protected Areas Authority of Sharjah	UAE
Anne Lisa Chaber	Wildlife Consultant LLC	UAE
Khaliya AlKitbi	Environment and Protected Area Authority	UAE
Peter Dickinson	Ski Dubai	UAE

Name	Affiliation	Country
Jawaher Ali Al Rasheed	Wasit Wetland Center	UAE
Sara Mohamed	Wasit Wetland Center	UAE
Kevin Hyland	Wildlife Protection Office	UAE
Panos Azmanis	Dubai Falcon Hospital	UAE
Lisa Banfield	Al Ain Zoo	UAE
Greg Simkins	Dubai Desert Conservation Reserve	UAE
Peter Arras	Management of Nature Conservation Al Ain	UAE
Reza Khan	Dubai Safari	UAE
Lyle Glowka	Convention on Migratory Species Office - Abu Dhabi	UAE
Nick P. Williams	Coordinating Unit, CMS Raptors MoU	UAE
Jenny Renell	Coordinating Unit, CMS Raptors MoU	UAE

Participants – Overarching Workshop: *Toledo, Spain, 16-19 February 2017:*

Name	Affiliation	Country
Stoyan Nikolov	Bulgarian Society for the Protection of Birds	Bulgaria
Mashpal Kry	Department of Wildlife and Biodiversity	Cambodia
Phaerun Sum	BirdLife Cambodia	Cambodia
Roller Ma Ming	Xinjang Institute of Ecology and Ecography, Chinese Academy of Sciences	China
Kofi Adu-Nsiah	Ghana Wildlife Division	Ghana
Hamid Amini	Department of the Environment	Iran
Mohammad Ashgari Tabari	Ornithology Unit, Wildlife Research Bureau, Department of Environment	Iran
Ohad Hatzofe	Israel Nature and Parks Authority	Israel
Charles Musyoki	Kenya Wildlife Service	Kenya
Batbayar Galtbalt	Wildlife Science and Conservation Center	Mongolia
Naeem Ashraf Raja	Biodiversity Programme	Pakistan
Sharif Baloch Uddin	Wildlife and National Parks, Balochistan	Pakistan
Hamad Alqahtani	Saudi Wildlife Authority	Saudi Arabia
Mohammed Shobrak	Taif University	Saudi Arabia
André Botha	Endangered Wildlife Trust	South Africa
Nicolas Lopez	Environmental Agency, Junta de Comunidades Castilla-la Mancha	Spain

Name	Affiliation	Country
Juan Pablo Castaño Lopez	Tecnico Media Ambiente, Junta de Comunidades Castilla-la Mancha	Spain
Ricardo Gómez Calmaestra	Spanish Ministry of Environment	Spain
Rubén Moreno Opo	Spanish Ministry of Environment	Spain
Juan Carlos Atienza	SEO/BirdLife	Spain
David de la Bodega Zugasti	SEO/BirdLife	Spain
Jorge Fernández-Oureta	SEO/BirdLife	Spain
Sara Cabezas-Diaz	SEO/BirdLife	Spain
Alvaro Camina	IFC-World Bank Group	Spain
Manuel Martin López	Fundación CBD-Habitat	Spain
Rhys Green	University of Cambridge	United Kingdom
Jemima Parry-Jones MBE	International Centre for Birds of Prey	United Kingdom
Roger Safford	BirdLife International	United Kingdom
Iván Ramírez Paredes	BirdLife International	Spain
Masumi Gudka	Africa Partnership Secretariat, BirdLife International	Kenya
Nicola Crockford	Royal Society for the Protection of Birds	United Kingdom
Chris Bowden	Royal Society for the Protection of Birds	India
Daniel Hegglin	Vulture Conservation Foundation	Switzerland
José Tavares	Vulture Conservation Foundation	Turkey
Jovan Andevski	Vulture Conservation Foundation	Spain
Borja Heredia	CMS Secretariat	Germany
Tilman Schneider	CMS Secretariat	Germany
Nick P. Williams	Coordinating Unit, CMS Raptors MoU	UAE
Jenny Renell	Coordinating Unit, CMS Raptors MoU	UAE
Fernando Spina	Italian Bird Ringing Centre	Italy

List of Additional Contributors (individuals who contributed information or other inputs, but did not attend any of the workshops)

Africa

Name	Affiliation	Country
Houssein Rayaleh	Association Djibouti Nature	Djibouti
Mohcen Menaa	Oum El Bouaghi University	Algeria

Osman Gedow Amir	Somali Wildlife and Natural History Society	Somalia
Pete Hancock	Raptors Botswana	Botswana
Samantha Nicholson	Endangered Wildlife Trust	South Africa
Sarra Mesabhia	Oum El Bouaghi University	Algeria
Tebogo Mashua	Department of Environmental Affairs	South Africa
Rob Davies	HabitatInfo	UK

Europe

Name	**Affiliation**	**Country***
Jordi Solà de la Torre	Dept of Environment, Government of Andorra	Andorra
Sevak Baloyan	Ministry of Nature Protection of Republic of Armenia	Armenia
Alex Llopis	Vulture Conservation Foundation	Austria
Elchin Sultanov	Azerbaijan Ornithological Society	Azerbaijan
Dejan Radosevic	The Institute for protection of cultural, historical and natural heritage	Bosnia & Herzegovina
Dobromir Dobrev	Bulgarian society for the protection of birds	Bulgaria
Emilian Stoynov	Fund for Wild Flora and Fauna	Bulgaria
Ivana Jelenić	Ministry of Environmental and Nature Protection	Croatia
Goran Susic	Ornithological station Rijeka CASA	Croatia
Nicolaos Kassinis	Game and Fauna Service Ministry of Interiro	Cyprus
Jean Paul Urcun	LPO Aquitaine	France
Néouze Raphaël	L.P.O. Grands Causses	France
Olivier Patrimonio	Ministère de l'Environnement	France
Pascal Orabi	LPO France	France
Aleksandre Abuladze	Institute of Zoology Ilia State University	Georgia
Victoria Saravia	Hellenic Ornithological Society	Greece
Elzbieta Kret	WWF Greece	Greece
Stavros Xirouchakis	Natural History Museum of Crete- University of Crete	Greece
Szilvia Gőri	Hortobágy National Park Directorate	Hungary
Miklós Dudás	Hortobágy National Park Directorate	Hungary
Ohad Hatzofe	Nature and Parks Authority Israel	Israel
Marco Gustin	Lipu - Italian League for the protection of Birds	Italy
Alessandro Andreotti	ISPRA - Istituto Superiore per la Protezione e la Ricerca Ambientale	Italy

Name	Affiliation	Country*
Guido Ceccolini	Association CERM Endangered Raptors Centre	Italy
Fulvio Genero	VCF	Italy
Tareq Emad Qaneer	The Royal Society for the Conservatio of Nature	Jordan
Laith El-Moghrabi	ECOConsult	Jordan
Nyambayar Batbayar	WSCC of Mongolia	Mongolia
Tuguldur Enkhtsetseg	the nature conservancy	Mongolia
Eduardo Santos	LPN - Liga para a Protecção da Natureza	Portugal
António Espinha Monteiro	Instituto da Conservação da Natureza e das Florestas	Portugal
Nela Miauta	Ministry of Environment, Waters and Forests	Romania
Elena Shnayder	Siberian Environmental Center	Russian Federation
Mohammed Shobrak	Taif University	Saudi Arabia
Bratisalav Grubač	Institute for Conservation Nature of Serbia	Serbia
Saša Marinković	Instite for biologycal research Siniša Stanković	Serbia
Uros Pantovic	Bird Protection and Study Society of Serbia	Serbia
Juan Antonio Gil Gallus	Fundación para la Conservación del Quebrantahuesos	Spain
Pascual López-López	University of Valencia	Spain
Fernando Feas	IAF	Spain
Rubén Moreno-Opo	Ministry of Agriculture, Food and Environment of Spain	Spain
Joan Real	University of Barcelona	Spain
Borja Heredia	UNEP/CMS	Spain
Eduardo Soto-Largo Meroño	Fundación CBD-Habitat	Spain
Helena Tauler-Ametller	University of Barcelona	Spain
Nicolás López Jiménez	SEO/BirdLife	Spain
Antonio Hernandez-Matiaz	University of Barcelona	Spain
Reto Spaar	Swiss Ornithological Institute	Switzerland
Daniel Hegglin	Stiftung Pro Bartgeier	Switzerland
Ahmad Aidek	Ministry of Local Administration and Environment	Syrian Arab Republic
Raffael Ayé	BirdLife Switzerland	Tajikistan
Jovan Andevski	Vulture Conservation Foundation	The FYR of Macedonia
Itri Levent Erkol	Doğa Derneği - BirdLife Turkey	Turkey
Elif Yamaç	Anadolu University	Turkey

Name	Affiliation	Country*
Ilker Ozbahar	Nature Research Society	Turkey
Elena Shnayder	Siberian Environmental Center	Ukraine
Salim Javed	Environment Agency-Abu Dhabi	United Arab Emirates
Shakeel Ahmed	Environment Agency - Abu Dhabi	United Arab Emirates
Roman Kashkarov	Uzbekistan Society for the Protection of Birds	Uzbekistan

Asia

Name	Affiliation	Country
Stephane Ostrowski	Wildlife Conservation Society	Afghanistan
Roller MaMing	Xinjiang Institute of Ecology and Geography	Chinese Academy of Sciences
Wu Daoning	Xinjiang Institute of Ecology and Geography	Chinese Academy of Sciences
Xu Guohua	Xinjiang Institute of Ecology and Geography	Chinese Academy of Sciences
Su Hualong	Academy of Forestry	China
Ma Qiang	Academy of Forestry	China
Bishwarup Raha	India	India
Nay Myo Shwe	Myanmar	Myanmar
Lay Win	Myanmar	Myanmar
Thet Zaw Naing	Myanmar	Myanmar
Zayar Soe	Myanmar	Myanmar
Win Ko Ko Naing Htun	Myanmar	Myanmar
Win Ko Ko	Myanmar	Myanmar
Uzma Khan	WWF Pakistan	Pakistan
Muhummad Jamshed Iqbal	WWF Pakistan	Pakistan
Hamera Aisha	WWF Pakistan	Pakistan
Warda Javed	WWF Pakistan	Pakistan
Saeed Abbas	WWF Pakistan	Pakistan
Shahid Iqbal	WWF Pakistan	Pakistan

Annex 2: Range and population status

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

No data	
Resident	
Breeding visitor	
Non-breeding	
Reintroduced	
Extinct since 1985	
Possibly extinct	
Passage	
Vagrant	

Country	Region	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	AS															
Albania	EU															
Algeria	AF															
Andorra	EU															
Angola	AF															
Armenia	EU															
Austria	EU															

Azerbaijan	**EU**															
Bangladesh	**AS**															
Belgium	**EU**															
Benin	**AF**															
Bhutan	**AS**															
Bosnia and Herzegovina	**EU**															
Botswana	**AF**															
Bulgaria	**EU**															
Burkina Faso	**AF**															
Burundi	**AF**															
Cambodia	**AS**															
Cameroon	**AF**															
Cape Verde	**AF**															
Central African Republic	**AF**															
Chad	**AF**															
Croatia	**EU**															
Cyprus	**EU**															
Czech Republic	**EU**															
Denmark	**EU**															
Djibouti	**AF**															
DPR China	**AS**															
DPR Korea	**AS**															
DR Congo	**AF**															
Egypt	**AF**															
Equatorial Guinea	**AF**															
Eritrea	**AF**															

Estonia	EU															
Ethiopia	AF															
Finland	EU															
France	EU															
Gabon	AF															
Gambia	AF															
Georgia	EU															
Germany	EU															
Ghana	AF															
Greece	EU															
Guinea	AF															
Guinea-Bissau	AF															
Hungary	EU															
India	AS															
Iraq	AS															
Islamic Republic of Iran	AS															
Israel	ME															
Italy	EU															
Ivory Coast	AF															
Jordan	ME															
Kazakhstan	EU															
Kenya	AF															
Kuwait	ME															
Kyrgyzstan	EU															
Lao PDR	AS															
Lebanon	ME															
Lesotho	AF															

Liberia	AF															
Libya	AF															
Malawi	AF															
Malaysia	AS															
Mali	AF															
Malta	EU															
Mauritania	AF															
Mongolia	AS															
Morocco	AF															
Mozambique	AF															
Myanmar	AS															
Namibia	AF															
Nepal	AS															
Netherlands	EU															
Niger	AF															
Nigeria	AF															
Oman	ME															
Pakistan	AS															
Poland	EU															
Portugal	EU															
Qatar	ME															
Republic of Korea	AS															
Republic of the Congo	AF															
Romania	EU															
Russia	EU															
Rwanda	AF															
Saudi Arabia	ME															

Senegal	**AF**															
Serbia	**EU**															
Sierra Leone	**AF**															
Singapore	**AS**															
Slovakia	**EU**															
Slovenia	**EU**															
Somalia	**AF**															
South Africa	**AF**															
South Sudan	**AF**															
Spain	**EU**															
Sudan	**AF**															
Swaziland	**AF**															
Switzerland	**EU**															
Syrian Arab Republic	**ME**															
Tajikistan	**EU**															
Tanzania	**AF**															
Thailand	**AS**															
The FYR of Macedonia	**EU**															
Togo	**AF**															
Tunisia	**AF**															
Turkey	**EU**															
Turkmenistan	**EU**															
Uganda	**AF**															
Ukraine	**EU**															
United Arab Emirates	**ME**															
United Kingdom	**EU**															
Uzbekistan	**EU**															

Vietnam	**AS**															
Western Sahara	**AF**															
Yemen	**ME**															
Zambia	**AF**															
Zimbabwe	**AF**															

Annex 2.2-2.5 Status and breeding population estimates for European, Middle East and Central Asian range countries

The following tables were derived from the questionnaires 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 in Asia. This lack of information would be addressed by the implementation of Result 10.1 (Table 8).

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

Country	**Status**	**Breeding pairs**	**Q**	**Year(s) of estimate**	**Breeding Population**	**Q**
Albania	extinct					
Andorra	breeding	1	G	2016	stable	G
Armenia	breeding	1	M	2007-2009	stable	M
Austria	breeding	3	G	2015	small increase	G
Azerbaijan	breeding	20-100	P	2000-2016	stable	P
Bosnia and Herzegovina	extinct					
Bulgaria	extinct	0	G	2016		
Egypt	breeding	2-3	M	2015		
France	breeding	59-61	G	2016	small increase	G
Georgia	breeding	20-25	M	2001-2012	small increase	M
Greece	breeding	6	G	2016	moderate	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
Mongolia	breeding	500-1000	P	2016	small increase	P
Palestina	extinct		P			
Portugal	extinct		G	2005		
Romania	extinct					
Russian Federation	breeding	181-237	G	2008	moderate	G
Russian Federation (Altai-	breeding	55-75	G	2016	stable	G
Saudi Arabia	extinct		M	2010		
Syria	extinct		M			
Serbia	extinct		G	2016		
Spain	breeding	116 (134*)	G	2015	moderate	G/M
Switzerland	breeding	14	G	2016	large increase	G
Syrian Arab Republic	extinct		M	2008		
Tajikistan	breeding	100s	P			P
The FYR of Macedonia	extinct		G	2015		
Turkey	breeding	160-200	M	2013	decline	M
Turkmenistan	breeding					
Uzbekistan	breeding	50-70	M	2009	stable	P
Yemen	breeding					

Data missing

Q – Data quality (Good, Medium, Poor)

*Territorial pairs

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

Country	Status	Breeding pairs	Q	Year(s) of estimate	Breeding Population	Q
Albania	extinct					
Armenia	breeding	50	M	2007-2009	stable	M
Azerbaijan	breeding	20-100	M	2000-2016	stable	M
Bosnia and Herzegovina	extinct					
Bulgaria	extinct	0-1	M	2016	stable	M
Croatia	extinct					
Cyprus	extinct		G			
Egypt	extinct					
France	breeding	30	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						
Mongolia	breeding	5000 -7000	P	2016	small decline	P
Portugal	breeding	18	G	2016	large increase	G
Romania	extinct					
Russian Federation	breeding	63-102	M	2004	small decline	M
Russian Federation (Altai-	breeding	71-96	G	2009	moderate	G
Saudi Arabia	wintering			2003		
Serbia	extinct		M	2016		
Spain	breeding	2068	G	2015/2012	moderate	G
Tajikistan	breeding	10-100	P			
The FYR of Macedonia	extinct		G	2015		
Turkey	breeding	80-200	M	2013	decline	M/P
Turkmenistan	breeding					
Uzbekistan	breeding	80-120	M	2005	small decline	P
Yemen	breeding					

Data missing

Q – Data quality (Good, Medium, Poor)

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

Country	Status	Breeding pairs	Q	Year(s) of estimate	Breeding Population trend in the last 10	Q
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 and 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	200	P	2013	decline	P
Israel	breeding	50-55	G	2016	stable	G
Italy	breeding	8	G	2015	decline	G
Jordan	possibly		P			
Kazakhstan	breeding	80-100	M	2012	decline	
Kyrgyzstan						
Lebanon	extinct					
Oman	breeding	>100	M	2013	stable	G
Palestine	breeding					
Portugal	breeding	110-130	M	2012	large decline	M
Qatar						
Romania	No breeding			2005-2016		
Russian Federation	breeding	88-121	G	2005	stable	G
Saudi Arabia	breeding	**?**	M	2012	large decline	M
Serbia	extinct		M	2016		
Spain	breeding	1452-1556	G	2008/2015	stable/decline	G
Syrian Arab Republic	breeding	25	M	2011		
Tajikistan	breeding	50-500	P			
The FYR of Macedonia	breeding	23	G	2015	large decline	G
Turkey	breeding	1000-2000	G	2013	decline	G
Turkmenistan	breeding	60-70	P	2012/2014	decline	P
United Arab Emirates	possibly	2-5	M	2015		
Uzbekistan	breeding	135-140	G	2011	decline	G
Yemen	breeding	800	G	2012	stable	G

Data missing

Q – Data quality (Good, Medium, Poor)

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

Country	Status	Breeding pairs	Q	Year(s) of estimate	Breeding Population trend in the last 10 years	Q
Andorra	breeding	2-mar	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 and Herzegovina	extinct					
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	possibly					
Iraq						
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						
Palestine	breeding					
Portugal	breeding	750	G	2007	moderate increase	G
Romania	extinct					
Russian Federation	breeding	152-223 x 2	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						
Tajikistan	breeding					
The FYR of Macedonia	breeding	14	G	2015	decline	G
Turkey	breeding	150-200	P	2013	small decline	P
Turkmenistan	breeding					
Ukraine (Crimea)	breeding	23-25	G	2016	stable	G
Uzbekistan	breeding	140-150	P	2009	decline	P
Yemen	breeding					

Data missing

Q – Data quality (Good, Medium, Poor)

Annex 3: Threat maps per species

This Annex maps the most severe (Critical and High) threats for each species in each subregion, using the same logic and colour scheme as the overarching threat map (Fig. 3). This allows the reader to understand in greater detail the threats affecting each vulture species. As in Figure 3, only range states where vultures are regularly present are brightly coloured; vagrant range states are not shown.

Fig. A3.1. Threats to the **Bearded Vulture *Gypaetus barbatus*** in each subregion of its range.

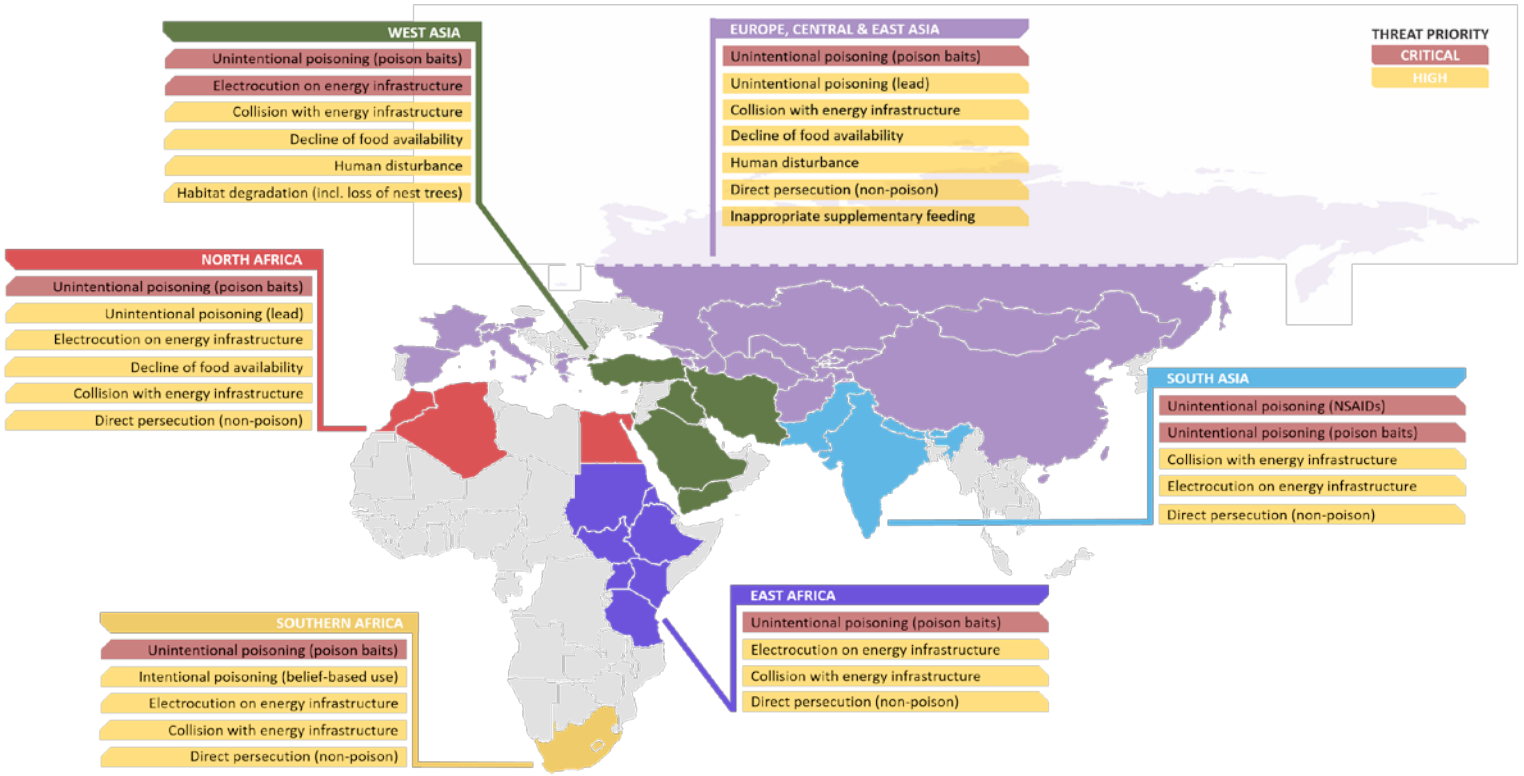


Fig. A3.2. Threats to the **Egyptian Vulture** ***Neophron percnopterus*** in each subregion of its range.

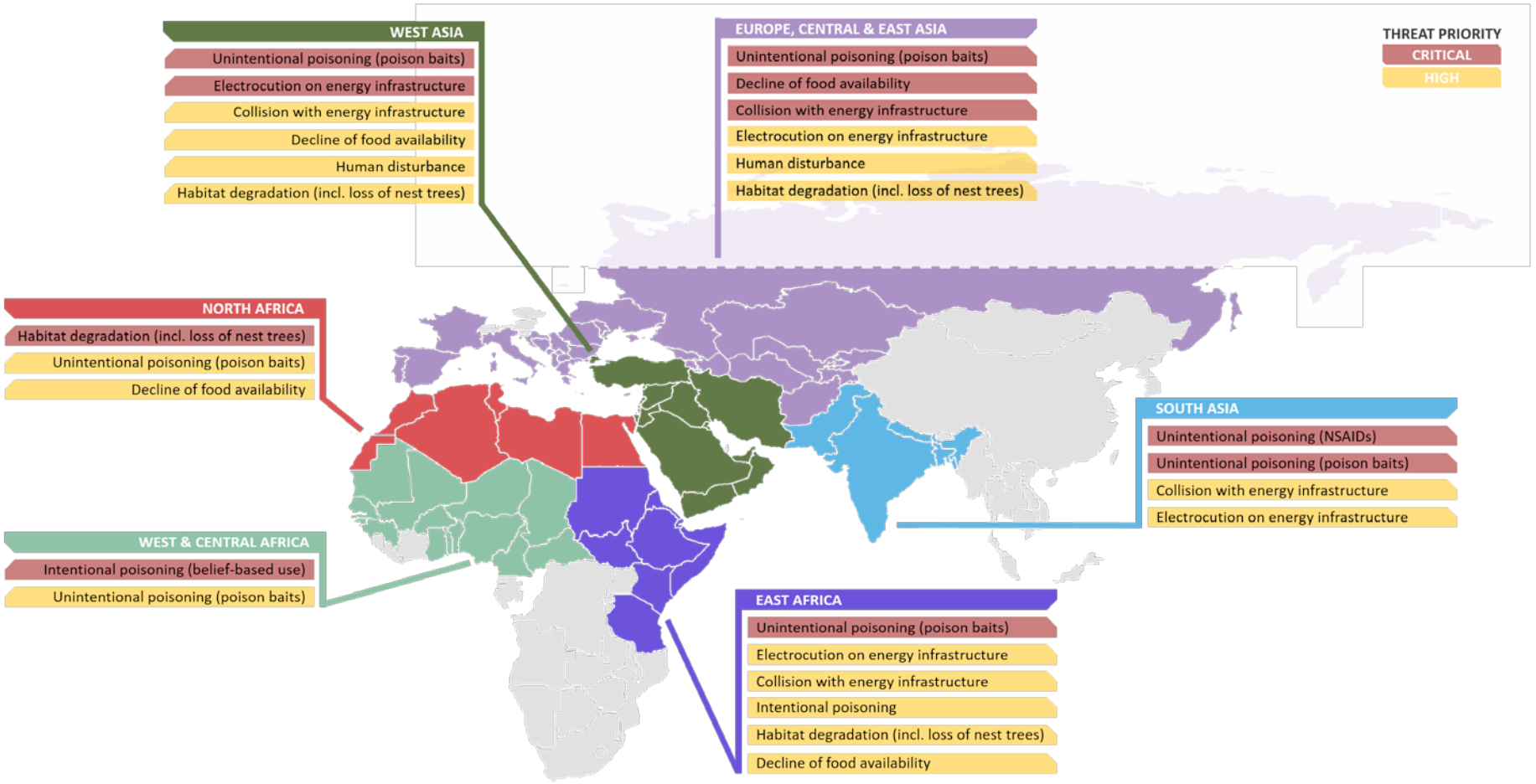


Fig. A3.3. Threats to the **Red-headed Vulture *Sarcogyps calvus*** in each subregion of its range.

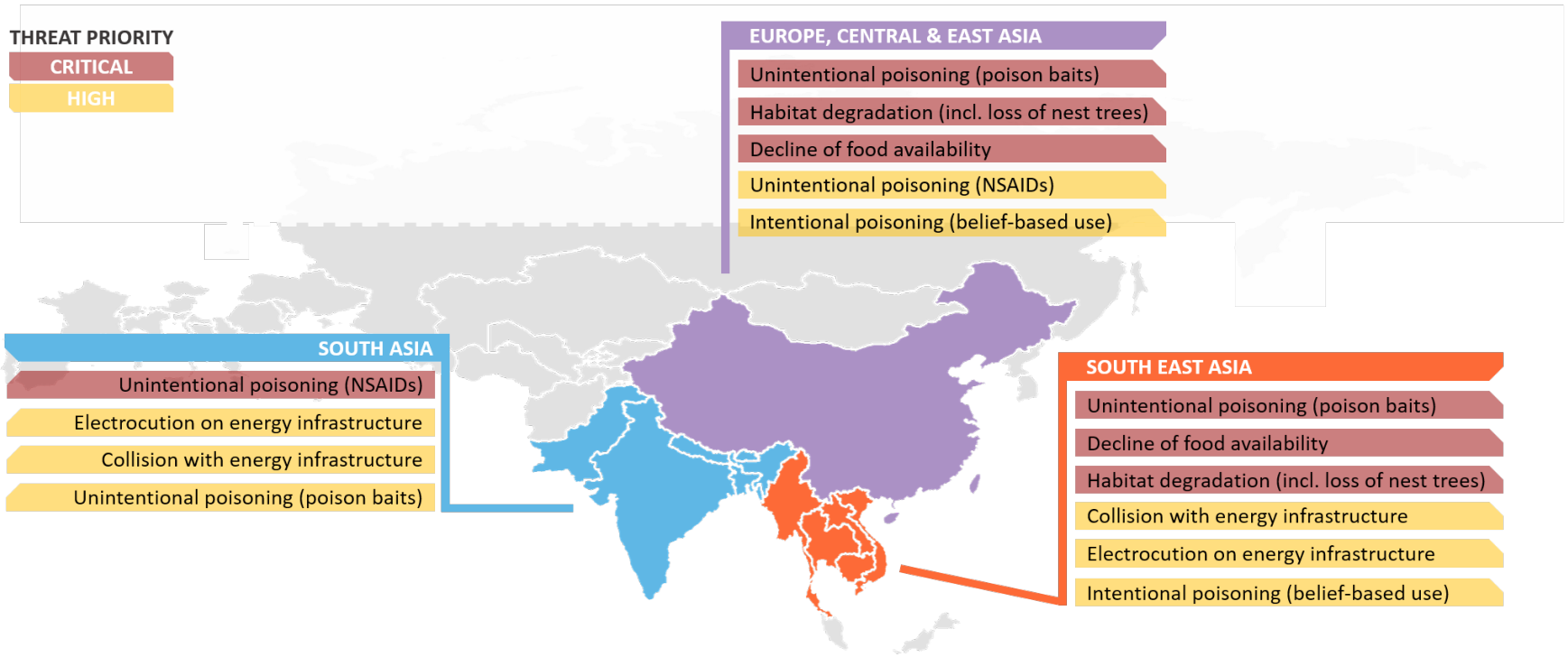


Fig. A3.4. Threats to the **White-headed Vulture *Trigonoceps occipitalis*** in each subregion of its range.

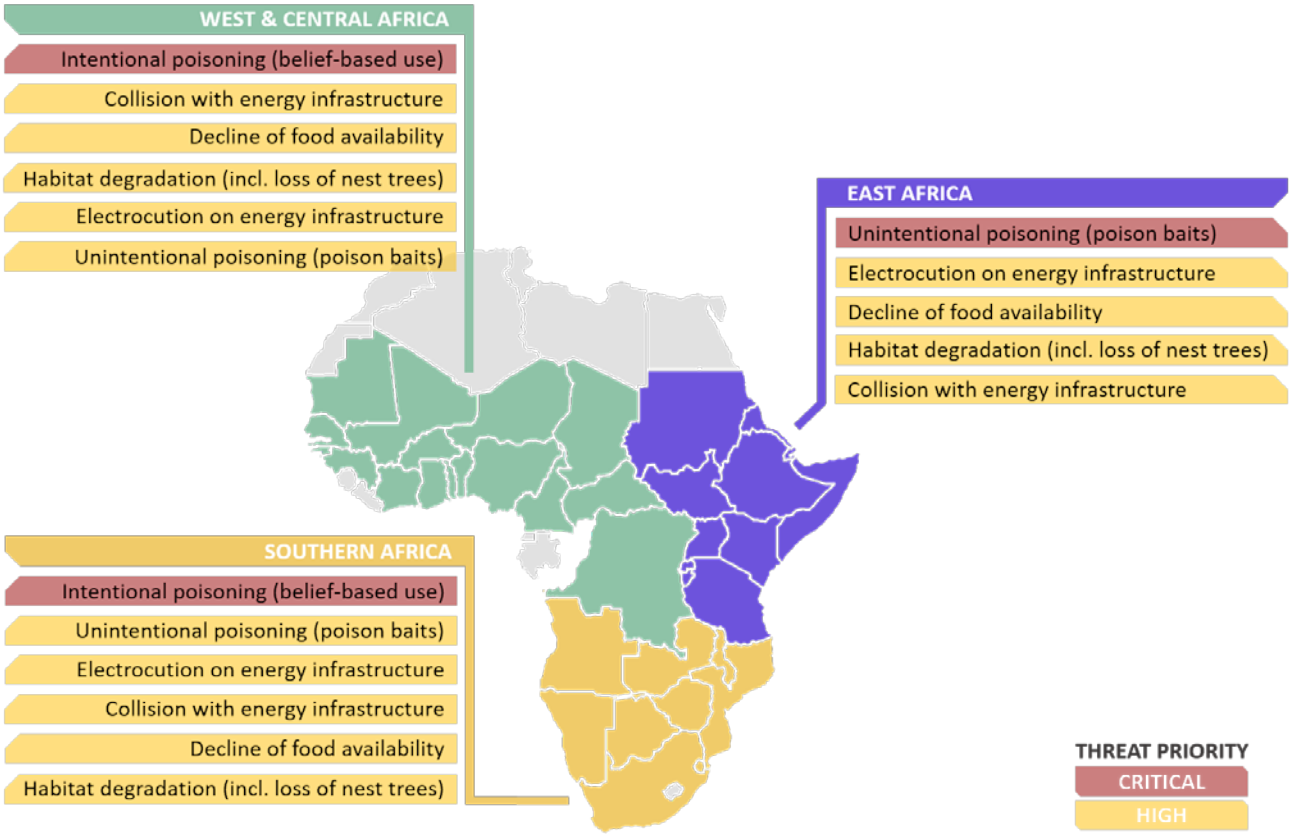


Fig. A3.5. Threats to the **Hooded Vulture** ***Necrosyrtes monachus*** in each subregion of its range.

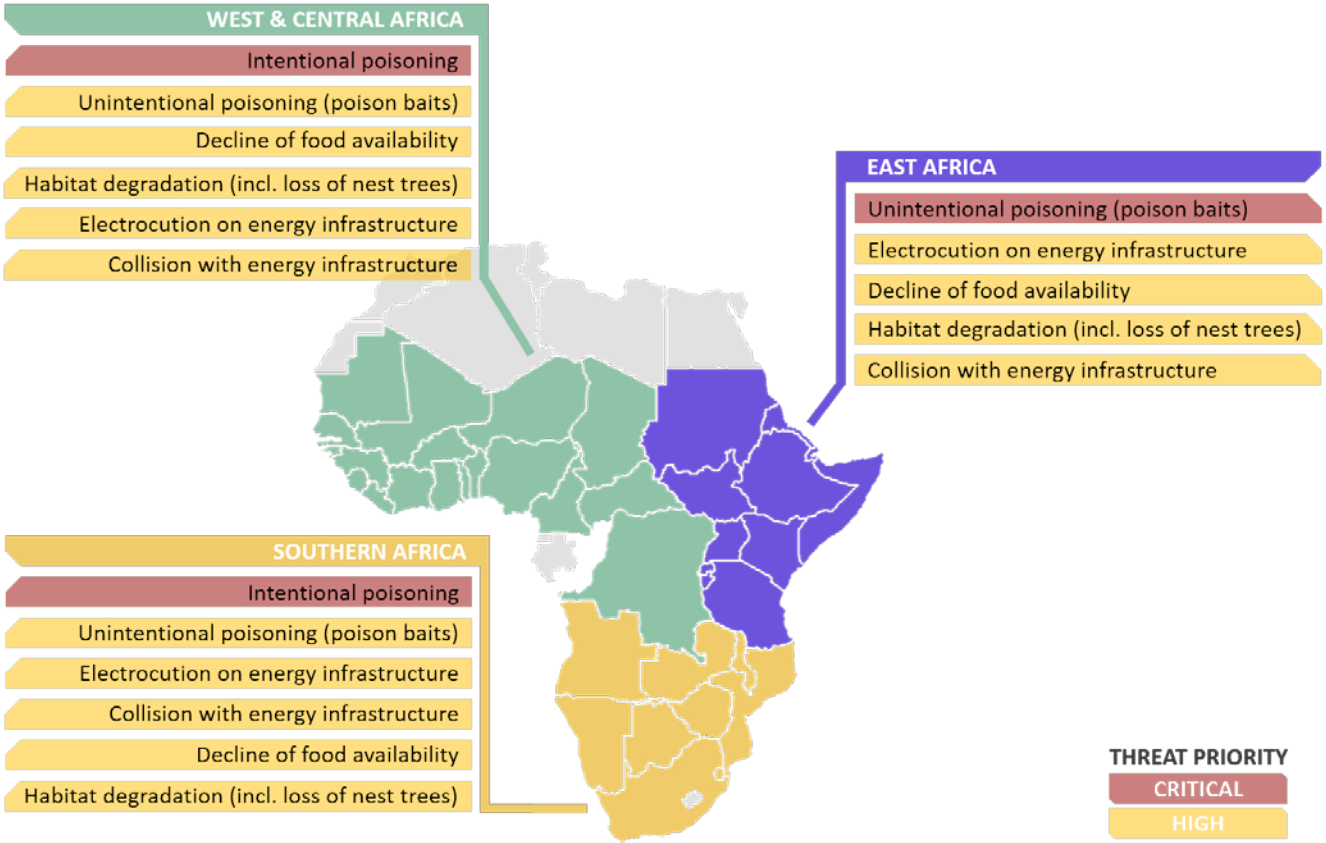


Fig. A3.6. Threats to the **Himalayan Griffon *Gyps himalayensis*** in each subregion of its range.

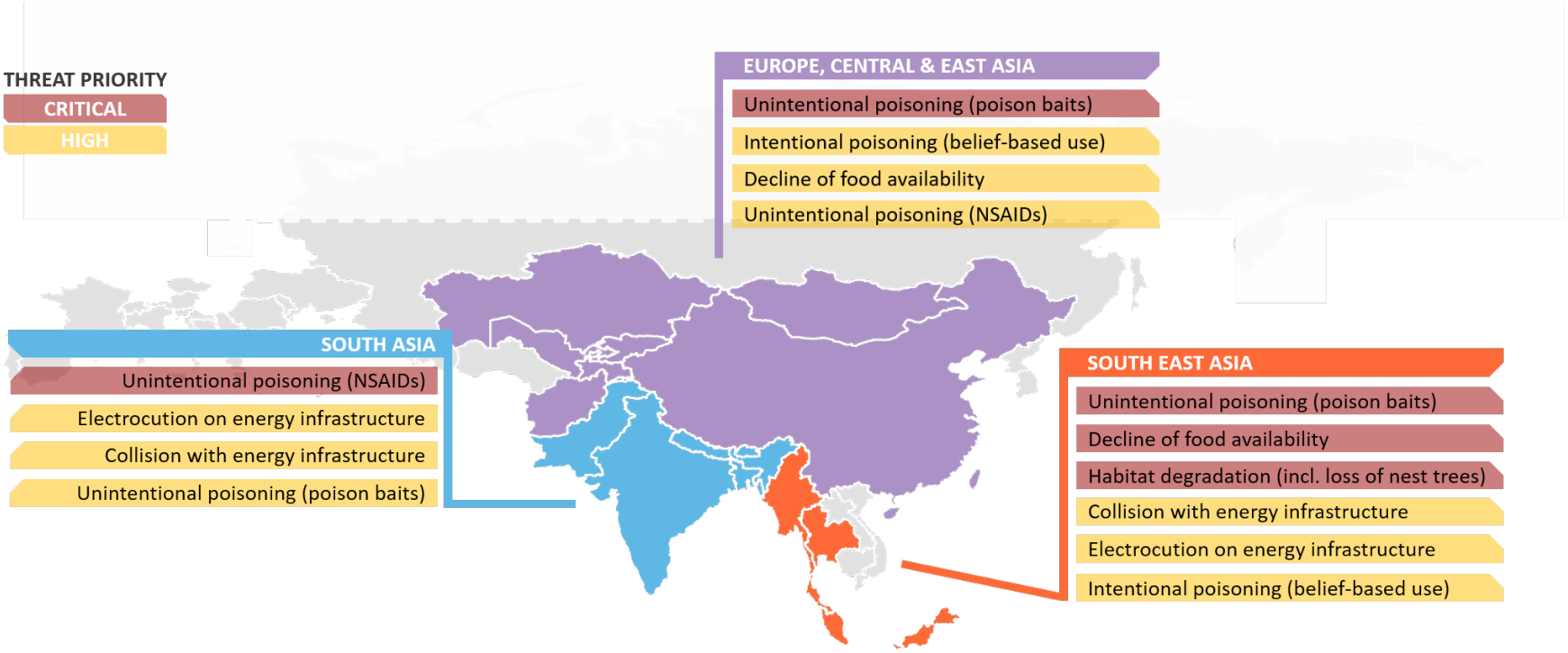


Fig. A3.7. Threats to the **White-rumped Vulture *Gyps bengalensis*** in each subregion of its range.

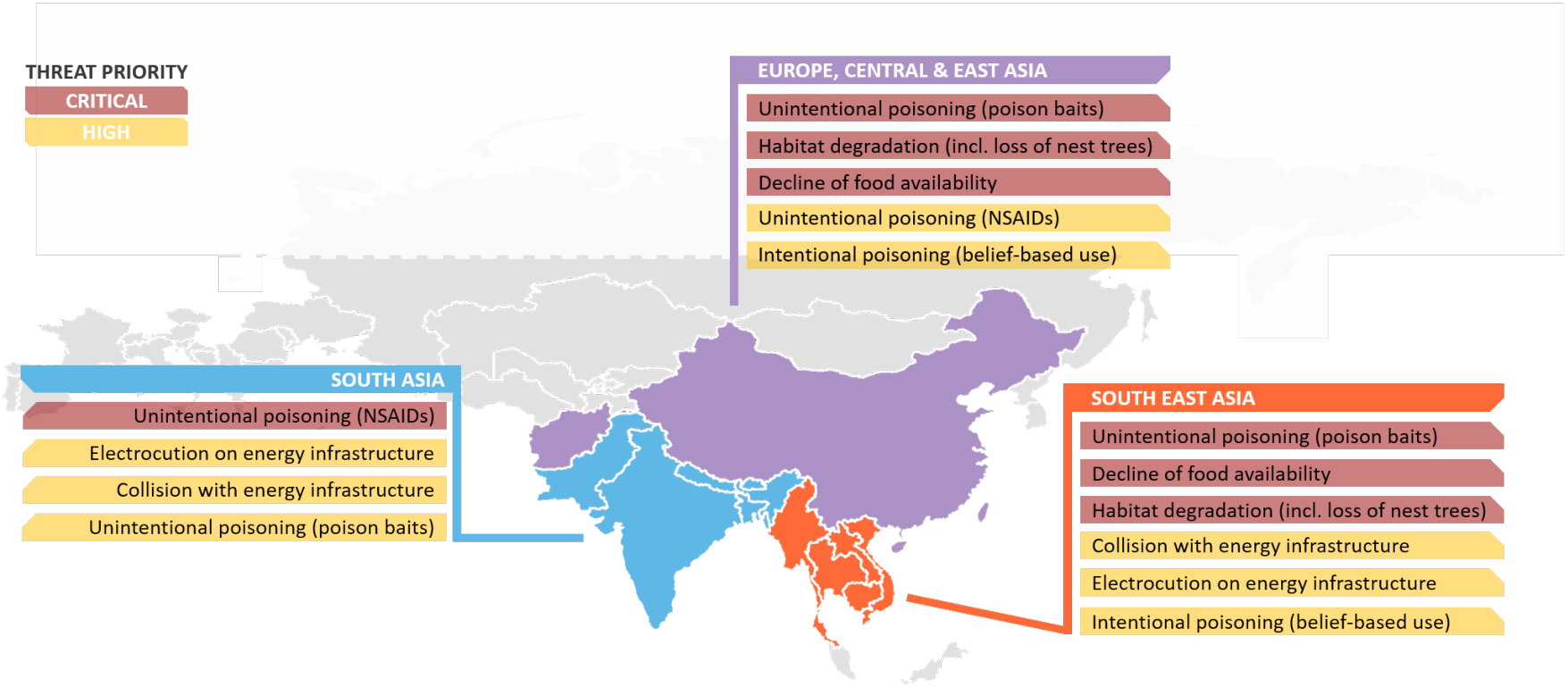


Fig. A3.8. Threats to the **White-backed Vulture *Gyps africanus*** in each subregion of its range.

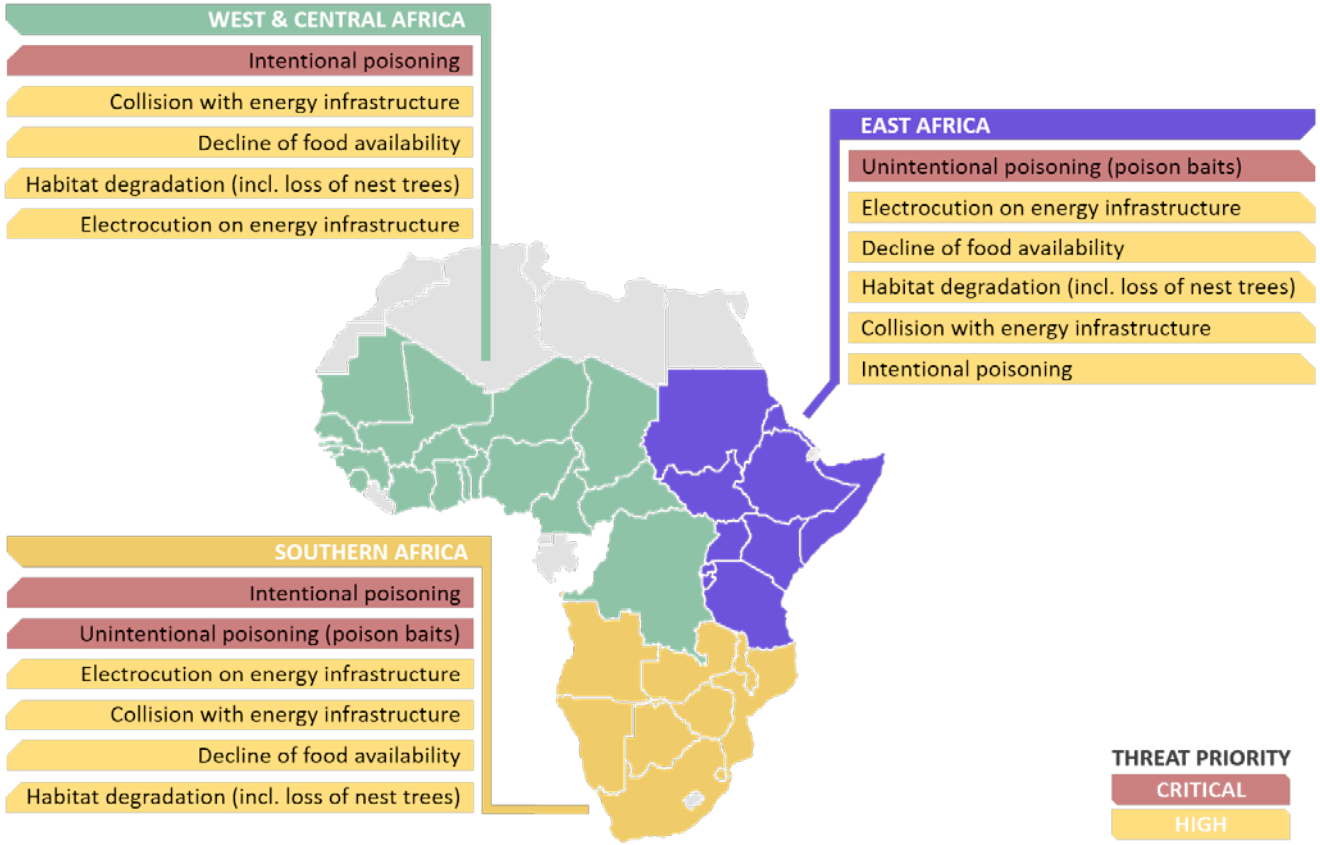


Fig. A3.9. Threats to the **Indian Vulture** ***Gyps indicus*** in each subregion of its range.

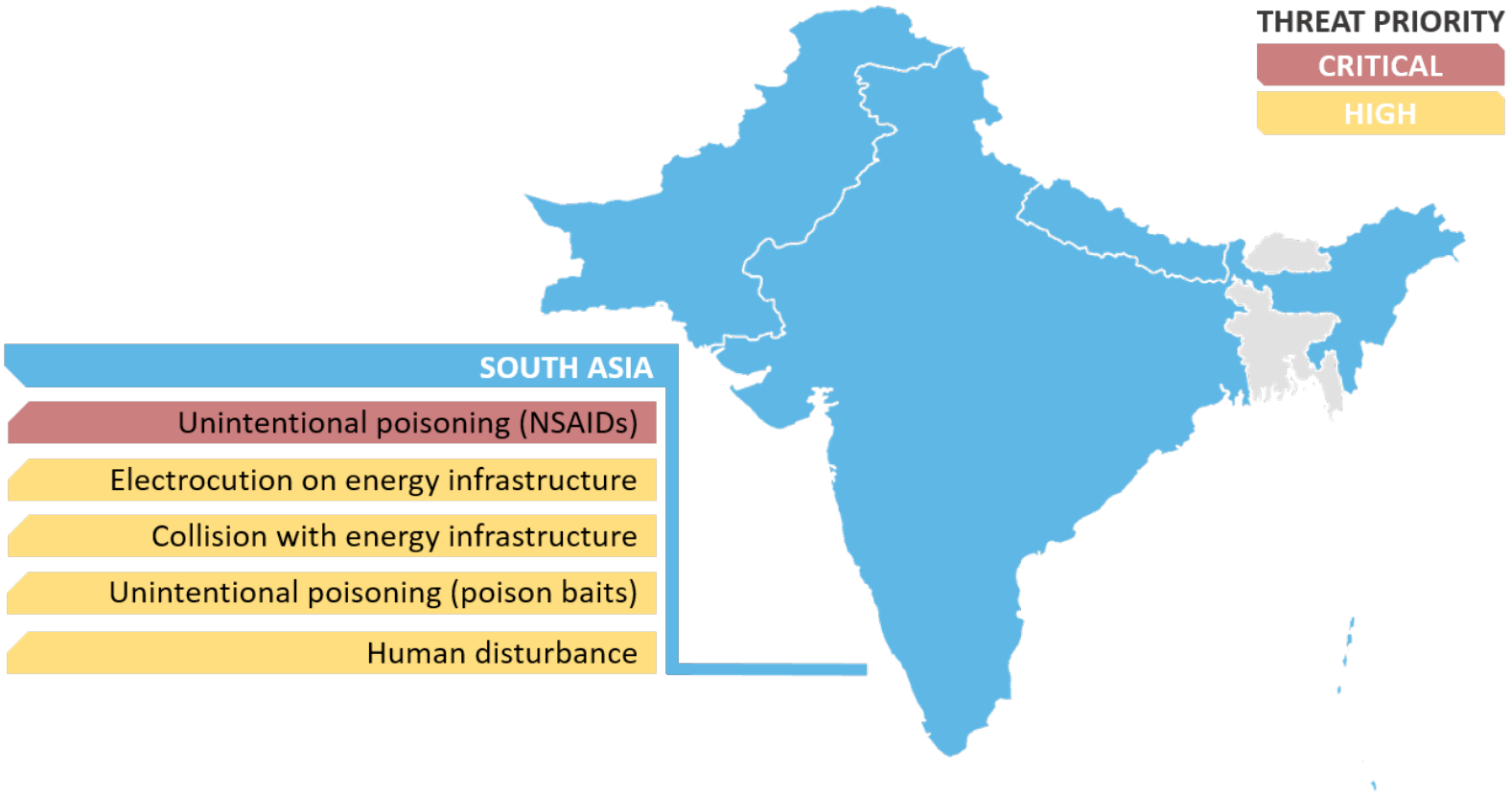


Fig. A3.10. Threats to the **Slender-billed Vulture *Gyps tenuirostris*** in each subregion of its range.

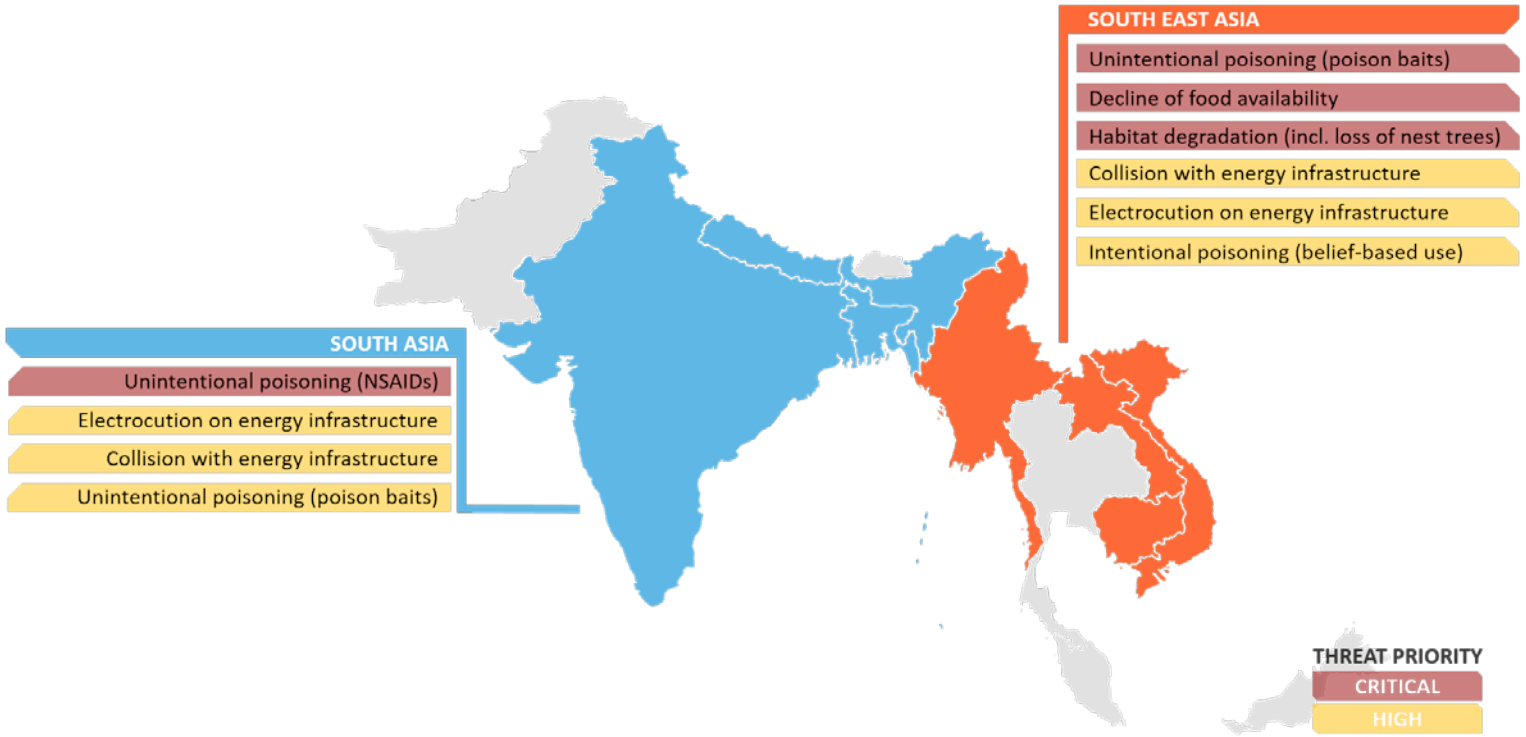


Fig. A3.11. Threats to the **Cape Vulture *Gyps coprotheres***.

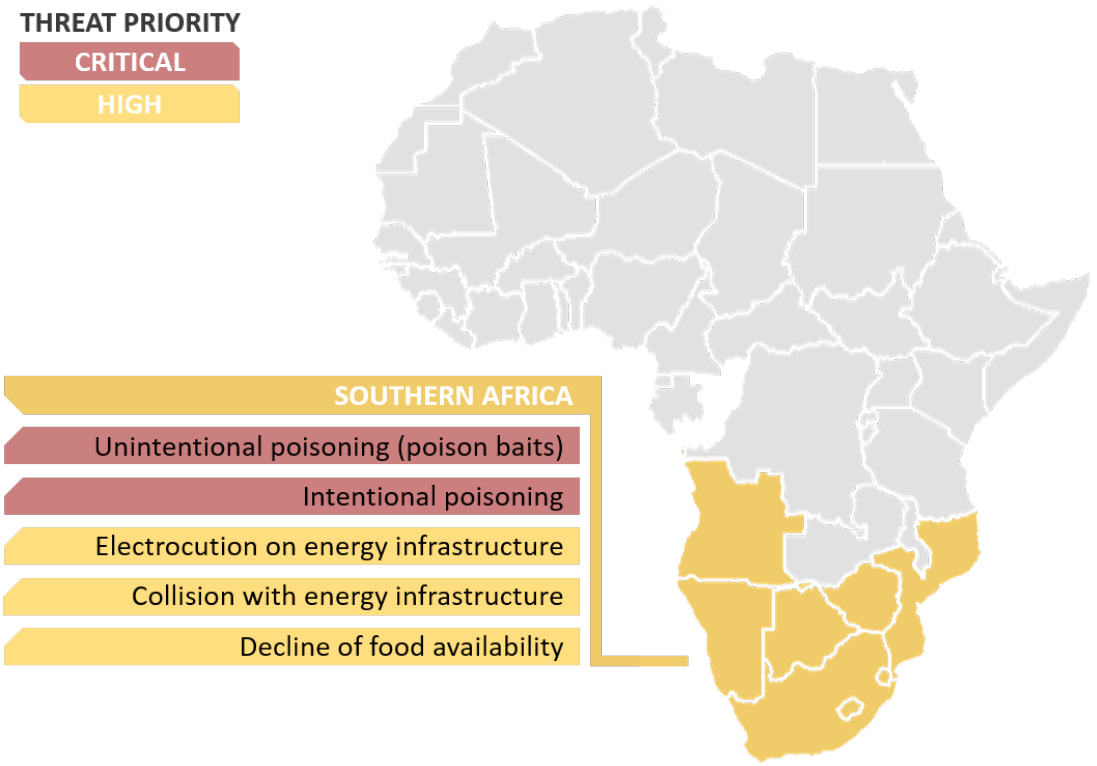


Fig. A3.12. Threats to the **Rüppell's Vulture *Gyps rueppelli*** in each subregion of its range.

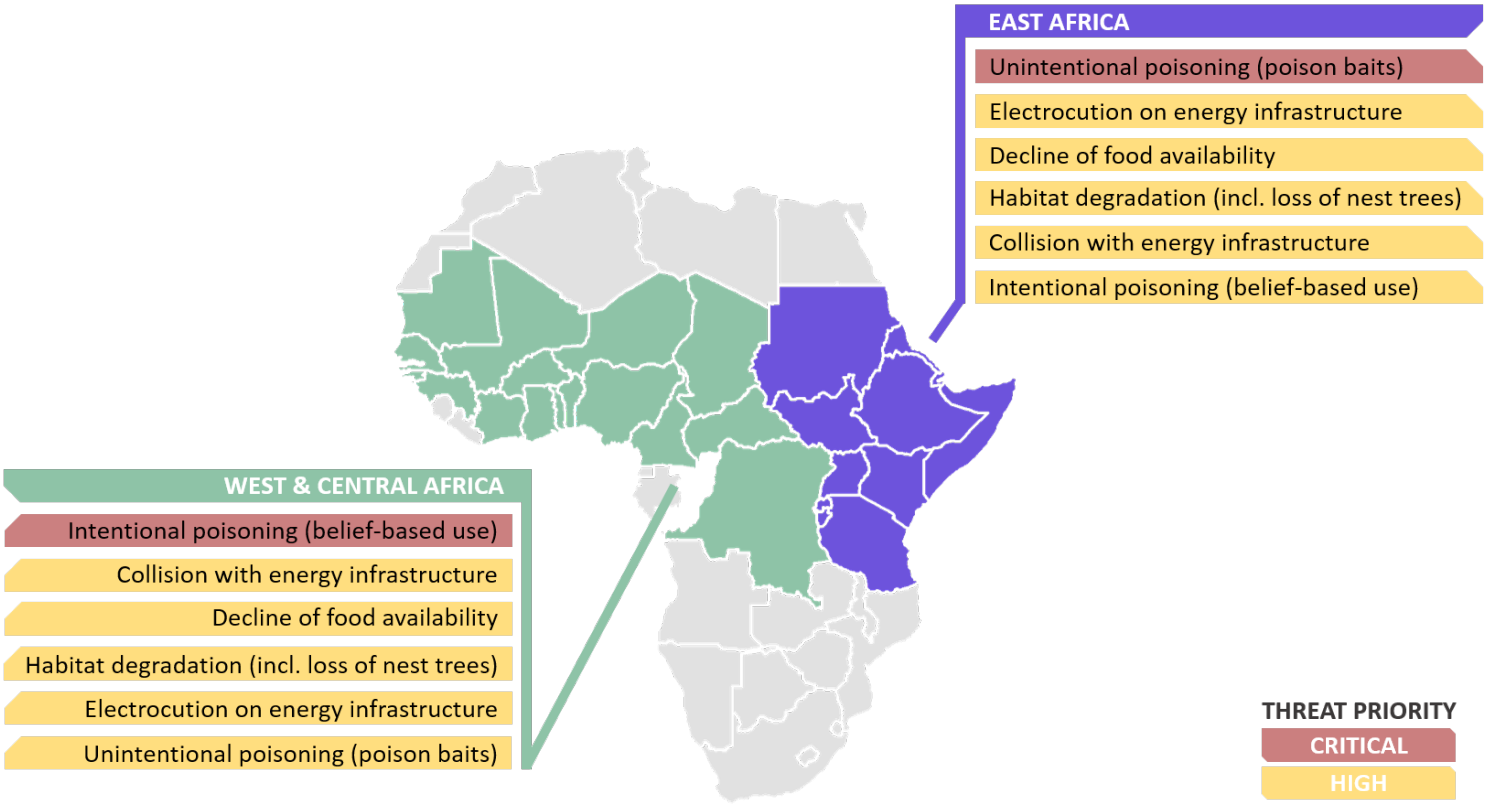


Fig. A3.13. Threats to the **Griffon Vulture *Gyps fulvus*** in each subregion of its range.

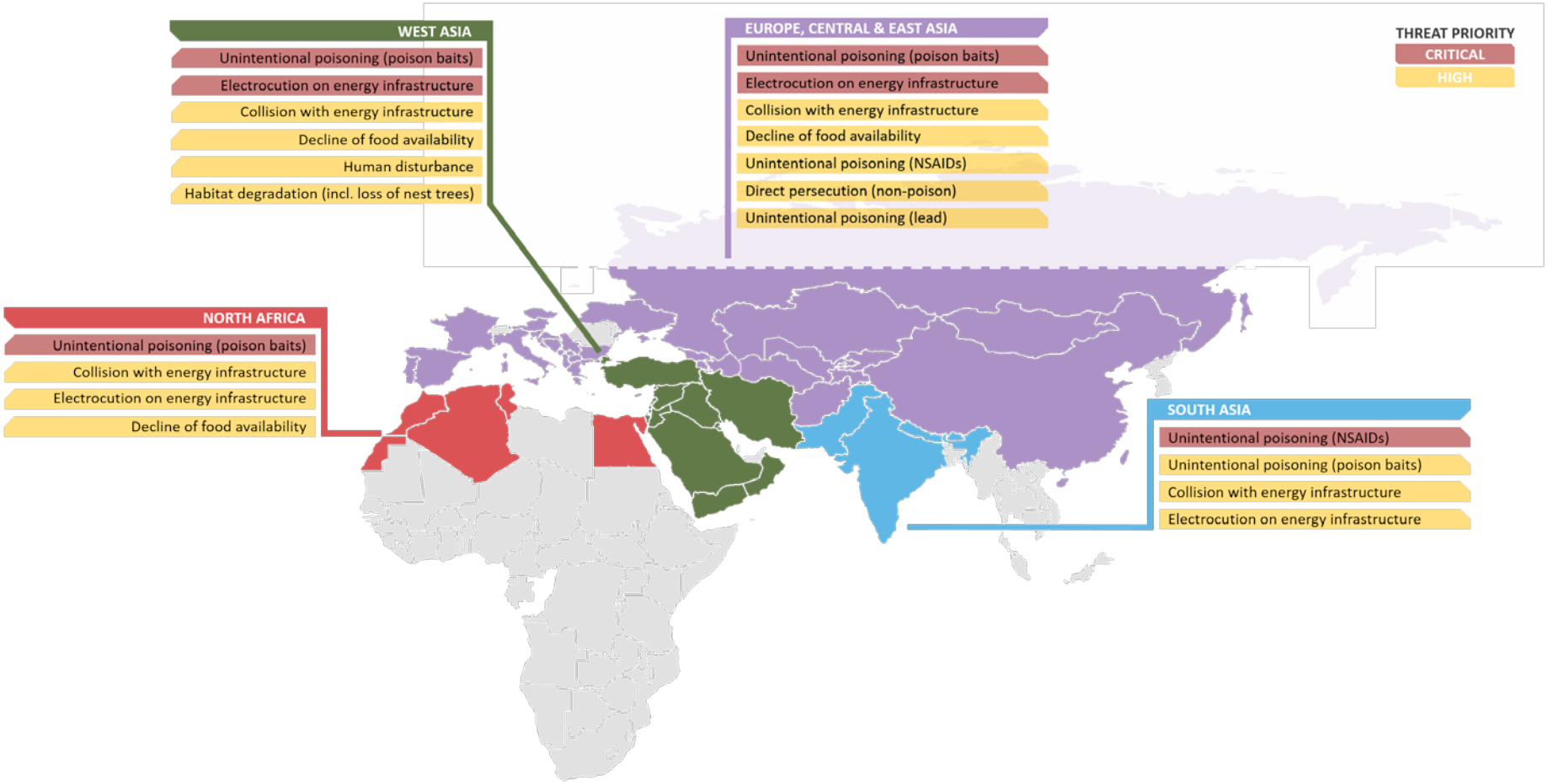


Fig. A3.14. Threats to the **Cinereous Vulture *Aegypius monachus*** in each subregion of its range.

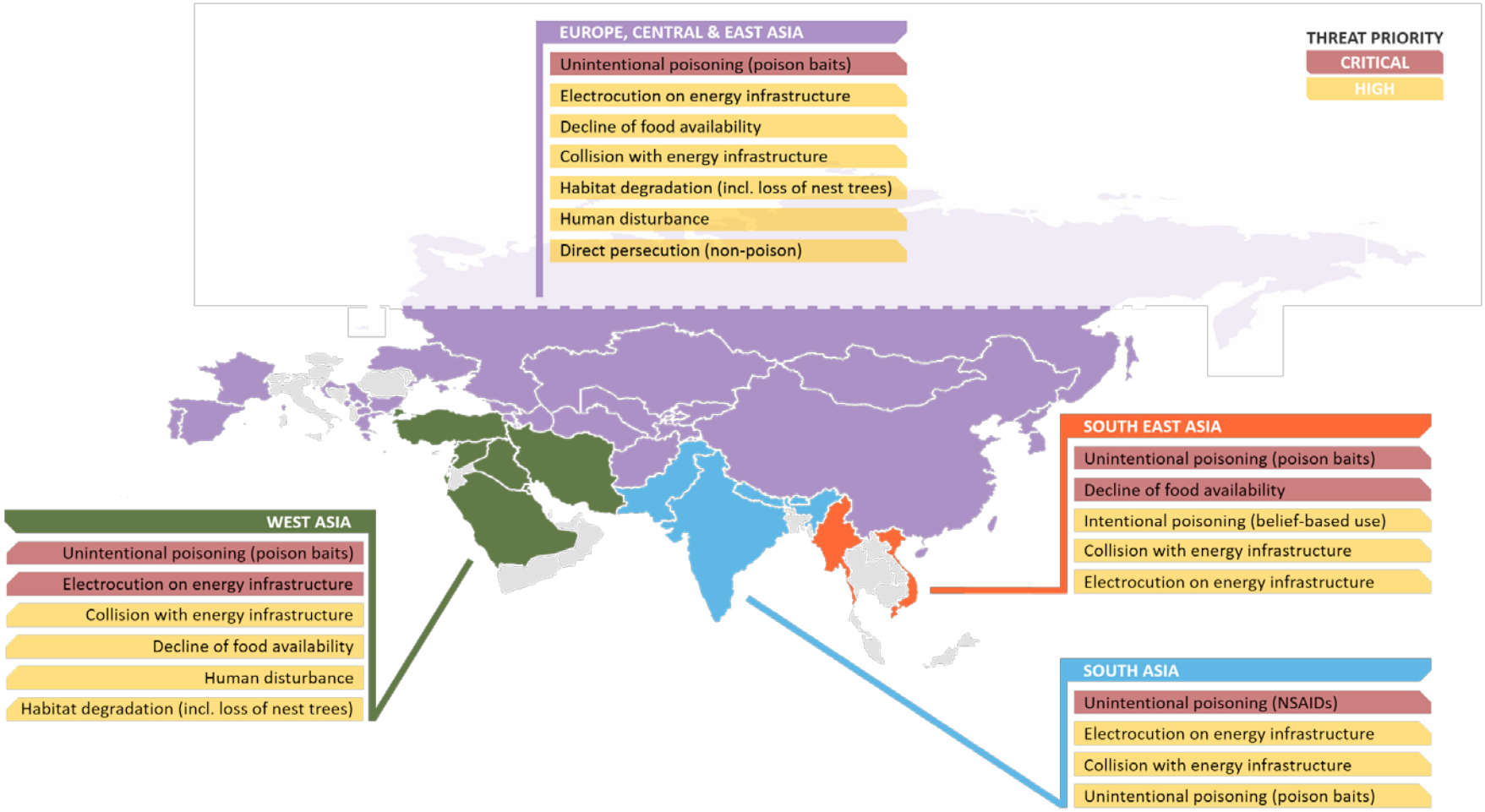
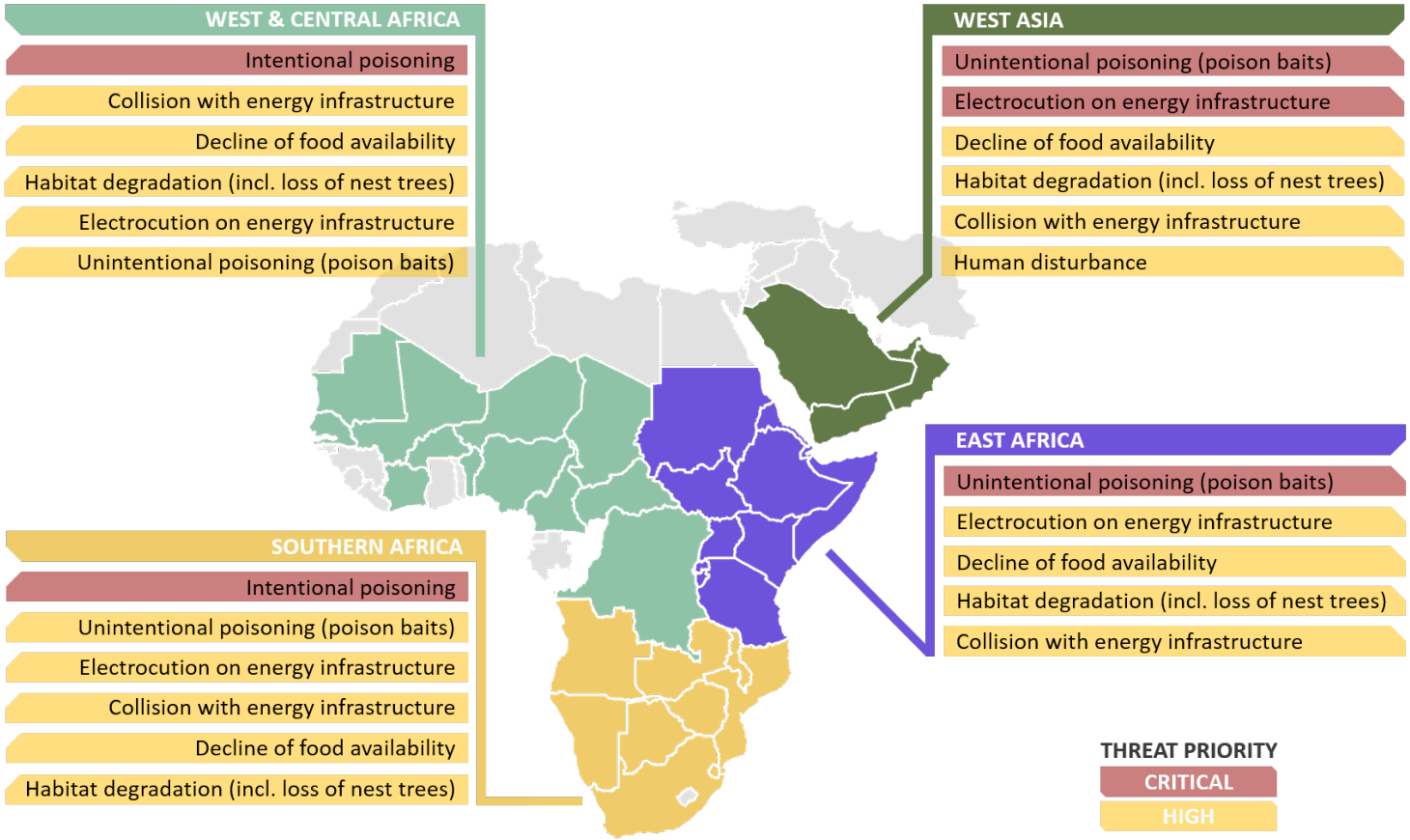


Fig. A3.15. Threats to the **Lappet-faced Vulture *Torgos tracheliotos*** in each subregion of its range.



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

To be inserted; currently available at http://www.lifeneophron.eu/en/EVFAP.html

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

To be inserted; not currently available.

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

To be inserted; currently available at

http://service-rspb.wearewhy.co.uk/app/uploads/sites/2/2016/03/SAVE-Blueprint-Asian-Vultures-2016-updated.pdf

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.

A4.1 List of and links to current region-specific plans

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

4.1.2. 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).

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

A4.2 List of and links to current national (country-specific) plans

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

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

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

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

4.2.5. Bangladesh Vulture Action Plan – to be published end of March 2017 and included in final draft following public consultation

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

A4.3 List of and links to existing species-focused plans

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

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

4.3.3. 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)

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

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

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

4.3.7. 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

4.3.8. 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

A4.4 Threat-focused plans and strategies

4.4.1. 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

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

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

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

4.4.5. 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

4.4.6. 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

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

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

4.4.9. 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

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