

A Blueprint for the Recovery of Asia's Globally Threatened Vultures



February 2014

(Including January 2015, 16, 17, 18 & 19 additions)

The Current State of South Asia's Vultures

Twenty years ago there were tens of millions of vultures in the Indian subcontinent. They provided a valuable ecosystem service by disposing of millions of tonnes of waste carrion from dead cattle each year. Now they, and the services they provided, are nearly all gone. Three species of *Gyps* vultures endemic to South and Southeast Asia, oriental white-backed vulture (*Gyps bengalensis*), long-billed vulture (*G. indicus*) and slender-billed vulture (*G. tenuirostris*), are the worst affected and are threatened with global extinction after rapid population declines, which began in the mid-1990s. They are listed by IUCN as Critically Endangered, the highest level of endangerment short of extinction in the wild. The oriental white-backed vulture population in India in 2007 was estimated at one-thousandth of its level in the early 1990s. Veterinary use of the non-steroidal anti-inflammatory drug (NSAID) diclofenac is the major cause of these declines. Diclofenac has been used to treat symptoms of disease and injury in domesticated ungulates in many parts of the Indian subcontinent since the 1990s. The effects of diclofenac have been studied experimentally on captive individuals of three of the global total of eight *Gyps* vulture species. In all of the species tested, death occurred within a few days of treatment with a single dose of diclofenac and severe kidney damage and extensive visceral gout (accumulation of the excretory product uric acid) were observed post mortem. The kidneys of vultures that died in these experiments showed similar pathology to that found in the majority of vulture carcasses collected from the wild since the declines began. A large-scale survey of the amount of diclofenac in liver tissue from carcasses of domesticated ungulates available as food to vultures in India in 2004 – 2005 showed that the prevalence and concentration of the drug at that time was more than sufficient to cause the observed rapid population declines which were occurring then.

There are important differences between Southeast Asia and the Indian subcontinent in the problems faced by vulture populations. Cambodia still supports small but stable remnant populations of oriental white-backed vulture, slender-billed vulture and red-headed vulture (*Sarcogyps calvus*) numbering hundreds of individuals in total. Diclofenac appears not to be widely used for veterinary purposes in the Southeast Asian countries where surveys have been conducted, including Cambodia and Myanmar. Most recorded vulture deaths in Cambodia are attributed to accidental poisoning. Hunters use poisoned bait to catch and kill quarry species such as waterbirds and poisoned bait is also used to kill problem dogs or cattle. Cambodia's vultures are also thought to be chronically food limited. Populations of wild ungulates on whose carcasses they previously relied upon have undergone severe declines. The free-ranging herds of domestic bovids that replaced them are now also declining, as a result of mechanisation of agriculture. Infrastructure development and illegal logging are increasingly bringing people into remote areas where vultures remain.

Conservation Responses

Soon after research had indicated the severity of the effects of diclofenac on vulture populations, the governments of India, Pakistan and Nepal commenced actions to prevent the contamination of vulture food supplies with the drug. India's National Board for Wildlife recommended a ban on veterinary use on 17 March 2005. In May 2006, a directive from the Drug Controller General of India was circulated to relevant officials, requiring the withdrawal of manufacturing licences for veterinary formulations of diclofenac. This directive was further strengthened in 2008, when it was made an imprisonable offence to manufacture, retail or use diclofenac for veterinary purposes. Similar measures were introduced in Pakistan and Nepal at about the same time. Veterinary use of diclofenac was banned in Bangladesh in 2010.

Action to prevent the extinction of *Gyps* vultures in South Asia is coordinated by Saving Asia's Vultures from Extinction (SAVE), a consortium of eleven organisations with established expertise in vulture conservation, which was established in 2011. The national and state governments of the four vulture range states in the Indian subcontinent are engaged in conservation measures through national action plans, and are linking their activities through the Regional Steering Committee for Vulture Conservation (RSC), set up to implement the recommendations of the inter-governmental Declaration on Vulture Conservation within the region in May 2012. For more details of the composition and function of SAVE see Appendix I.

Conservation actions undertaken so far, in addition to the restrictions on diclofenac use, include surveys to measure the effectiveness of the ban on veterinary diclofenac, regular surveys of vultures to measure their population trends, awareness raising to make the ban more effective, advocacy for enforcement of the ban, contact with the pharmaceutical industry, testing to establish which veterinary drugs are safe and which are harmful to vultures, the creation of Vulture Safe Zones in which intensive campaigns are undertaken to remove toxic NSAIDs from the food supply of the remaining small populations of wild vultures, and conservation breeding to provide a secure captive population and a surplus of captive-bred birds for reintroductions.

Vulture conservation measures in Cambodia differ from those employed in the Indian subcontinent because the threats are different, especially in the absence of a significant threat from diclofenac. Conservation actions taken so far include monthly supplementary feeding at up to seven sites in the north and east of the country, nest protection and advocacy against inappropriate use of agricultural chemicals as poisons.

There is Hope for South Asia's Vultures

These conservation actions have achieved substantial success and have resulted in the following major achievements.

1. All vulture range states in the Indian subcontinent have banned the veterinary use of diclofenac.
2. Regular monitoring of NSAID residues in cattle carcasses shows that the level of diclofenac contamination of the vulture food supply has fallen substantially.
3. Safety testing identified a safe alternative drug, meloxicam, and monitoring of NSAID residues in cattle carcasses shows that its use has increased markedly in India. Veterinary meloxicam has become widely available in Nepal and Bangladesh.
4. Vulture Safe Zones, which were pioneered in Nepal, are being introduced in other states, expanded, tested and developed.
5. Population monitoring in Cambodia indicates that the small populations of vultures there are approximately stable.
6. Captive populations of all three of the endangered *Gyps* species have been established. The captive birds are surviving well and juveniles of all species have been bred in captivity.
7. In India, regular monitoring of vultures using the repeatable survey method of road transect counts shows that vulture declines have slowed or ceased. Evidence from vulture monitoring in Nepal, Pakistan and Bangladesh also indicates that the population declines there have slowed or reversed.

What remains to be done?

These are all hopeful signs, but the following serious concerns remain.

1. Vulture populations are precariously small and will remain vulnerable to adverse events until numbers have increased substantially. This vulnerable period will be lengthy because the low natural reproductive capacity and long duration of immaturity of vultures means that, even under the most favourable conditions, the shortest period in which a wild vulture population can double in size is about ten years. The rate of the recent population decline was much more rapid than the most rapid possible rate of increase, with the population of the species most strongly affected by diclofenac halving every year in India and Pakistan. Even when diclofenac has disappeared, conditions may not permit the maximum possible rate of recovery because of other problems caused by the vulture decline (see points 2 and 3 below) and effects of other NSAIDs (see points 5 - 7 below).
2. In the Indian subcontinent, the disappearance of vultures has led to cattle carcasses being disposed of in ways, such as burial, that may restrict the availability of carrion as food for a recovering vulture

population in the future. In Southeast Asia, low populations of wild and domesticated ungulates continue to limit the small vulture populations there.

3. Increases in populations of feral dogs and other predators, caused by enhancement of their carrion food supply in the absence of vultures, may be increasing the frequency of predation of livestock and, as a response, the deliberate placement of poison baits in carcasses to kill the predators. This in turn leads to unintended poisoning of vultures. Large populations of feral dogs and other species of scavengers give rise to other problems, such as an increased risk of dog bites and rabies in humans and other types of disease and public nuisance. Dealing with these problems imposes substantial extra costs on government agencies and charities.
4. Contamination of cattle carcasses with diclofenac has declined, but it has not been eliminated yet. Diclofenac intended for human use is easy to obtain, and easy to misuse for the treatment of livestock because pharmaceutical companies market the drug in larger vials than are required for human medicine. Consequently, carcasses of wild vultures continue to be found with traces of diclofenac in their tissues and post-mortem findings continue to indicate that diclofenac poisoning was the cause of death.
5. The veterinary use of another NSAID (ketoprofen) known to be toxic to *Gyps* vultures is legal and has increased. Other NSAIDs are also in legal use which may be harmful to vultures, but have not yet been tested.
6. Aceclofenac, an NSAID that is likely to be metabolised into diclofenac after being administered to cattle, is beginning to be used. It is likely to kill vultures that feed on contaminated carcasses.
7. There is no coordinated, well-established and efficient regulatory mechanism by which legal restrictions are imposed upon veterinary drugs known to cause harm to vultures or on those whose effects have not yet been studied.
8. In some areas, the sparse remaining populations of vultures are threatened by loss or disturbance of nest sites through tree-felling or development.

Action Timelines for advocacy, awareness raising and regulation at the national level (AD). [2019 updates highlighted]

Timeline code	Activity	Responsible agencies	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
AD1	Achieve the removal from the market of vials of diclofenac supposedly intended for human medicine in excess of 3 ml capacity.	BNVRC BFD IUCNB'desh WWFPak NVRC BCN NTNC BNHS SAVE Associates CVWG MVWG	<p>India: Propose restrictions on large vials to the Regional Steering Committee, National Vulture Recovery Committees (NVRCs), governments and pharmaceutical industry. Establish the restrictions. Pakistan/Bangladesh: make contact & take steps to prevent licensing through drug authorities. Nepal: seek ban [Note achieved for the only offending Nepal company – Done]</p>											
			<p>India: Proactive involvement (including providing technical assistance) in court case brought by Indian pharma company to uphold 2015 ban. All: Monitor availability of larger (<3ml) diclofenac vials</p>											
			<p>India: Approach appropriate agency/ies accredited /recognised by concerned governments to undertake pharmacy surveys and produce reports related to the multi-dose vial issue Cambodia: To achieve Govt. ban of veterinary diclofenac Myanmar: Removal of diclofenac from the market and undercover survey for NSAIDs Myanmar: propose restriction on large vials of diclofenac to government</p>											
AD2	Achieve the banning of the veterinary use of ketoprofen and aceclofenac in India, Pakistan, Bangladesh, Nepal, Bhutan, Cambodia & Myanmar	BNVRC BFD IUCNB'desh WWFPak NVRCs BCN, NTNC BNHS CVWG MVWG SAVE Associates [+Bhutan agency tbc]	<p>All/SAVE: Discuss the issue with the Regional Steering Committee, governments and pharmaceutical industry using research results</p>											
			<p>Bangladesh/Nepal/Pakistan/India: Seek ban – follow-up on process already initiated. Bangladesh only: Enforce ban within VSZ as first step. 2020: Bangladesh should have a whole-country ban on ketoprofen. India/Nepal: Approach State Drug Controller/Animal Husbandry Director to stop Govt. supplies to vets and prohibits use by Govt vets. (refer to 2012 Delhi Declaration) – at least all VSZ initiatives to do this Bangladesh/ Nepal/ Pakistan/ India: Provide technical assistance and advice on the operation of the ban, using information from monitoring. SAVE to make/update materials available on website specific to these NSAIDs Myanmar & Cambodia: Removal of ketoprofen and aceclofenac from the market Myanmar & Cambodia: monitor availability and use of NSAIDs in Myanmar</p>											

Timeline code	Activity	Responsible agencies	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
AD2 (cont'd)						<p>India: Formally approach Drug Controller Gen (India) through IVRI. Request IVRI to provide technical input for joint recommendation with BNHS to prompt an advisory from DCGI on this as interim measure</p> <p>Pakistan: Approach Pakistan drug authorities requesting ban (even though not in use) Build on Provincial-level ban to extend to Federal level.</p> <p>Nepal: Approach Nepal drug authorities requesting ban & follow up</p> <p>Bangladesh: Hold meetings with Bangladesh DGDA to reinforce & extend ketoprofen ban to national level by 2020 (Bangladesh)</p> <p>India: Contact all state/provincial Animal husbandry Depts to stop supplying Govt vets with these drugs</p> <p>2019: Extend progress on this to all states.</p>								
AD3/4 <i>Note AD3 & AD 4 now combined</i>	Establish system and procedures by which veterinary drugs with unknown effects on vultures have their approval for veterinary use withheld or withdrawn until scientific testing on <i>Gyps</i> vultures establishes their safety at maximum likely exposure levels. (ALL, although lower priority only for Cambodia)	BNVRC BFD IUCNB'desh WWFPak NVRC BCN NTNC BNHS RSPN [BANCA? tbc] SAVE Associates	All/SAVE: Initiate discussions with Regional Steering Committee, National Vulture Recovery Committees (NVRCs), govts and pharmaceutical industry. Establish procedures											
									SAVE (all partners coordinated by TAC) writes protocol and make this available on SAVE website. [Now available]. Provide and update technical assistance and advice on the operation of the procedures, using information from monitoring.					
									All: Explore the possibility of a moratorium on new (veterinary) NSAIDs					
									All/SAVE: Discuss with NVRCs and at Regional Steering Committee (RSC). Approach medicines regulatory authorities to request that any new veterinary medicine should be tested for safety to vultures prior to registration/release to market. [NB to amend wording here after discussion with drug authority representatives/experts]					
AD5	Work with both the pharmaceutical industry and governments to identify, by a robust safety testing and approval	IVRI BNHS Drug Authorities SAVE TAC	All: Provide encouragement and technical advice.											
									India: Promote funding of IVRI safety testing and discuss revision of the list of drugs to be tested. Provide encouragement and technical advice.					

Timeline code	Activity	Responsible agencies	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
	process, NSAIDs that are safe for vultures. Currently meloxicam is the only such drug.							2019: Agree on best approach to achieve this, and to acknowledge any progress - through relevant national partners [consider revised wording here]						
AD6	Contribute, with government agencies and pharmaceutical companies, to maintaining pharmacovigilance and regulation of veterinary drugs, to prevent their negative effects on wild vultures.	NVRCS BNVRC, BFD IUCN B'desh WWF Pakistan BCN, NTNC BNHS Drug Administrations Veterinary Universities MVWG CVWG			All: Initiate discussions with Regional Steering Committee, national committees, governments and pharmaceutical industry. Establish procedures.									
					2019: Propose as agenda item for next RSC meeting. Proposed procedure/s to be developed and shared? SAVE Prog Manager to draft and circulate. Bangladesh: contacted NSAIDs manufacturers, and to discuss further at national committee meeting. Two meloxicam-producing companies already using vulture-safe labelling which can be shared as 'good practice'. Pakistan: meetings held with DRAP to discuss procedures but this work to be developed.									
AD7	Establish a SAVE alert system for veterinary drugs which combines information of levels of use from pharmacy surveys and analyses of cattle carcasses with results from safety testing to draw attention of govts to potentially hazardous drugs.	SAVE TAC All SAVE Partners	All/SAVE: Operate system and provide advice to the Regional Steering Committee, governments and pharmaceutical industry											
					All/SAVE: Establish system within SAVE. (System established 2016.) Operate system and provide advice to the Regional Steering Committee, governments and pharmaceutical industry.									
					SAVE: Add SAVE website feature on this (include updates on pharmacy surveys) All partners to alert SAVE of any changes & post on website									
					SAVE: Improve prominence on SAVE website & update information 2019: Further additions to add, and improving easy access to these important dossiers on SAVE website Also to add updated information to dossiers on efficacy and costs for each compound [if feasible].									

Timeline code	Activity	Responsible agencies	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
AD8	Improve the availability of more effective vulture-safe drugs and formulations thereby facilitating take up by veterinary practitioners	BNVRC DGDA DLS IUCN			<p>All: Contact and sensitisation of pharma industry (approach major companies for support). Sensitise drug regulation authorities in each country to take appropriate steps to favour production of well formulated veterinary meloxicam.</p> <p>2019: Share and publicise good practice examples among SAVE and more widely for companies (eg Bangladesh) able to demonstrate better (eg neutral pH etc) meloxicam formulations and alert Govts to this aspect. Sensitise more companies on this.</p>									
AD9	Develop wider awareness-raising initiatives to highlight NSAIDs concerns and provide incentives/acknowledgement of those taking positive steps.	SAVE Associates BNVRC All to consider			<p>India & Bangladesh: Initiate system to support eg cattle shelters & dairy cooperatives that ensure only vulture-safe NSAIDs are used. (eg kite-mark/certification system).</p> <p>2019: develop/promote progress achieved in Bangladesh (labelling) & Tamil Nadu initiatives</p> <p>Myanmar: consider initiatives generating awareness with pharmacies, drug distributors, vets, farmers</p>									
AD10	Develop SAVE positions on key issues as highlighted by the CMS Vultures MSAP	Coordinated by TAC, but led by in-country partners			<p>SAVE/All: Circulate position statements and report at annual meeting [Note Research needs also added in research and survey section]</p> <p>2018: MSAP clearly draws on the SAVE blueprint for South Asia and should be considered synonymous with it. Ongoing watching brief on activities under MSAP; update CMS on SAVE updates.</p> <p>2019: Propose link to updated SAVE blueprint via MSAP.</p>									

Action Timelines for conservation breeding (CB).														
Timeline code	Activity	Responsible agencies	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
CB1	Conservation breeding of OWBV, LBV and SBV at VCBC Pinjore (India).	BNHS Haryana FD CZA	Maintain the captive population in good health. Produce as many fledglings as possible of all three species, using artificial intervention as appropriate.											
				Maintain the captive population in good health. Produce as many fledglings as possible of all three species, using artificial intervention as appropriate, but with less emphasis on OWBV and more on SBV and LBV, using artificial intervention for those species if appropriate. Transfer of surplus immatures to release programme.										
					Maintain the captive population in good health. Produce sufficient fledglings to replace adult losses.									
CB2	Conservation breeding of OWBV, LBV and SBV at VCBC Rajabhatkha wa (India).	BNHS W Bengal FD CZA	Maintain the captive population in good health. Produce as many fledglings as possible of all three species, but with special emphasis on SBV, using artificial intervention for that species if appropriate.											
				Maintain the captive population in good health. Produce as many fledglings as possible of all three species (subject to sufficient aviary space). There should be special emphasis on SBV, using artificial intervention for that species if appropriate. Transfer of surplus immatures to release programme.										
					Maintain the captive population in good health. Produce sufficient fledglings to replace adult losses.									
CB3	Conservation breeding of OWBV and SBV at VCBC Rani (India).	BNHS Assam FD CZA	Maintain the captive population in good health. Produce as many fledglings as possible of both species, but with special emphasis on SBV, using artificial intervention for that species if appropriate.											
				Maintain the captive population in good health. Produce as many fledglings as possible of both species (subject to sufficient aviary space). There should be special emphasis on SBV, using artificial intervention for that species if appropriate. Transfer of surplus immatures to release programme.										
					Maintain the captive population in good health. Produce sufficient fledglings to replace adult losses.									
CB4	Conservation breeding of OWBV at VCC Changa Manga (Pakistan).	WWF Pak Punjab Prov Govt.	Maintain the captive population in good health. Produce as many fledglings as possible by natural methods and artificial incubation as necessary. Transfer of birds to release programme as appropriate.											
					Maintain the captive population in good health. Produce sufficient fledglings to replace adult losses.									

Timeline code	Activity	Responsible agencies	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	
CB5	Conservation breeding of OWBV at VCBC Chitwan (Nepal).	BCN NTNC DNPWC	Maintain the captive population in good health. Produce as many fledglings as possible by natural methods.												
				Maintain the captive population in good health. Produce as many fledglings as possible by natural methods. Transfer some wild-bred birds to release facility.											
					Maintain the captive population in good health. Produce as many fledglings as possible by natural methods. Transfer captive-bred immatures to release facility.										
						Maintain the captive population in good health. Produce sufficient fledglings to replace adult losses. 2019: Update the release plan (ongoing) in consultation with national partners, with plans to release captive-bred birds when less than 2 years old, maintaining best breeding birds but releasing others. All this subject to ongoing safety-evaluation of the environment and annual review.									
CB6	Conservation breeding of OWBV and LBV at CZA centres (India).	CZA Zoos	Training of staff and preparation of facilities Transfer of captive-bred OWBV and LBV from VCBC Pinjore.												
				Maintain the captive population in good health. Produce as many fledglings as possible by natural methods.											
					Maintain the captive population in good health. Produce as many fledglings as possible by natural methods. Transfer captive-bred birds to release facility or other centres.										
						Maintain the captive population in good health. Produce sufficient fledglings to replace adult losses. Update release plan annually.									
CB7	Conservation breeding of OWBV in Bangladesh.	BNVRC BFD Zoos Safari Parks	Consider the development of a VCBC in Bangladesh. [This has been considered, and decided not to do so. This item therefore completed]												
CB8 (action added Nov. 2014)	Conservation breeding of OWBV & LBV at VCBC Bhopal (India)	BNHS Madhya Pradesh FD CZA	Establish & maintain a captive population in good health – primarily through supply and exchanges of subadult birds from other existing centres.												
				Maintain the captive population in good health. Produce as many fledglings as possible of both species (subject to sufficient aviary space), initially through natural breeding but subsequently using artificial intervention as appropriate. Transfer of surplus immatures to release programme and fully integrate the management of this population with the wider release plans and any exchanges required to optimize genetic and sex-ratio aspects of the Indian captive populations of these species as a whole.											
					Maintain the captive population in good health. Continue to supply birds for release programme. Produce sufficient fledglings to replace adult losses.										

Action Timelines for Vulture Safe Zone implementation (VS).

Timeline code	Activity	Responsible agencies	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	
VS1	Identification and selection of new provisional Vulture Safe Zones (pVSZs) in India, in particular for LBV.	BNHS	Collect information and select pVSZs.												
				Completed											
VS2	Capacity building & local advocacy of prov. Vulture Safe Zones (pVSZs) India.	BNHS SAVE Associates	India: Develop capacity in pVSZs. (ongoing)												
VS3	Selection of pVSZs in India suitable for conversion to full VSZs.	BNHS			India: Selection and conversion (2017 ongoing) of pVSZs to full VSZs based upon undercover pharmacy monitoring data and monitoring of fates of tagged vultures. Focus on proposed release areas & transboundary areas VSZs and review current emphasis (prioritise Haryana, UP, Bihar, Gujarat, Tripura, Meghalaya, W Bengal, Jharkhand)										
						India: Review selection/process & then again review in 2019, 2021. (2017 MP Reviewed)									
							India: Other VSZs to be reviewed in 2018 (not completed). 2019: UP & Tamil Nadu VSZs priority visits for 2019.								
VS4	Maintenance and review of VSZs in India	BNHS SAVE Associates	India: Continue VSZ implementation. Potential removal of VSZ status if monitoring shows that conditions have changed.												
VS5	Release of captive-bred vultures in VSZs in India.	BNHS Indian State Govts	India: Transfers of captive-bred vultures to holding aviaries in VSZs.												
						India: Releases of first captive-bred vultures in VSZs. (not completed)									
							2019 India: Initial releases once tracking & NSAIDs criteria in place according to release plan 2020: Continued releases of captive-bred vultures in VSZs (following updated release plan).								

Timeline code	Activity	Responsible agencies	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	
VS6	Maintenance and review of VSZs in Nepal.	NNVRC BCN	Nepal: Continue VSZ implementation and expansion												
VS7	Release of wild-taken & captive-bred vultures in VSZs in Nepal.	NNVRC BCN NTNC					Nepal: Releases of wild-taken OWBV not likely to breed from VCBC. [6 captive-reared released 2017] - completed								
						Nepal: 1-2 Releases of captive-bred OWBVs each year. Numbers released subject to annual review, taking release success & numbers of birds bred into account. [8 captive-bred and 4 captive-reared to be released in 2018]									
VS8	Identification & selection of additional pVSZ Pakistan.	WWF Pak	Identify and select pVSZs	Pakistan: Develop capacity [Note 2nd pVSZ identified 2017 and process of capacity building and advocacy is underway and continuing]											
				2019: Continuing: progress, monitoring and meetings with provincial wildlife department to declare as pVSZ.											
VS9	Maintenance & review of VSZs in Pakistan.	WWF Pak	Pakistan: Continue VSZ implementation and expansion. [Fundraising still required 2019 to support, in process].												
VS10	Release of captive-bred vultures in VSZs in Pakistan	WWF Pak												2020 Pakistan: Releases of captive-bred vultures in VSZs	
VS11	Livestock management and husbandry training in pVSZs and VSZs in Pakistan	WWF Pak Parkar Fndn	Pakistan: Continue to implement training programme. [Ongoing]												
VS12	Free veterinary camps in pVSZs and VSZs in Pakistan.	WWF Pak ICI Pakistan, Lahore Uni Vet School	Pakistan: Continue to implement programme. [Ongoing]												

Timeline code	Activity	Responsible agencies	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
VS13	Community-led vulture-based tourism in pVSZs and VSZs in Nepal and Pakistan.	BCN WWF Pak SAVE Associates	<p>Nepal: Continue to implement programme in Nepal (after ensuring viability, and ensuring no disturbance). [Ongoing Progressing with Nepal tourism board]</p> <p>Pakistan: Creating nature clubs at schools. [Rather than tourism, emphasis is on outreach around breeding centre. Progress with nature clubs in VSZ at Nagar Parkar]</p>											
VS14.	Identification and selection of pVSZs and VSZs in Bangladesh.	BNVRC BFD IUCNB'desh	Identify and select pVSZs.	Completed										
VS15.	Implementation of pVSZs in Bangladesh.	BNVRC BFD IUCNB'desh	<p>Bangladesh: Continue to implement VSZ programme for two main VSZs.</p> <p>2019: Government is committed to continuing VSZ work. Pharmacy surveys progressed on track along with other advocacy work in 2018. NB: Two VSZs established for white-rumped vultures in Bangladesh, but no measures proposed for Himalayan Griffon in northern Bangladesh. 40-50 being rehabilitated annually.]</p>											
VS16.	Identify pVSZs in Cambodia	Cambodia Vulture Working Group (CVWG) BirdLife Cambodia,	<p>Cambodia: Identify and select pVSZs (not completed)</p> <p>2019: develop VSZ concept with areas proposed or decide if this approach is not relevant for Cambodia at CVWG meeting(s)</p>											
VS17.	Implementation of pVSZs in Cambodia	BLC, CVWG	<p>Cambodia: Continue to implement VSZ programme. [to add specific actions here in future]</p>											
VS18	Identify pVSZs in Myanmar	MVWG	<p>Myanmar: collect information and select sites for pVSZs</p>											
VS19	Maintenance & review of VSZs in Myanmar	MVWG	<p>Myanmar: Continue VSZ implementation and expansion. [Fundraising required to support, in process]. Review in 2022/2023</p>											

Action Timelines for Vulture Safe Zone monitoring (ZM).

Timeline code	Activity	Responsible agencies	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
ZM1	Monitoring movements, survival and causes of death of wild vultures with GPS PTTs in pVSZs and VSZs	BNVRC BFD IUCNB'desh BNHS IVRI BCN WWF Pak	Nepal/Bangladesh/ Pakistan/India: Seek permits for capture & tagging wild vultures in VSZs.											
					All: Capture and tag samples of wild vultures with GPS tags. Monitor to identify foraging sites, recover corpses and establish cause of death.									
					Nepal/Bangladesh/ Pakistan/India: Seek permits for OWBV capture and tagging of wild vultures in VSZs. (done for RHV) Initial tagging trials & monitoring/ recovery system in place for any mortalities for autopsy [Started in Nepal – 11 wild birds tagged in 2017; 9 tagged in 2018]									
					2019 India: hope to commence tagging wild birds, pending tags and permissions. Plan to be developed.									
				Pakistan/Bangladesh: ongoing priority to initiate & funding now in place for tags in Pakistan , permissions process underway for deployment in 2019. Permissions received in Bangladesh , but no funds for tagging at present. Myanmar: initiate monitoring with tagging as option in future Cambodia: initiate monitoring with tagging as option in future										
ZM2	Monitoring of survival and causes of death of released vultures with GPS PTTs in pVSZs and VSZs.	BNVRC BFD IUCNB'desh BNHS IVRI BCN WWF Pak	All: Seek tagging permissions											
					All: Tag all captive-bred vultures prior to release with GPS tags. Monitor to identify foraging sites, recover corpses and establish cause of death. Started in Nepal – 6 captive-reared birds tagged and released in 2017, 12 more tagged and released in 2018. Ongoing									
					Nepal: further releases planned for 2018 and on to 2024. Ongoing.									

Timeline code	Activity	Responsible agencies	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
ZM3	Monitoring of movements, survival and causes of death of released vultures with GPS PTTs in pVSZs and VSZs in Pakistan.	WWF Pak												
ZM4	Monitoring of availability of NSAIDs for veterinary use in representative samples of pharmacies and other outlets in pVSZs and VSZs.	BNVRC BFD IUCNB'desh BNHS IVRI BCN WWF Pak DGDA SAVE Associates MVWG CVWG	All: Conduct undercover surveys of outlets for veterinary drugs. Record NSAIDs offered for use for veterinary purposes. Identify the provenance and vial size of diclofenac and date of manufacture offered for veterinary use.											
ZM5	Monitoring of wild vulture populations and breeding success in pVSZs and VSZs in India, Pakistan, Bangladesh, Nepal, Myanmar & Cambodia.	BNVRC BFD IUCNB'desh BNHS IVRI BCN WWF Pak BLCambodia CVWG SAVE Associates	All: Conduct surveys over representative areas of the zone, including nest counts and/or road transect surveys, as appropriate											

Action Timelines for research and monitoring at the national level (RM).														
Timeline code	Activity	Responsible agencies	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
RM1	Develop method for GPS PTT vulture tracking and corpse recovery in VSZs.	RSPB BNHS BCN	Complete tagging and recovery tests on RHV and LBV. Evaluate corpse recovery using simulated tagged corpses. Test tag attachment methods on captive <i>Gyps</i>											
			Begin tag deployment on <i>Gyps</i> vultures in pVSZs and VSZs.											
			Done											
RM2	Road transect surveys of vulture numbers in India .	BNHS RSPB	Conduct surveys using same methods as in previous surveys.											
			Publish results of the survey done in the previous year.											
			Results published.											
			India: Conduct surveys using same methods as in previous surveys.											
			Publish results of the survey done in the previous year											
			Conduct surveys using same methods as in previous surveys.											
			Publish results of the survey done in the previous year											
			Conduct surveys using same methods as in previous surveys.											
Publish results of the survey done in the previous year														

Timeline code	Activity	Responsible agencies	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
RM3	Road transect surveys of vulture numbers in Nepal.	BCN RSPB	<p>Nepal: Conduct survey using same methods as in previous surveys. Western lowland surveys annually. Midhills and East-West highway survey every four years (done in 2018, draft paper is in review).</p>											
			<p>Nepal 2019: Next annual survey to be conducted</p>											
RM4	Vulture population monitoring in Pakistan, Bangladesh, Cambodia and Myanmar.	WWF Pak BNVRC IUCNB'desh BFD	<p>Continue to develop and conduct repeatable population surveys.</p> <p>Bangladesh: Ongoing annual surveys</p> <p>Pakistan: National survey planned for 2018 (but funds not available) Hoped for in 2019, but still funding-dependent. Follow up from 2010 survey.</p> <p>Cambodia: annual census conducted</p> <p>Myanmar: baseline survey to be carried out in 2019, methodology to be established.</p>											
RM5	Monitoring of NSAID contamination of ungulate carcasses in northern India and Nepal.	BNHS IVRI BCN	Complete current round of sample collection in several states. Measure concentrations of all NSAIDs potentially hazardous to vultures											
			Publish NSAID monitoring results and expected effects on vulture death rates											
			Collect samples in several states according to previous protocol. (not India) Measure concentrations of all NSAIDs thought to be potentially hazardous to vultures											
			<p>India: Collect samples for India. Longstanding problem exporting samples was resolved (for now) and samples are currently being analysed at ERI (Scotland).</p> <p>Nepal: have stopped collecting carcass samples.</p> <p>Bangladesh: have 2 year project in progress with a target of 1000 samples. Started in 2018 and is on track.</p>											
			<p>Publish NSAID monitoring results and expected effects on vulture death rates</p> <p>Collect samples in several states according to previous protocol. Measure concentrations of all NSAIDs thought to be potentially hazardous to vultures</p>											
			Publish NSAID monitoring results and expected effects on vulture death rates											
			Collect samples in several states according to previous protocol. Measure concentrations of all NSAIDs thought to be potentially hazardous to vultures											
			Publish NSAID monitoring results and expected effects on vulture death rates											

Timeline code	Activity	Responsible agencies	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
RM9	Monitoring of availability of NSAIDs for veterinary use in pharmacies and other outlets in Pakistan.		Conduct undercover surveys of outlets for veterinary drugs. Record NSAIDs offered for use for veterinary purposes. Identify the provenance and vial size of diclofenac offered illegally for veterinary use [Pharmacy surveys ongoing]											
			2019: Punjab wildlife department funding new surveys in the Punjab in 2019, outside VSZs; surveys inside VSZs are ongoing.											
RM10	Estimation of the former and potential future value of the ecosystem services provided by wild vultures.		Conduct a survey of costs of cattle carcass disposal, feral dog control and other ecosystem service measurements. [IUCN India have a paper in development since 2016. Request for SAVE website when available although still not published by Jan 2019.] Highlighted as a priority in the MSAP; not taken a high priority for SAVE due to acknowledged challenges (2018). Will offer support/respond constructively to collaborators from other disciplines.											
RM11	Investigate factors affecting use of vulture-safe NSAIDs by veterinarians, paravets and livestock owners.	Juergen, RG, TAC, HCT, WWFPak, BNHS (VP)	Conduct questionnaire studies, choice experiments and other investigations, as appropriate. [Questionnaire circulated. Only 3 replies received (India). 2018 – revisit and aim for a wider, more effective circulation. 2019: Share also with Pakistan, Bangladesh, Myanmar.											
			2019: Exploit potential for collaboration with social scientists who could pursue some of this work. TAC to progress this in 2019.											

Action Timelines for Fundraising (FR).

Timeline code	Activity	Responsible agencies	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	
FR1	Develop stronger fundraising capacity.							1. Identify national focal points for fundraising.							
											2. FACC to meet 4 times/year and develop further actions				
FR2			Actions to be proposed and agreed through FACC during 2019												
FR3															
FR4															
FR5															

Action Timelines for Cambodia (CAM).														
Timeline code	Activity	Responsible agencies	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
CAM1 (minor rewording Nov. 2014)	Monthly supplementary feeding in at least six sites		Provide at least one dead cow per month at vulture restaurants 2018: 4 feeding sites remain.											
CAM2	Improve population monitoring		Census vulture restaurants in March, June, September and December											
CAM3	Safeguard nesting areas from logging		Check all known nest locations, improve law enforcement at key sites											
CAM3	Safeguard nesting areas from logging			Law enforcement to prevent logging at key sites										
CAM4	Protect vulture nests from human predation		Evaluate effectiveness of nest protection across sites											
			Continue nest protection if found to be effective											
			Continue nest protection if found to be effective											
			Evaluate effectiveness of nest protection across sites											
			Continue nest protection if found to be effective											
			Continue nest protection if found to be effective											
			Evaluate effectiveness of nest protection across sites											
			Continue nest protection if found to be effective											
			Continue nest protection if found to be effective											
			Evaluate effectiveness of nest protection across sites											
			Continue nest protection if found to be effective											
			Continue nest protection if found to be effective											

Timeline code	Activity	Responsible agencies	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
CAM5	Monitor sales of veterinary drugs at key sites		Quarterly monitoring of veterinary drug sales at key sites											
CAM6	Increase sustainability of CVWG		Integrate vulture conservation activities into other NGO activities											
			Develop sustainable financing where possible											
			Evaluate CVWG activities and effectiveness											
			Develop sustainable financing where possible											
			Nationalize management of CVWG											

Action Timelines for Myanmar (MYA).														
Timeline code	Activity	Responsible agencies	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
MYA1	Nesting site protection and law enforcement	MVWG						2019: Start with one of the three key nesting sites in 2019						
MYA2	Public awareness through social media	MVWG						Start in 2019 at one site with local community and social media at national level. Will also work through zoo – e.g. vulture awareness day.						
MYA3	Restaurant site for environmental tourism	MVWG						One site to start with in 2019 – twice per year. No budget for this, but will try and increase interest.						
MYA4	Threat assessment	MVWG						Questionnaires, focus group discussion at one site.						
MYA5	Update Myanmar vulture species action plan	MVWG						Plan to be updated and aligned with SAVE blueprint and Vulture MSAP						

NB that agreed it may be useful to share experiences from Africa on poisoning responses with all SAVE partners. TAC to develop action timeline for this during 2019.