Urgent Needs for Global Wildlife Health

Why Wildlife Health Matters

The health of wildlife, while not routinely considered until a prominent disease emergency occurs, is essential for life on Earth. Wildlife health is a fundamental indicator of the health of the planet, its ecosystems, and services which humans and agricultural systems depend upon. Monitoring and understanding disease processes in wildlife populations can provide early warning of perturbed microbial systems and potential risks of emerging infection that can impact human health and the economy. Biodiversity decline is the end point of a complex chain of mostly anthropogenic impacts; wildlife health indicators are likely to pre-empt population collapse and allow for early intervention that is vital to conservation. Declines of wildlife populations due to disease can have a wide range of significant consequences, from impacts on pollination, pest control, food chains, soil productivity, livelihoods, and a reversal of conservation gains.

As seen in several recent major wildlife mass mortality events, results of decades of conservation investments can be undone within weeks. Simultaneously, exposures between wildlife, livestock, and humans are occurring on an unprecedented scale, creating risk of high-impact disease transmission.

Wildlife health is widely under-developed in the design, resourcing, and operations of national biodiversity and health programs. Capacity building, efforts to fill knowledge gaps, and surveillance programs are urgently needed at country and regional levels. **Global efforts are needed to provide essential stop-gaps to support countries and provide risk reduction strategies.**

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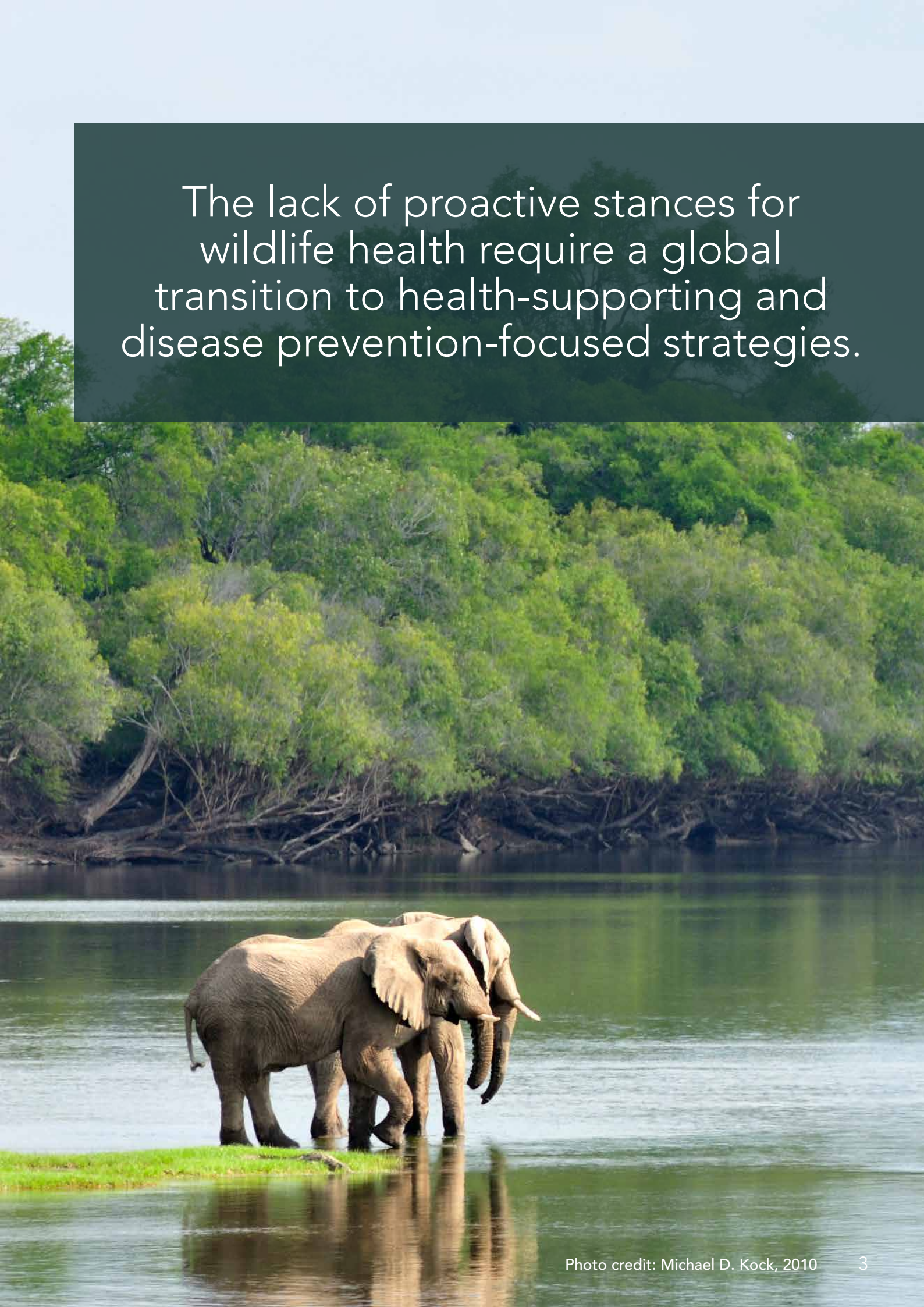
The lack of proactive stances for wildlife health require a global transition to health-supporting and disease prevention-focused strategies.



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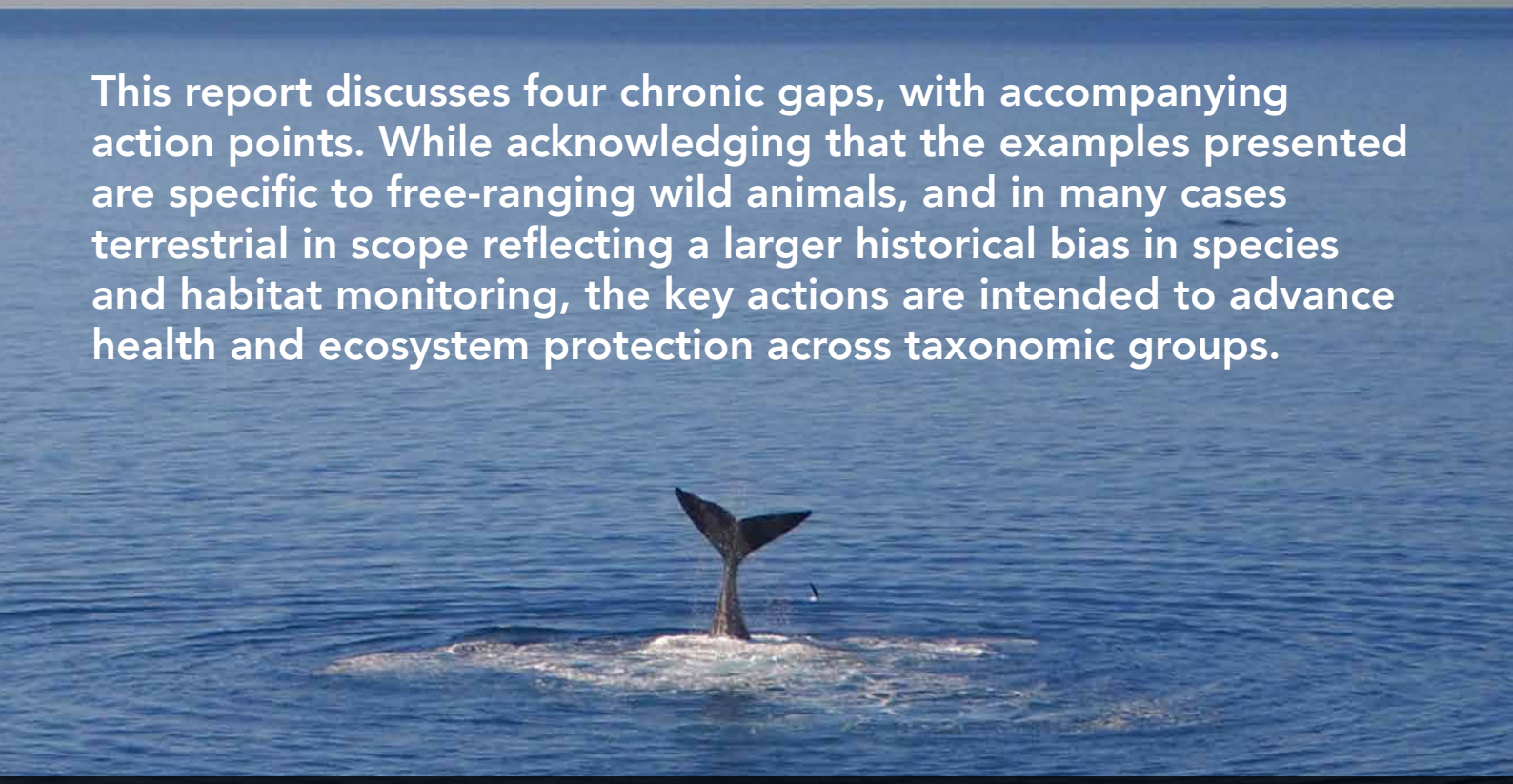
Overview of report

This high-level gap analysis provides a follow up to the IUCN Crossroads blog titled "It is Time for a Global Wildlife Health Authority" (17 September 2020), expanding on operational gaps and potential immediate avenues for solutions. The primary audience is intergovernmental agencies, organizations, and donors seeking to support countries in their implementation efforts around biodiversity and health. A key element is the establishment of suitable institutional arrangements which bridge the demands of wildlife, domestic animal, and human health in the context of health indicators, endemic and epidemic diseases, and emerging pathogens. Country capacity development is another key ingredient and is the subject of forthcoming guidance.

This report discusses four chronic gaps, with accompanying action points. While acknowledging that the examples presented are specific to free-ranging wild animals, and in many cases terrestrial in scope reflecting a larger historical bias in species and habitat monitoring, the key actions are intended to advance health and ecosystem protection across taxonomic groups.



Key areas where global institutions can contribute importantly by providing overarching infrastructure to support country efforts:

1) Diagnostics and investigation;
2) Reporting;
3) Planning and response; and
4) Health supportive and disease preventive development strategies.

The world must build back better to address threats beyond the current pandemic. The proposed actions should be considered as part of COVID-19 recovery efforts and the design and implementation of the Post-2020 Biodiversity Framework.

Current global programs have notable strengths that provide a basis for enhancement, and the existing OIE-CITES cooperation agreement (2015) and the FAO/OIE/WHO Tripartite Collaboration (2018) signal a shared interest in collaboration. However, it should be recognized that no institution presently has a mandate that covers the full scope needed for wildlife health, i.e. as it relates to the conservation of biological diversity, human and domestic animal health, and ecosystem management. Successful implementation will require agencies to develop coordination channels and commitments potentially beyond the reach of current agreements, priority areas, and mandates.

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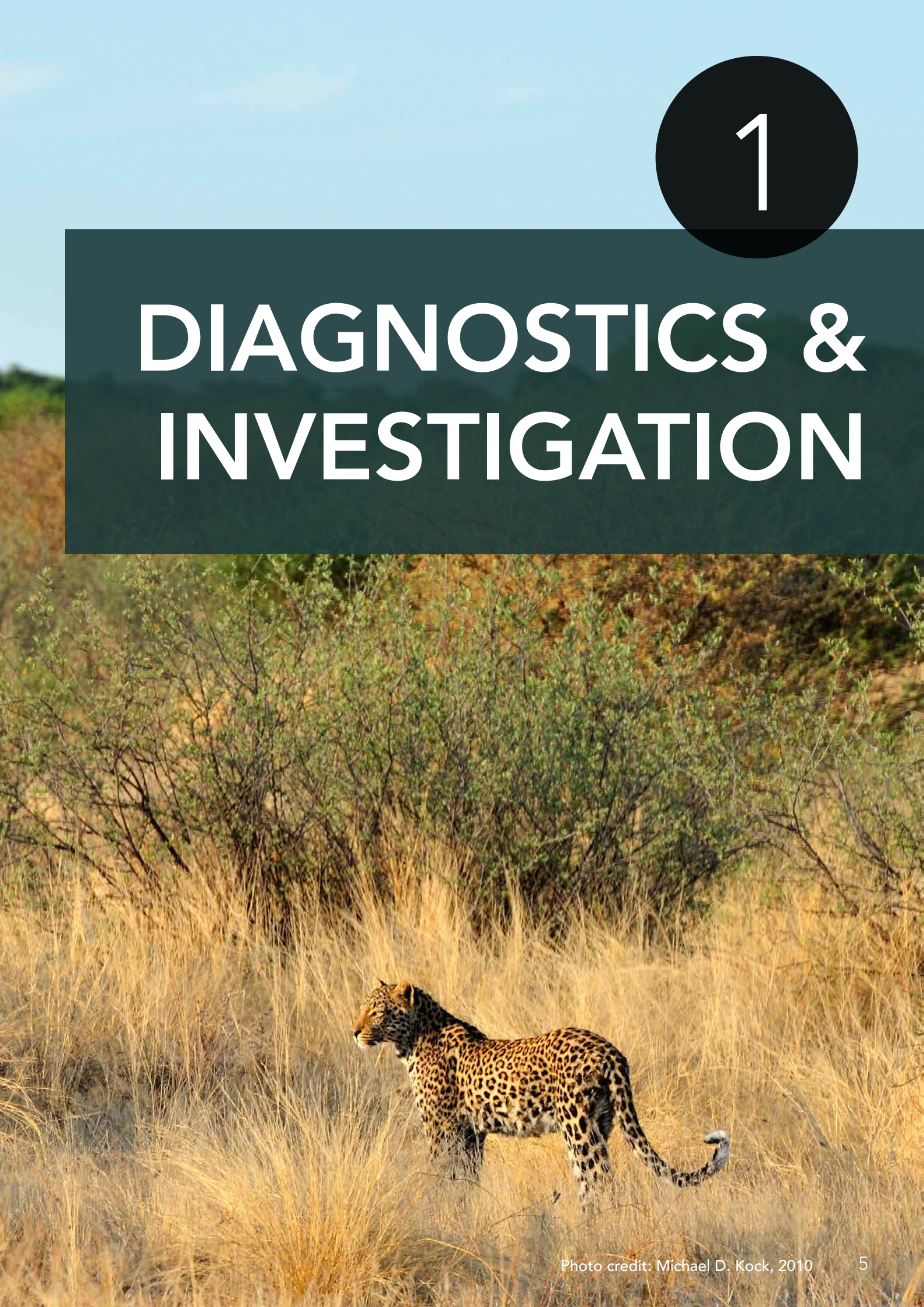
DIAGNOSTICS & INVESTIGATION



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Diseases are increasingly recognized as a threat to endangered wild animal populations.

However, recent large-scale die-offs, as seen with the saiga antelope mass deaths in 2015 and 2017 in Central Asia and the mass beaching of pilot whales in Tasmania and African elephant deaths in Botswana in 2020, highlight that the underlying causes of these mortality events are often not apparent in the field. Investigations require rapid and thorough diagnostic screening and collation of environmental and ecological data to inform response and control measures. Given current technical and practical challenges in establishing comprehensive diagnostic capacity for wild animals in many countries, shipment to international reference laboratories is often required for adequate analysis. If the causes of die-offs are not identified immediately, intervention strategies cannot be implemented, the risk of spread to other animals or people cannot be evaluated nor controlled, and authorities and the public cannot be properly informed, thus creating confusion and the potential for inappropriate and inadequate responses.

Basically developed to ensure that international trade in specimens of wild animals and plants does not threaten their survival, CITES regulations can unintentionally impede movement of emergency diagnostic specimens from species of conservation concern, requiring lengthy processes to acquire both import and export permits. There is now further concern about the unintended consequences of the Nagoya protocol on access and benefits sharing from genetic resources in holding up essential international diagnostic collaboration.

Many wildlife experts face frustrations over delays in movement of routine research samples due to CITES procedures; we note that these delays can impede research important for establishing overall baselines and monitoring populations and pathogen circulation. However, **from a conservation lens, emergency diagnostic specimens warrant special attention and emergency procedures, as failure to move these specimens rapidly and efficiently increase conservation, animal, and public health risk.** In recent years, investigations of major disease emergencies have been plagued by a number of administrative issues from a confusing and fragmented process (e.g. inconsistent species names), leaving room for senseless delays. For human and livestock disease, where samples are granted virtually same-day international movement and a rapid definitive diagnosis, bureaucratic delays in movement of emergency diagnostic samples to qualified reference laboratories would be viewed as negligent; for wildlife emergencies, even in the face of mass mortality events, they can be the norm.

In order to determine toxicological, infectious, or other causes (e.g. starvation, weather) of physiological stress, testing may involve numerous approaches with iterative diagnostic pathways. This is apparent with the response to the elephant mortality event in Botswana in July 2020. Even with the eventual successful movement of specimens for international diagnostic support for this event (likely aided by major media attention around a charismatic species), cause of death or exacerbating factors for this particular incident are still poorly understood. Some possible causes of the elephants' death have been speculated to address immediate political needs to inform the public of a cause, despite a lack of certainty or firm evidence for any specific diagnosis. Multiple marine mammal mass mortality events in recent years have not received a similar level of attention and remain unresolved. Even getting suitable specimens to a laboratory is uncertain; each submission requires separate

paperwork and costs, which acts as a disincentive to international collaboration among often under-resourced wildlife authorities and scientific experts. In any given setting, a gap in cold chain of even a day or two due to export or import delays may compromise sample quality if proper storage facilities are not available or not used appropriately. This inefficiency delays and ultimately may prevent access to critical information needed to inform preventive and control measures.

The disparity between the global North and South is stunning when considering access to diagnostic technology. Restrictions on movements of specimens from CITES-listed species – those at greatest risk of extinction – may paradoxically impede the very diagnostics needed to save their lives. This was apparent in two recent mass mortality events leading to the death of >80% of the global population, representing >500,000 saiga antelope (including calves of the year) in Central Asia, with months-long delays in export and import agreements for testing to identify known diseases. Failure of cold chain at the airport spoiled tissues, rendering them unusable for culture and detailed study.

To facilitate the transfer of biological samples where this is urgently required, Parties have agreed on a set of simplified procedures for permits and certificates. In August 2019, the 183 Parties to CITES amended these procedures to further facilitate the rapid movement of diagnostic samples, and it was agreed that guidance for practitioners on their use should be developed. However, from our perspective, the simplified procedures still fall short for emergency diagnostics, notably by:

> **Simplified procedures for Appendix I species** (the species which need greatest protection) require that an import permit covering the transaction is issued by the importing Party; and

> Insufficient support for implementation, including no formal definition nor designated authority for declaring a wildlife disease emergency and providing necessary support to facilitate and track expedited procedures.

In addition to simplified procedures, CITES Parties are encouraged to register their scientific institutions to facilitate scientific exchange of specimens to conduct taxonomic, wildlife forensic, and species-conservation research, and hundreds of institutions from 75 Parties are registered. Diagnostic testing centers recognized as an official reference laboratory or a collaborating centre by the World Organisation for Animal Health (OIE) automatically qualify for inclusion in the CITES register of scientific institutions. Once included in the Register by the CITES Management Authority, such laboratories can exchange samples with other registered laboratories or scientists without having to first obtain a CITES permit to do so.

However, diagnostic testing centers recognized as an official reference laboratory or a collaborating centre by the World Organisation for Animal Health (OIE) are not automatically included in the CITES register. Registration relies on the management authority of the hosting Party, which may not be familiar with wildlife health needs in country or internationally.

An upmost priority for conservation must be ensuring access to rapid and high-quality diagnostics for endangered species of all taxa. Utilizing the existing model of OIE Reference Laboratories, in coordination with CITES to facilitate selection, registration, and transport would enable rapid diagnosis while ensuring access and benefits sharing are fully respected via trusted reference laboratories.

2

REPORTING

Photo credit: Michael D. Kock, 2006

Wildlife can experience devastating consequences of disease on vulnerable populations.

For endangered wildlife, even species survival is threatened. Unusual events, whether novel or changed in scale or scope, present uncertainties for disease management, potentially when multiple stressors are at play. Putting these events into context, for conservation, agriculture, food security, and public health, is challenged by the lack of a systematic approach to reporting and monitoring.

Except as specified for OIE-Listed Diseases, there is no requirement for international reporting of diseases in wildlife. **Countries are encouraged to contribute to the voluntary report on non OIE-listed diseases in wildlife through the OIE WAHIS Interface, which is the sole standardized database for intergovernmental reporting of wildlife disease events, but few countries contribute information into this system.** Between 2008-2018, a total of 4,229 reports of wildlife disease were recorded on the WAHIS-Wild Interface, with >75% from Europe (thus less than 15% of member countries). Reports reflected disease in 501 species, with almost one-fifth of the species at elevated extinction risk as assessed by the IUCN Red List of Threatened Species. In recent years, the value of the voluntary reporting of non OIE-listed diseases in WAHIS has been questioned because of low utilization; while revised criteria for reporting is proposed, there may not be clear mandates and responsibilities for those asked to report and thus few incentives for authorities to participate as well as misconceptions about possible impacts on livestock trading status. The current voluntary report format and annual schedule for non OIE-listed disease could serve an important role in establishing baseline data on diseases for wildlife, especially if all member countries provided comprehensive reports. The system currently is not conducive to tracking population impacts, with many reports not indicating the scale of the event in terms of number of individuals and breadth of affected population. IUCN Red List assessments are revised every so many years, and thus some species could go extinct or drop to near extinction levels between periods if hit by a catastrophic disease event. **An effective global tracking system is critically needed and international collaboration is essential for managing threats associated with transboundary and migratory species.**

Lessons from other systems

In addition to reporting by national authorities, information gained from other sources may be important for assessing wildlife disease risk. Through the United States Geological Survey National Wildlife Health Center, the Wildlife Health Information Sharing Partnership (WHISPers) event reporting system tracks disease morbidity and mortality, with attribution to infectious, traumatic, nutritional, toxic, or other causes. This database is unique in tracking event determination status, which can shed light on future threats and is important because initial suspicions may prove wrong. Other tracking efforts have been rolled out by expert groups, but rely on a volunteer network lacking global authority. The African Wildlife Poison Database, managed by the IUCN SSC Vulture Specialist Group and its partners, collates current and historical information on poisoning of scavengers and other wildlife on the African continent, with nearly 15,000 reported poisonings by the end of 2019.

3 RESPONSE

Photo credit: EcoHealth Alliance

Responses to disease outbreaks and epidemic threats have resulted in blaming of wildlife and in some cases intentional killing of wild animals rather than implementing more effective and sustainable approaches

such as improving poor agricultural practices and biosecurity in domestic animal and human dominated landscapes and interfaces. There is no ongoing or systematic initiative to track and respond to wildlife outbreaks and mortality events; thus, response relies solely on appeals from individual wildlife health experts and expert groups, with little to no authority and limited bandwidth. The IUCN SSC WHSG provides guidance on request in its expert capacity but lacks any formal authority or scope to mobilize resources or directives. Likewise, the International Whaling Commission's Stranding Initiative offers expert support and best practices for marine mammal strandings response, but interventions are constrained by bureaucratic processes and require an affected country's government to request official assistance. This reactive stance means that **appeals against targeting wild animals (some already endangered) often come too late, after the damage is done.**

Special attention must be given to wild birds and bats, given the extent to which they are victims of misinformation and intentional killings on the basis of perceived disease risk. Examples recorded in the past decade include wild bird culling and toxic chemical treatment of wetlands out of concern for avian influenza virus, and killings of individual bats and extirpation of entire bat colonies, including from a cave identified as a source of Marburg virus. Renewed bat culling efforts were most recently seen with the COVID-19 epidemic and remain an ongoing concern. None have proven to be effective. Such campaigns represent an ineffective and inefficient use of resources, are often counterproductive, and are detrimental to ecosystem integrity, potentially with long-term consequences. For conservation risk, they are directly detrimental to wild animal populations. For disease risk, they can actually increase risk via a number of pathways (e.g. spread via dispersion of animals or creating opportunity for immigration of non-immune animals and additional disease). They are often indiscriminate; for example, not distinguishing between bat species and epidemiological role (there are >1,400 species, with highly diverse ranges and conferring ecosystem services of benefit to health and economies, along with diverse microbiota). In addition to direct impacts on populations, killings can also have wider impacts, e.g. poisoning effects on non-target species. Policies are lacking that ensure coordination with conservation authorities in the design of adequate disease management response.

Wildlife blaming fails to tackle root causes of disease risk. **It should be widely understood that wildlife themselves do not pose risk, but rather human practices that alter ecosystem dynamics and present opportunities for pathogen exposure.** The lack of a global authority, and thus global guidance, on appropriate disease control measures leaves vulnerability to ad-hoc responses which may be well-intentioned but ineffective and detrimental. This lack of information in some cases has also stalled development and use of appropriate, evidence-based disease control strategies (e.g., vaccination of endangered wild canids where it may be a critical tool for survival).

Photo credit: Michael D. Kock, 2006

4

HEALTH SUPPORTIVE & DISEASE PREVENTIVE DEVELOPMENT STRATEGIES

Photo credit: Michael D. Kock, 2003

The risks associated with wildlife disease events appear to be expanding at a time when wildlife are already at increased peril.

This is logical when considering the growing risks also affecting human and domestic animal health, such as the movement of wild animals around the world with little to no disease monitoring for the vast majority of species and individual animals. **Given the extraordinary social and economic impacts of COVID-19, it is a massive indictment of our health systems that there is virtually no recording of zoonosis from wildlife and wildlife trade.** We can model risk but we have no evidence to ensure those models are accurate and when compared to domestic animals the often quoted risk is highly speculative. Widescale changes to ecosystems, such as forest fragmentation, introduction of domestic animals into wildlife habitat, pollution, and establishment of invasive species are fundamentally changing species interactions and ecosystem functions. While some wildlife health impacts are detected, particularly for charismatic megafauna and terrestrial species, limited detection capacity means many consequences are yet unseen. The trajectory of continued widescale ecosystem degradation and climate change presents many uncertainties, but wildlife will face increasing pressures that potentially exacerbate conflict with human and domestic animal populations.

The lack of proactive stances for wildlife health require a global transition to health-supporting and disease prevention-focused development strategies. **At present, standard risk and impact assessments for development projects take a siloed approach, treating environment and health in siloed fashion and easily missing critical links between them.** The World Bank's Environmental and Social Framework launched in 2018 greatly strengthened biodiversity protections, but there is a need to raise awareness for practitioners to more systematically include considerations around disease risk to wildlife as well as to humans and domestic animals when conducting environmental impact assessments (EIAs), whenever relevant. An integrated approach to EIAs could **anticipate disease risk and build in appropriate and cost-effective disease risk reduction measures from the onset.** The impacts of prior ecosystem changes on wildlife health have not been systematically captured, hindering thorough assessment of future development projects; at the same time, monitoring is not built in during project implementation to detect and respond to threats in real time.

The lack of disease prevention is to the detriment of conservation. Wildlife are affected by habitat encroachment, as seen with illness and deaths of critically-endangered mountain gorilla from human diseases such as measles and pneumonia. Wild canids have suffered rabies

outbreaks, leading to concerning declines in fragile Ethiopian wolf populations – and should be unsurprising when thinking of risks between unvaccinated domestic animals and susceptible wildlife. Despite human actions being responsible for disease risk, disease spillover events can contribute to a view of wildlife as pests. Dedicated action is needed to keep wildlife safe and preserve the public image of wildlife as positive and essential contributors to ecosystems.

As a result of a lack of global coordination, important lessons learned for wildlife health in one country or region may be missed in another. A ban on veterinary diclofenac (an anti-inflammatory drug used for livestock pain relief) in India and Nepal was enacted only after Gyps vulture declines of >90% were documented. Despite the clear ecological importance of vultures via carcass removal, and the availability of safer alternatives, diclofenac has been licensed for veterinary use elsewhere, and there are loopholes in human medical uses that allow for continued threat to vulture populations. Providing access to a more systematic evidence base for wildlife health can help decision making bodies – including those in the veterinary and human medicine sectors - minimize impacts in line with the precautionary principle.

At national level, many countries are establishing One Health coordination bodies to promote multi-sectoral collaboration in assessments, plans, and programs. However, wildlife and broader environment sector representation in One Health efforts is typically weak or non-existent at country level, and lacks champions at global level. **No global body integrates wildlife considerations into intergovernmental disease risk reduction efforts.** A global One Health approach, to comprehensively address human, animal, and environmental health issues at local, national, and international levels is needed.

Photo credit: EcoHealth Alliance

CASE STUDIES

Photo credit: Michael D. Kock, 2003

COVID-19 human pandemic

The breadth of species, disease threats, and situations understandably makes design of wildlife health programs challenging. Examples of wildlife health vulnerabilities and impacts indicate need for public and animal health and conservation action:

The **COVID-19 human pandemic** is atypical of most emergencies in that there is limited information about breadth of animal species susceptibility and potential severity of consequences. Human to animal transmission (zooanthroponosis) has been documented in household pets (cats, dogs), and zoo (tigers, lions) and farmed wildlife (mink), all via close human contact with captive animals. Experimentally, SARS-CoV-2 transmission has been shown in Cynomolgus Macaques, ferrets, raccoon dogs, and deermice rodents. There is no evidence that free ranging wildlife play an epidemiologically important role in transmission to humans, yet wild bats have been killed due to a misperception of a role in spread of the disease. Conversely, based on genetic similarity and prior impacts of respiratory diseases, there is a substantial concern over susceptibility of great ape species, including critically-endangered chimpanzees, gorilla, and orangutan. The risk of spillover from humans into other species is now of concern for susceptible wild animals and potentially in establishing new reservoir species. COVID-19 may add to the burden of known diseases that affect primate

Mass mortality events in marine mammals

species and fragile populations, from the common cold, to influenza, to bacterial pneumonia. This is not surprising given that 96% of global mammal biomass is now human and domestic animal, creating a pool of pathogens and risk of infection for the mostly depleted biodiversity of mammal life. Providing rapid and precise diagnostic information is critical to guide appropriate conservation measures best suited to a populations' survival.

Mass mortality events in marine mammals.
As with terrestrial taxa, unusual mortality events seem to be increasing in marine mammals. Yet the magnitude, rate, and extent are hard to define due to lack of systematic reporting and biases in geographic coverage in response capacity (e.g. most of the events and subsequent investigations in 2018-2020 came from North American and European coastlines). Importantly, most strandings are not properly investigated and causes are often not identified (untimely response and lack of access to specialized diagnostic labs are key limiting factors). Notwithstanding, recent causes of cetacean mortalities have been infectious diseases such as cetacean morbillivirus, harmful algal blooms, human interaction (entanglement or ship strike), and ecological factors (displacement, low food resources, extreme weather). The impacts on marine mammal populations are likely to worsen, as significant changes to the global marine environment are expected over the next decade, most notably from increasing industrialization of marine spaces, emerging disease, and climate change. Marine mammals are ecologically keystone species, highly charismatic, and attract significant public attention, factors that force governments to respond, often exposing the weaknesses of systems. These same traits, however, provide unique opportunities for raising citizen awareness

and conservation stewardship. Cumbersome processes within the International Whaling Commission have prompted independent efforts (e.g. the Global Stranding Network) to fill gaps. While the two will ideally work jointly to supplement strengths, the situation reinforces that existing models are not fulfilling their expected role, requiring duplicate effort and dispersed attention and funding.

Global amphibian declines

Global amphibian declines are at least partially linked to two fungal diseases caused by Batrachochytrium ssp ("chytrid"). The diseases are complex and an indicator of environmental and other stressors amongst amphibian populations and have also been demonstrated to be spread in trade and contaminated objects. While a reportable disease to the OIE, the scale of international trade and risk of movement within countries leaves many vulnerabilities, with inadequate safeguards for disease introduction into endemic amphibian populations. Chytrid is thought to be linked to the extinction of ~90 amphibian species and threatens many others.

Ebola epidemics in great apes

Ebola epidemics in great apes have been estimated to have resulted in major population declines, and may also indicate periods of heightened risk to human populations. International initiatives have sought to study viral circulation, but coordination efforts are still lacking across sectors at global level, with challenges in determining strategies for managing disease risk (e.g. vaccination in wild apes). The UNEP-Great Ape Survival Partnership (GRASP) includes disease monitoring guidance; while not robust, it is exceptional in the global architecture as a dedicated effort to prioritize health threats in a conservation context.

ACTIONS

Photo credit: EcoHealth Alliance

Immediate solutions are available that can be implemented at no or low cost. Taking these actions will advance basic global infrastructure to support countries in their wildlife health management efforts and promote a stronger post-COVID-19 recovery.

Promote coordinated planning and responses

> Develop and adopt appropriate strategies for management and control of wildlife disease epidemics, including pre-approved diagnostic plans and tools.

> Integrate wildlife health needs into country capacity evaluation (e.g. the OIE PVS) and develop capacity benchmarks for the environmental health sector.

> Approve decisions under multi-lateral development agreements including CBD, CMS, and UNEA condemning the inappropriate killing of wild animals in response to perceived disease threats, with exceptions only for cases of clinical disease posing immediate risk or in situations where there is sufficient scientific evidence that benefits exceed harm, and creating a path to integrate wild animal disease management into biodiversity strategies and action planning initiatives.

> Pass a resolution by the World Health Assembly (WHO) on the need for science-based responses regarding the management of wildlife and promote inclusion of wildlife-specific guidance in relevant processes (e.g. national action planning for health security) to ensure broad understanding in line with a One Health approach.

> Ensure global institutions have access to wildlife health expertise, and formalize rosters of experts for wildlife health, as available for human health under the International Health Regulations.

> Coordinate with educational institutions to ensure a sufficient workforce and training pipeline, and develop and harmonize international standards for wildlife health professional training curriculum.

Track disease events and impacts systematically

> Review and refine the scope of existing databases and/or develop new system(s) to ensure comprehensive coverage across taxonomic groups, interfaces, and types of threat (infectious and non-infectious).

> Prioritize event identification and sufficiently document and record the scale of events to ensure disease events are adequately tracked in a way that informs future threat assessment, management, and risk reduction strategies.

> Pursue efficiencies in information capture for visual observation of disease morbidity and mortality events (e.g. researcher and citizen science biodiversity monitoring databases).

> Develop a system for real-time notification of wildlife disease events, and facilitate pairing with technical support as needed.

> Develop a multidisciplinary community of practice from environment and wildlife sciences to ensure disease events include analysis of a variety of potential risk factors or drivers of disease emergence such as climate,

socioeconomic and development factors, and other animal, insect or plant community and/or environmental change that may have a role.

> Provide a direct link between disease reports in wild animals and the IUCN Red List of Threatened Species to facilitate adequate and real time consideration of disease risk and impact when assessing extinction threat.

Provide infrastructure for diagnostics and investigation

> Designate institutions as international wildlife disease laboratories to supply a sufficient diagnostics network to supplement country capacity as needed. The existing model of OIE reference laboratories can be used as a basis to alleviate concerns over access and benefits sharing of genetic resources (Nagoya Protocol) to develop selection criteria and terms of reference for designation.

> Pre-register designated wildlife disease laboratories with CITES to facilitate expedited procedures to avoid delays in disease emergencies.

> Exempt biological specimens for emergency diagnostics of CITES-listed species from permit requirements for international movement to these laboratories (e.g. a standard health permit).

> Establish a funding mechanism across taxonomic groups for emergency response to assist authorities in rapid investigation and control of disease events.

> Provide support within the CITES Secretariat, potentially assisted by a committee with representatives from technical agencies and intergovernmental partners, to facilitate timely movement of emergency diagnostic specimens from CITES-listed species as part of disease investigation (for wildlife morbidity/mortality events or suspected wildlife role in human or domestic animal disease events).

Advance health supportive and disease preventive development strategies

> Integrate wildlife disease risk analysis into development bank environmental and social risk and impact assessments, to improve risk identification and mitigation for disease threats to and from wild animals.

> Ensure wildlife disease risk is sufficiently considered in the appraisal, cost-benefit analysis, and implementation of development projects, particularly for land conversion, animal production and trade, and extractive industries, prioritizing prevention and building in effective biosecurity measures from the onset.

> Establish procedures for temporary moratoriums on national use or trade, or international trade of a given population or species during a major wildlife disease morbidity or mortality event, to allow for sufficient investigation and determination of non-detriment status of trade activities (to source population or via disease/pathogen introduction).

> Develop global guidance for consistency across UNDP, UNDRR, UNEP, and IUCN on ecosystem-based approaches to disease risk reduction and wildlife health protection in the context of health and ecological threats and emergencies.

Wildlife health must be recognized as a basis for healthy populations – human, domestic, and wild.

It is important to acknowledge the current gaps across institutions and sectors in the current system, which require strong coordination as policies and programs are rolled out, especially given the low involvement of environment/ wildlife sector in health initiatives to date.

While the world's conservation bodies have an imperative to rally around the health and survival of endangered species, it is indeed the whole of society that must address all species conservation for the health of our natural ecosystems. The current unprecedented rise of emerging infectious diseases could wipe out decades of investments and progress, including for conservation – but it is only one of many health threats the world's species face.

Photo credit: EcoHealth Alliance