

# One Health in Action

Wildlife Conservation Society



November 2020





## OUR MISSION

The Wildlife Conservation Society saves wildlife  
and wild places worldwide through science,  
conservation action, education, and  
inspiring people to value nature.

<https://wcs.org>

## OUR VISION

WCS envisions a world where wildlife  
thrives in healthy lands and seas, valued  
by societies that embrace and benefit  
from the diversity and integrity of life on earth.

## WCS HEALTH PROGRAM

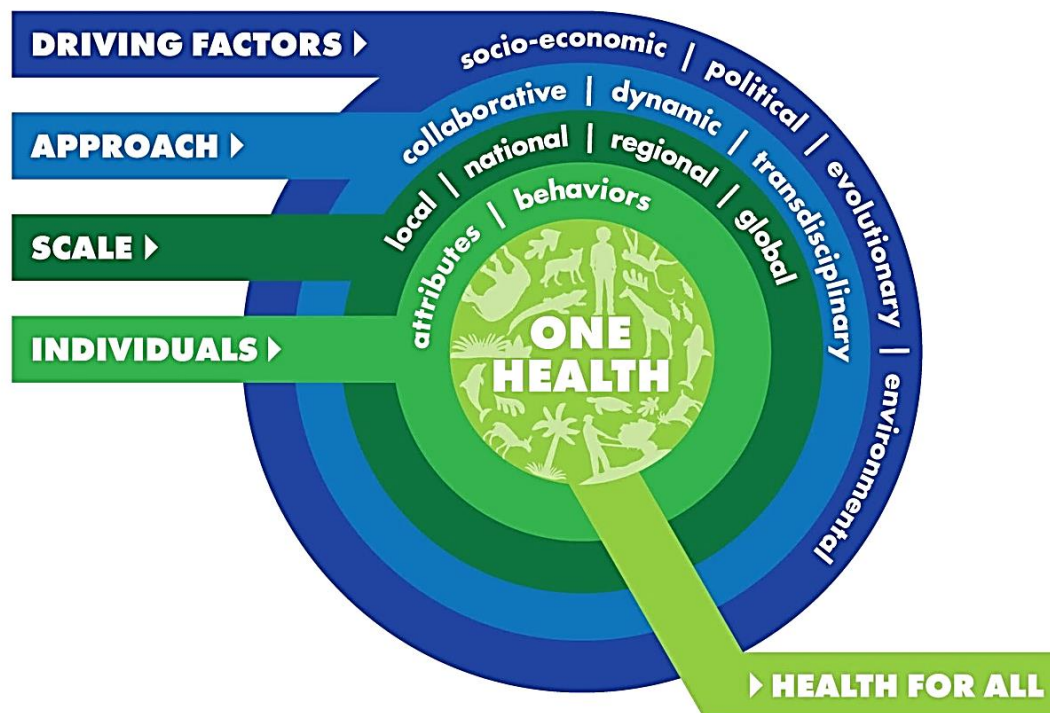
In 1989 WCS developed its Field Veterinary Program—the first and largest of its kind—in response to the growing recognition of the critical role of wildlife health in both conservation and development. The program later expanded to become the innovative [WCS Health Program](#), working around the world on a range of threats facing wildlife, livelihoods, and human health.

<https://oneworldonehealth.wcs.org/>



# CONTENTS

<b>Background</b>	<b>1</b>
<b>WCS's One Health Approach</b>	<b>2</b>
<b>1. Track and Improve Wildlife Health</b>	<b>3</b>
<i>Surveillance Towards Interventions</i>	4
<b>2. Monitor and Reduce Risk of Emerging Zoonoses</b>	<b>4</b>
<i>Monitoring and Surveillance</i>	5
<i>Reducing Risk: Transforming Data into Action</i>	7
<b>3. Mitigate Livestock Disease Transmission</b>	<b>8</b>
<i>Sustainable, Integrated Management Approaches</i>	8
<b>4. Building Veterinary Capacity</b>	<b>9</b>
<i>Key Capacity Building Efforts</i>	10
<b>5. Catalyze Global Change</b>	<b>11</b>
<b>Goals Moving Forward</b>	<b>12</b>



## BACKGROUND

---

From the most remote terrestrial wilderness to the deepest ocean, to the most densely populated cities, our planet is inexorably changing; experiencing fundamental and profoundly harmful species loss, habitat and soil degradation, pollution, wholesale destruction of forests and coral reefs, illegal and unsustainable exploitation of wild species, and proliferation of invasive species. All of these changes are exacerbated by the global climate crisis. Among other impacts, this planetary mismanagement has led to an escalation of health crises including zoonotic disease—those that are passed between animals and humans. Emerging and re-emerging infectious diseases, and amplification of non-infectious diseases, threaten not only humans but also the animal and plant biodiversity that forms the crucial infrastructure of life on our planet. More broadly, food supplies, economies, social cohesion, and global security are all vulnerable to the rising health threat.

Outbreaks and the international spread of infectious diseases impacting people (Ebola, SARS, COVID-19, monkeypox, MERS, avian influenza), animals (Peste des Petits Ruminants, African swine fever, chytridiomycosis and white-nose syndrome), and plants (wheat rust and cassava mosaic disease), remind us of a basic fact: human, animal, plant, and environmental health and well-being are all intrinsically connected, and profoundly influenced by human activities. Escalating environmental encroachment, species exploitation, natural resource extraction, pollution, and carbon emissions have overextended planetary capacity. Increased weather extremes destroy fertile land causing undernutrition and micronutrient deficiencies in the “bottom billion.” Together with their livestock, these communities are disproportionately harmed by environmental degradation, and the effects of climate change.

On October 25, 2019, just a month before the emergence of COVID-19, WCS, together with Global Health leaders, issued the Berlin Principles on One Health<sup>1</sup>: an “Urgent Call for A United Effort to Stop Diseases Threatening All Life on Earth.” To address the myriad of health challenges of the 21st century, while ensuring the biological integrity of the planet for current and future generations, we need to strengthen existing interdisciplinary and cross-sectoral approaches that address not only disease prevention, surveillance, monitoring, control, and mitigation, but also biodiversity conservation. The quality of current, and future, human and animal health, and well-being, depends on the success (or failure) of humanity’s environmental stewardship. A One Health approach is a collaborative, dynamic, and transdisciplinary approach—working at the local, regional, national, and global levels—with the goal of achieving optimal health outcomes for all. Today, broad consensus exists that health encompasses more than parasites and pathogens; it must incorporate socio-economic, political, evolutionary, and environmental factors while also considering individual attributes and behaviors.

Grounded in decades of experience working on the frontlines of pathogen spillover between wildlife, livestock, and humans, WCS rapidly responded to the needs of the emerging COVID-19 outbreak and subsequent pandemic. During the initial outbreak phase in January and early February 2020, we shifted regional health staff and laboratory diagnostic capacities in South-East Asia to perform coronavirus testing and train local public health partners. Ongoing coronavirus research, data analysis, and interpretation

---

<sup>1</sup> [doi.org/10.1016/j.scitotenv.2020.142919](https://doi.org/10.1016/j.scitotenv.2020.142919)

were prioritized, leading to valuable guidance for decision-makers while informing WCS policy. In support of governments, public health administrations, multilateral, and intergovernmental organizations, WCS teams have raised attention to the strong links and co-benefits between emerging infectious disease (EID) and ecological integrity, helping to craft new legislation and guiding regulations to mitigate the emergence and spread of novel pathogens from wildlife. Simultaneously, WCS worked closely with the media, in multiple countries, to communicate the origins and mechanisms of the outbreak, and acted as a vital firewall for the rapidly spreading infodemic. Close coordination between the Asia, Counter Wildlife Trafficking, International Policy, and Health programs firmly positioned WCS as the go-to conservation-based health expert, and health-based conservation expert, for multiple governments and administrations. WCS' understanding and communication on the role of commercial wildlife trade for consumption in disease emergence, and other drivers of Emerging Infectious Diseases (EID), contribute to framing policies and post-COVID-19 building back better efforts. WCS issued policy papers on the issue, from March 2020 onward, to help inform governments and other decision-makers, as well as to clarify what needs to take place in order to significantly reduce the risk of another similar zoonotic pandemic.

## WCS'S ONE HEALTH APPROACH

Intact and functional ecosystems provide the infrastructure for life, health, and well-being on our planet. The overall decline of the planet's species and ecosystems, coupled with the increased encroachment of humankind into the planet's remaining wild places, provides increased opportunity for disease. WCS' targeted One Health approach seeks to identify where and how these health risks are emerging, while supporting actions that reduce the overall risk to the health of humans, wildlife, animals, plants, and their environments. Beyond our core field-based conservation efforts that support the conservation of biodiversity and intact landscapes and seascapes, and in collaboration with our International Policy, Intact Forests, and other programs/experts, WCS leverages its unique veterinary, health and conservation capacity to deliver on five core One Health approaches:



- **Track and Improve Wildlife Health:** Apply innovative approaches to monitor and rapidly respond to disease of wildlife to mitigate the threat of extirpation and extinction posed to wildlife of multiple taxa from emerging wildlife pathogens.
- **Monitor and Reduce Risk of Emerging Zoonosis:** Monitor, analyze, and minimize wildlife disease, and mitigate spillovers from wildlife-reservoirs, focusing on high-risk drivers of emergence such as climate change, commercial wildlife trade and degradation of biodiverse landscapes.
- **Mitigate Livestock Disease Transmission:** Monitor and mitigate transmission of disease across the human-domestic animal-wildlife interface.
- **Build Veterinary Capacity:** Build capacity and veterinary medical skills for monitoring, prevention, and response to wildlife and zoonotic diseases. Significantly enhanced global veterinary capacity is needed to deal with disease outbreaks, particularly in the least developed countries. Training national staff in surveillance of wildlife, understanding drivers for emerging diseases, and the value of a One Health approach builds in-country sustainability and resilience.
- **Catalyze Global Change:** Leverage the conservation of intact land- and seascapes and their health co-benefits, paired with our scientific, field, and policy capacity, to protect wildlife and wild places, and to assess and highlight links between ecosystem integrity and health as part of the growing global “One Health” movement.

## 1. Track and Improve Wildlife Health

*WCS collaborates with multi-disciplinary partners around the globe to effectively implement innovative epidemiological sampling, tracking, modelling, and diagnostic approaches to study and rapidly respond to wildlife diseases that threaten the conservation of wild species.*

Emerging infectious diseases (EIDs) threaten not only human health, but also the welfare and conservation of wild species, across terrestrial, freshwater, and marine habitats. Similar mechanisms for disease emergence in humans apply to wildlife; with drivers of disease emergence in wildlife including human movement of pathogens by trade and travel, and expansion of human and domestic animal populations with encroachment on wild habitats. Wildlife EIDs include Chytridiomycosis, caused by the fungus *Batrachochytrium dendrobatidis* (*Bd*), that has caused devastating declines in amphibian populations from Central America to Australia. White-nose syndrome (WNS), another fungal disease, has killed many millions of hibernating bats, and caused local extirpations of some species in New York since the time the disease arrived in 2006, and is an imminent extinction threat to multiple susceptible bat species.

In marine environments, multiple emerging diseases of coral have been reported in recent decades, and an unknown pathogen almost entirely removed the black-spined sea urchin (*Diadema antillarum*) population from the Caribbean in the 1980s. Newly recognized morbilliviruses have caused a number of disease outbreaks in dolphins, porpoises, and seals in recent years. Canine Distemper Virus (CDV), a

pathogen of domestic dogs, has spilled over into several seal populations and has emerged as a threat to terrestrial wild carnivores too, including to tigers. Soil run-off and sewage effluent is implicated in the spread of toxoplasmosis from domestic and feral cats into populations of otters, dolphins, and whales. A One Health approach facilitates investigation of these diverse anthropogenic drivers of wildlife EIDs that threaten species' survival.

### ***Surveillance Towards Interventions***

- In North America, WCS recently led a study that investigated if mortality due to white-nose syndrome among hibernating bat species was related to environmental, behavioral, and physiological factors. The effort resulted in first-of-its-kind morphometric and physiological trait data of 3,073 bats, representing 14 species, across 14 sites in the U.S. and Canada (Alberta, British Columbia, Colorado, Montana, Northwest Territories, Nevada, Oklahoma, Oregon, Texas, and Utah). Bats with high rates of evaporative water loss (i.e. bats that typically select very humid winter roosts) were [found to be more susceptible](#) to the WNS-causing fungus, and results will assist conservationists and land managers to target at-risk species with appropriate interventions to help ensure long-term survival of threatened species.
- WCS scientists developed an innovative portable molecular laboratory the size of a briefcase, capable of identifying chytrid fungus (*Bd*) and other pathogens in real-time in the field. Previously, researchers were required to transport samples from remote study sites to a laboratory to confirm the presence of pathogens. Over the course of a long-term research effort from Latin America to Africa, our team has identified the presence of *Bd* in a wide range of habitats—from the highest elevation ever recorded (5,400m in Peru) to, unexpectedly, the [Peruvian neotropical lowlands](#). This study is enabling us to understand the resilience of certain amphibian species to the normally highly pathogenic fungus, and the [climate drivers of the disease](#). In understanding how species can adapt to a rapidly shifting ecosystem, we can develop management strategies that will best protect vulnerable montane species in an era of climate change.
- Canine distemper virus (CDV) can cause significant mortality in domestic and wild terrestrial, and marine mammals. It is a major threat among some endangered species. Using similar technology as for identifying *Bd*, WCS scientists have developed a portable qPCR device which enables wildlife health researchers in remote and low-resource places to diagnose the disease on site. This greatly strengthens our ability to understand the ecology and associated conservation threats of CDV in wildlife.
- WCS pathologists are part of a collaborative effort to determine the etiology and [pathophysiology of Sea Star Wasting Syndrome \(SSWS\)](#), which caused one of the largest marine wildlife die-offs ever recorded, killing millions of sea stars from over 20 species, from Alaska to Mexico. The findings will guide the development of treatment strategies for sea stars in managed care, and lays the groundwork for future research strategies relevant to the conservation of sea stars as keystone species in marine ecosystems.



## 2. Monitor and Reduce Risk of Emerging Zoonoses

*WCS uses adaptive, holistic, and forward-looking approaches for the detection, prevention, monitoring, control, and mitigation of emerging zoonotic diseases to reduce known and potential future health threats to wildlife and people. Across WCS, we engage through partnerships with national government agencies, [Indigenous Peoples and Local Communities](#), and academic and research institutions.*

Of recent zoonotic disease outbreaks in humans, 72% originated in wildlife, and the frequency at which diseases ‘spill over’ from wildlife to humans is escalating. Scientists estimate that there are approximately 1.7 million yet-to-be discovered viruses in mammals and birds, with around 700,000 believed to have zoonotic potential. Notable examples of zoonotic disease spillovers and their devastating impacts on public health include the emergence of SARS-CoV (2003) from a live animal market in China; Ebola outbreaks linked to primate and antelope bushmeat consumption; and HIV-AIDS which is the result of multiple transmissions of simian immunodeficiency viruses (SIVs) from non-human African primates to people through human exposure to blood and/or body fluids. The 2019 emergence and global pandemic of SARS-CoV-2, likely triggered by human-wildlife contact with a bat or an intermediate host species in China, has brought to the fore the risk that the spillover of zoonotic pathogens poses to human health and economic stability.

### **Monitoring and Surveillance**

*WCS evaluates the epidemiological drivers of emerging zoonotic diseases at high-risk wildlife hunting/capture, farming, trade, and trafficking interfaces across Africa, Asia, and Latin America, and takes on leadership roles in large health donor funded programs such as [PREDICT](#), guaranteeing that conservation is an integral and essential aspect of global health.*


Intact, functional ecosystems provide the critical foundation of life on our planet. Our recent WCS review shows that [ecological degradation increases the overall risk of zoonotic disease outbreaks originating from wildlife](#). Examples abound: index cases of Ebola virus disease outbreaks in humans subsequent to a spillover from wildlife reservoirs occur mostly in hotspots of forest fragmentation. In areas of high biodiversity, the risk of a spillover event is heightened by human activities (e.g. road building, mining, logging, agricultural intensification, and poaching) that elevate contact rates between humans and high-risk wildlife species.

- In partnership with local governments across Central Africa, WCS set up an early warning system for Ebola, working with traditional hunters, forest communities, and rangers to raise awareness and promote best practices in zoonotic risk reduction, and to monitor wildlife health through sampling and [a carcass monitoring network](#). The network covers more than 30,000 km<sup>2</sup> of remote forest in northern Congo, an area that is home to more than 60% of the world’s gorillas. These remote communities are far from health services, and WCS health teams are often





their only source of public health information on Ebola virus disease (EVD). In addition to producing devastating illness and fatalities in humans, EVD is suspected to be a main cause in the decline of gorilla and chimpanzee populations in Africa, along with hunting, and habitat loss. In the Republic of the Congo, for example, the 2005 Ebola outbreak had a human mortality rate of more than 80%, with 10 fatalities, while an estimated 5,000 great apes also died. WCS scientists have worked in Ebola “hot zones” for over 15 years to identify and study the ecology of potential disease reservoirs, such as the [hammer-headed fruit bat](#), create [innovative point-of-care diagnostic tests](#), and establish risk reduction strategies.



	PREVENTATIVE INTERVENTION PRIORITIES						
	Prevent the degradation of ecosystems to preserve ecological integrity	Reduce the risk of wildlife-to-hunter disease transmission in rural areas	Implement outreach and behavioral changes at the frontline at the human, wildlife and forest interface	End rural-urban supply and urban sale of wild meat from mammal and bird species	End urban demand for wild meat	Expand spillover surveillance and feed information into national One Health early warning and response platforms	Improve preparedness and access to care through strengthening public health infrastructure
RISK AND THREAT REDUCTION TARGET							
Pre-emergence threat	✓		✓				
Exposure at the wildlife-human interface	✓	✓	✓	✓	✓	✓	✓
Addressing human to human spread			✓			✓	✓
CO-BENEFITS BEYOND HUMAN HEALTH	Biodiversity Climate Economic	Biodiversity Economic	Biodiversity Economic	Biodiversity Economic	Biodiversity Economic	Economic	Biodiversity Climate Economic

- Along intact landscape edges, WCS is studying the impacts of anthropogenic changes on disease emergence, spread, and human health. Beyond increasing the risk of zoonotic disease emergence, the encroachment upon and degradation of intact ecosystems have negative impacts on other aspects of human health, including: prevalence of endemic zoonotic diseases, vector-borne and waterborne diseases; air quality; nutrition; mental health; and access to traditional medicines; while also aggravating the impacts of climate change. Holistic data can demonstrate how management interventions at a landscape scale can result in multiple downstream health benefits, and improved resiliency for ecosystems and humans in the face of emerging diseases, natural disasters and a changing climate.
- For example, in Fiji, WCS is part of a collaborative [Ridge-to-Reef research](#) effort to study how terrestrial human activities are impacting coral reefs. We are finding that expansion of

commercial agriculture, logging, mining, and coastal development can harm coral reefs and their associated fisheries through increases in sediment and nutrient runoff. This leads to increased algal cover on affected reefs and ultimately increased incidence of disease and death of corals. The breakdown of reef structure directly harms food security, human wellbeing, and cultural practices in island communities around the world. The same activities that degrade island watersheds and reefs are also linked to the occurrence of water-related disease, such as typhoid and leptospirosis, in people. [A One Health approach at the watershed scale](#) can improve water safety, water quality, and the overall health of the ecosystem and people.

Our decades of work demonstrate that removal of animals from the wild (legally or due to poaching), and commercial trade of wildlife pose a significant risk to global health via the spillover of pathogens from wild animals to humans. In addition, they divert resources away from communities relying on wildlife for subsistence. Wildlife markets represent super-interfaces due to large numbers of admixed species and their potential to shed, share, and recombine viruses. WCS has identified viruses belonging to multiple high-risk pathogen families along wildlife trade chains, including novel corona-, influenza- and paramyxo-viruses. Our findings demonstrate the substantial human health risks from trade in wildlife. In Vietnam we demonstrated in field rats used for human consumption, that positivity to coronaviruses significantly increases from the site of capture to the market and ultimately the restaurant kitchen. These results exemplify that the spillover [risk significantly increases along the trade chain](#) from source to plate.



- [WCS surveys of markets in Lao PDR](#) over a three-year period identified sales of 1,937 mammals from 12 taxonomic families capable of hosting 36 known zoonotic pathogens. Over 6,000 animals (birds, reptiles, and mammals) listed by Lao PDR as near extinct or

threatened with extinction were observed for sale: the combined risks to human health and biodiversity highlight the need for a multi-sectoral approach to effectively protect public health, economic interests, and biodiversity. Our [research](#) confirmed that the bushmeat trade in Lao PDR is considerable, and likely exceeds sustainable levels; that bushmeat consumption in urban centers is not a necessity but a preference; that high contact rates between consumers and bushmeat add to the zoonotic disease transmission risk; and that integrated assessments of conservation, food security, and food safety risks are needed.

### **Reducing Risk: Transforming Data into Action**

*Using a data driven approach, WCS highlights the potential devastating health and economic impacts of trade in wild animals (both domestic and international trade), and is presenting this evidence to relevant government authorities to strengthen legislation, regulations, and intergovernmental policy, and ultimately work to phase out commercial wildlife trade for human consumption.*

The farming, hunting/capture, trade, and consumption of wildlife directly impacts the livelihoods of millions, including [Indigenous Peoples and Local Communities](#) (IPLCs), and involves a complex network of actors and stakeholders, ranging from remote wild landscapes to urban centers, all of whom must be considered in the development and implementation of just, effective, and sustainable policy for successful interventions. Trade of wildlife for human consumption presents challenges for policy-makers confronted with the trade-offs between conservation, food security, food safety, culture, and tradition. In the face of these complex issues, quantitative risk assessments facilitate decision making.

- In Viet Nam, WCS developed [a position paper](#) supporting the government in their efforts to review wildlife trade, animal health and public health regulations, and introduce new policies, with the aim of reducing risk of viral spillover from wildlife and preventing future pandemics, like COVID-19.
- In Central Africa, WCS issued a report on [reducing the risk of future emerging infectious disease outbreaks by changing social norms around urban bushmeat consumption](#) and stopping its commercial trade which can assist national and regional decision makers.

## **3. Mitigate Livestock Disease Transmission**

*WCS works to mitigate the impacts of agricultural expansion by engaging cross-disciplinary government partners, multilateral and intergovernmental organizations, public-private partnerships, and Indigenous Peoples and Local Communities. WCS promotes sustainable co-management of wildlife and livestock for production, providing economic resilience for local communities whilst achieving biodiversity conservation outcomes, and improved environmental stewardship.*

Livestock and feed production are among the greatest threats to biodiversity, and are key drivers in land-use change. Today nearly 40% of all habitable land is used for livestock: either for grazing or feed production. Livestock production is also the biggest driver of tropical forest destruction, and is responsible for 20% of global warming. On the other hand, some 12% of the global human population depends directly

on livestock for food [milk, meat and eggs], fiber and income, draught power, fertilizer and soil conditioner, and household energy. The multiple relationships between ecosystem integrity, conservation efforts, and the health of wildlife/livestock/humans are still poorly researched. The traditional characterization of these interfaces has focused on the epidemiological role of wildlife as spillover/spillback hosts while solely prioritizing the economic importance of livestock. The value of wildlife and intact environments at these interfaces has been largely neglected until very recently. Work by WCS promotes the more accurate characterization of these interfaces as bi-directional, dynamic in nature while recognizing the role of the environment and shared resources, such as pasture and water.

### ***Sustainable, Integrated Management Approaches***

- In Inner Asia, WCS works with local communities on improved management and vaccination of livestock to reduce the risk of disease spillover into vulnerable wildlife populations: WCS scientists collected clinical, histopathologic, epidemiologic, and ecological evidence to assess the nature and population effects of a recent outbreak of the viral disease Peste de Petits Ruminants (PPRV) on the Mongolian saiga (*Saiga tatarica*). [WCS health professionals found that the disease poses an existential threat](#) to the species, killing an estimated 80 percent of the population in Mongolia within a four-month period after spilling over from domestic livestock into wild saiga herds. In Afghanistan, the Kyrgyz People trade livestock across some of the remotest mountains in the country, where populations of Marco Polo sheep (*Ovis ammon polii*) and Himalayan ibex (*Capra sibirica hemalayanus*) still survive in good numbers. These wild ungulates are highly susceptible to PPRV, which is endemic in local livestock. [Training para-veterinarians and working with communities to achieve PPRV vaccination](#) of their livestock lowers the risk of spillover to critical wildlife populations, and improves the financial stability of the herders.





- In the Andes, WCS works with local governments and Indigenous Peoples to improve the health and management of the vicuña (*Vicugna vicugna*), a wild camelid declared endangered in its natural range in 1968, and whose populations have since rebounded thanks to robust conservation efforts. Rural communities shear fiber from wild vicuña, providing economic benefits complementary to their traditional farming and livestock production activities and incentivizing the protection of vicuña. In [Peru](#) and [Bolivia](#) our teams research and monitor the health of vicuña, including contagious diseases such as sarcoptic mange, which damages the valuable fiber, and can cause severe disease and even death in these camelids. Indigenous vicuña managers are trained in best-practice procedures, hygiene, and animal welfare protocols for vicuña shearing, with a direct positive impact on vicuña health and community income.
- In Mesoamerica, WCS is addressing the interlinkages between cattle movements, health, forest conservation, and livelihoods. We work with the Guatemalan government to reduce the impacts of cattle ranching on apex predators including the jaguar (*Panthera onca*), and to determine the health status of the cattle. Cattle ranching within core zones of protected areas is illegal; however, it is permitted in some areas of the Maya Biosphere Reserve. We have collated data on numbers of cattle, interfaces with wild animals, and potential for disease transmission among wildlife, cattle, and humans. Of note, in 2019 we tested 1,200 cows for brucellosis and found 44% to be positive. These data support government management recommendations for ranchers reducing land used by livestock, support the expulsion of cattle from biodiverse areas, decreasing deforestation while improving livestock health.

## 4. Build Veterinary Capacity

*WCS builds capacity and veterinary medical skills for monitoring, prevention, and response to wildlife and zoonotic diseases, especially in the least-developed countries. Building regional health capacity and the cross-cutting incorporation of health strategies, allows WCS and collaborators to detect and respond in a timely manner to health threats to wildlife and domestic animals, and people, within WCS landscapes and seascapes and beyond.*

At its core, WCS continually works to develop both individual capacity, and to strengthen institutions to further the integrated understanding of human, animal, and environmental health, whilst recognizing the need for expanded diversity and gender equality. We promote the highest standards of One Health expertise in support of conservation, while providing guidance in animal health, handling, and welfare expertise in the various regional translocation, reintroduction [rewilding], and ecotourism ventures launched, co-managed, or managed by WCS. Veterinary medical needs in WCS regions and countries vary considerably. These range from basic para-veterinary skillsets in Afghanistan's Wakhan corridor to embedded clinical wildlife veterinarians in the Congo basin and Latin America, and specific pathology and epidemiology skillsets in Mongolia, to fully-fledged internationally recognized One Health expertise across South-East Asia. When required, the health program, in collaboration with the zoological health program

and with additional support from international partners, will actively plan, lead, and implement outbreak responses, capacity building activities and interventions necessitated by rewilding activities.

### **Key Capacity Building Efforts**

Across the globe, training national staff in safe and ethical surveillance of wildlife, understanding drivers for emerging diseases and the value of a One Health approach builds in-country sustainability and resilience for the detection of and response to future emerging health threats to both humans and wildlife, contributing towards growing health outputs and environmental goals.

- Through the [USAID PREDICT project in Viet Nam and Mongolia](#), WCS trained over 800 individuals (rangers, WCS veterinarians and biologists, behavioral scientists, government staff from forestry, animal and human health sectors, faculty members and students), in topics as diverse as: the safe and ethical capture and sampling of wild animals; bushmeat, rodent, small carnivore, pangolin, non-human primate, and bat sampling; implementing cold chain for sample transport from the field and packing and shipping of biological samples; biosafety and Personal Protective Equipment (PPE) and basic laboratory safety; conducting qualitative research; other-infectious disease surveillance in wildlife.



Effective surveillance systems not only provide early detection, but also monitor the impact of interventions, and provide a guardrail in case of ineffective or insufficient measures. Although interest and capacity for wildlife health surveillance has grown globally over the past decade, there are still significant gaps in the implementation and maintenance of effective surveillance mechanisms that support early threat identification. As the current COVID-19 pandemic has highlighted, there is urgent need for behavioral and policy changes to address the root causes of spillover and disease emergence.

WCS is engaging with national partners and governments to support the design, development, and implementation of national wildlife health surveillance programs.

- Across Southeast Asia, we have advanced wildlife health surveillance systems and disease investigation; leveraging hand-held [Spatial Monitoring and Reporting Tool \(SMART\)](#) technology used by WCS rangers for an eyes-in-the-field approach to early disease detection. Training rangers in mortality and morbidity reporting improves the detection of wildlife die-offs and increases safe disease sampling under field conditions. These efforts facilitate the identification of potential zoonotic pathogens and diseases of conservation concern. Early warning systems are essential in securing an accurate diagnosis for diseases of wildlife, and rapid-response is a prerequisite for the subsequent implementation of mitigation measures. Today, SMART is deployed in close to 1,000 sites across the world, including 150 WCS landscapes, and 16 national-scale systems, creating an unprecedented potential for a global network of ***boots on the ground and eyes in the field*** that act as sentinels for unusual events in these remote areas of the spillover frontline. Combining SMART with a Wildlife Health Intelligence Platform [WHIP], designed as a national wildlife health surveillance database, will help transform wildlife health data into knowledge, and realize our goals of rapid response to wildlife disease outbreaks and identification of events with potential zoonotic concern. The system allows for key activities associated with disease emergence, such as poaching, wildlife trade, and encroachment into natural areas, to be similarly recorded, integrated, and addressed in a truly comprehensive One Health approach.

WCS is a leader in medical and surgical animal care, as well as pathology diagnoses of zoo, aquarium and wild animals. As the oldest zoo-based veterinary program in the world, our veterinarians are recognized for their excellence in zoological medicine, wildlife pathology, and conservation health. WCS's Wildlife Health Center is a renowned research hospital, boasting the latest treatment technologies and on-site pathology diagnostic capabilities, and is a center for training the next generation of the world's wildlife health professionals.

- From elementary school age to high school and graduate students, our health center staff train veterinary, pathology, biology, and a diverse range of students hailing both locally from New York and internationally from countries around the globe, building the capacity of the world's future zoological and wildlife health workforce

## 5. Catalyze Global Change

Leverage intact land- and seascapes and their health co-benefits to wildlife and people, paired with our scientific, field and policy capacity, to protect wildlife, wild places, and the rights of Indigenous Peoples and Local Communities, and to assess and highlight links between ecosystem integrity and health as part of the growing global “One Health” movement.

No one group or sector of society holds enough knowledge and resources to single-handedly prevent the emergence or resurgence of diseases while maintaining and improving the health and well-being of all

species in today's globalized world. As a world leader in conducting scientific research and translating data to inform decision makers for effective policy change and action towards improved animal, human and environmental health stewardship, WCS is uniquely positioned to provide robust One Health leadership through a conservation lens, and to facilitate collaborative global efforts.

WCS is globally recognized for leadership and excellence in zoological and wildlife medicine, pathology, and global health conservation initiatives. We provide state-of-the-art veterinary care and management for the thousands of animals in our five parks, and we are the world's largest conservation organization with an embedded health program working globally. Our One Health collaborative approach addresses health threats to species, and the complex interrelationships between the health of wildlife, domestic animals, people, and



© K. Gruetzmacher/ WCS

the landscapes/seascapes they all depend on. Diseases impact people and animals alike. WCS has been monitoring and providing health support to wildlife around the world as part of our core mission. Coupled to our core mission of ensuring the health and vitality of wildlife and the landscapes/seascapes they live in; we will seek partnership with human health professionals to build more holistic programs around One Health. Our work has revealed two critical areas where the health of wildlife, and the health of humans and their domestic animals, are intrinsically linked through infectious and emerging diseases – wildlife trade and consumption, and livestock production. We have established comprehensive field-based programs to monitor and mitigate the risk from these two great threats while also developing guiding legislation and support for national governments and multilateral organizations. To support these efforts, we are building appropriate veterinary capacity around the world and driving a global "One Health" movement to support and scale these efforts to achieve optimal health outcomes for humans, wildlife, and the environment.

Many multilateral organizations now recognize the interconnections between the environment, ecological integrity and health; WCS is well placed to lead this effort. WCS demonstrates strong policy leadership on the national and international stage, and successfully engages intergovernmental organizations using robust science with a One Health approach. The 2018 UNEP-CBD-WHO report: Connecting Global Priorities: Biodiversity and Human Health, highlights the core principle that biodiversity gives rise to health benefits. In October 2020, the UN Convention on Biological Diversity will, for the first time, host a full-day event dedicated to health and the environment. We submitted a white paper to SBSTTA (Subsidiary Body on Scientific, Technical, and Technological Advice) for the May 2020 meeting,



positioning WCS as the go-to One Health partner on biodiversity and health in preparation for the COP 15 in China.

Leveraging [evidence WCS gathered on the devastating impact of PPRV on Mongolian saiga](#) populations, we worked with CITES to improve protections for the species, and have been working with FAO and the OIE on the Global Strategy for the Control and Eradication of PPRV, positioning conservation and wildlife on this global agenda, to ensure that global approaches to surveillance, response, and eradication of PPRV consider the impacts and ecology of the disease in wild as well as domestic ungulates.

A worldwide [One Health coalition](#) is necessary to support individual nations in addressing land-use change, marine degradation, carbon release, soil degradation, environmental pollution, emerging diseases, and species extinctions that, if left unmitigated, undermine the health of people, animals, plants, and the planet. Intensive work within each discipline is essential to develop expertise. Leadership, research, and practices that bridge traditional disciplinary silos are a prerequisite to resolving the impact of continued human development and growth. WCS, building on decades of expertise in maintaining and restoring [ecological integrity](#), using systems approaches, and addressing health issues at the interface between humans and wild environments. Framed by our recent establishment with global health experts of the [Berlin Principles](#), we will continue to invest in dynamic, collaborative, and cross-disciplinary partnerships as the leading conservation organization on the One Health stage.



Twitter: [@WCSHealth](#)

Facebook: [@WCSHealth](#)

## GOALS MOVING FORWARD

---

- Provide state-of-the-art veterinary care and management for the animals in our five parks and across our landscapes and seascapes.
- Improve integration of environment and biodiversity in global One Health movement.
- Build One Health capacity and veterinary medical skills for monitoring, prevention, and response to wildlife and zoonotic diseases, particularly in least-developed countries
- Provide scientific and technical veterinary medical skills for diverse rewilding efforts
- Monitor, surveil and mitigate wildlife and zoonotic disease impacts and reservoirs.
  - Roll-out the necessary reporting tools to build and strengthen wildlife health surveillance systems [WHIP – SMART Health] across 20 country programs and AI disease surveillance is trialled in 5 countries
  - Assess the role of traditional knowledge at the spillover frontlines in early warning public health systems
  - Leverage our research on the potential devastating health and economic impacts of trade in wild animals to strengthen legislation to phase out commercial wildlife trade for human consumption
  - Map species and pathogen richness and diversity against a range of protected areas in specific geographies
- Research and highlight the links between health, biodiversity and intact ecosystems
  - e.g., Investigate pathogen and AMR diversity, reservoir host ecology (e.g., bats) and transmission routes across forest health gradients; reflect on trade-off between wilderness as source of pathogens, integrated health benefits, and the health care needs of Indigenous Peoples and local communities; partner to implement economic tools to demonstrate health as a quantifiable ecosystem service, correlated with ecological integrity/intactness, in selected conservation landscapes or seascapes; develop capacity to assess the growing threat to wildlife posed by contaminants, and the eco-toxicological impacts of agro-industrial activities at a range of scales
  - Links between health, biodiversity and intact ecosystems are affirmed in global and national policies
  - Links between health, biodiversity and intact environments are firmly established at the CBD COP 15
- Mitigate disease transmission across the human-domestic animal- wildlife interface.
  - OIE, FAO, and at least 20 national governments establish and adopt frameworks that integrate wildlife health surveillance, concerns, and conservation goals into the international standards for combatting notifiable livestock diseases.
  - National strategies on reportable livestock diseases incorporate wildlife health monitoring in at least 20 countries.
  - Health engagement in rangeland management issues at the livestock/wildlife interface directly and more broadly through advising government partners on land-use choices that have the potential to be ecologically, socially, and economically sustainable.

### *Contacts:*

Dr. Christian Walzer, Executive Director, WCS Health Program: [cwalzer@wcs.org](mailto:cwalzer@wcs.org)

Dr. Lucy Keatts, Senior One Health Advisor, WCS Health Program: [lkeatts@wcs.org](mailto:lkeatts@wcs.org)