VIEW

Five Year Progress Report

2012-2017

Our mission is to protect endangered wildlife
by tackling the health threats they face in their native habitats.

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I. Introduction

> ***Our Vision***
>
> *We envision a world where all countries have the commitment and local capacity to support wildlife health as a cornerstone of conservation.*

The Veterinary Initiative for Endangered Wildlife (VIEW), a (501) (c) (3) nonprofit organization, was founded in 2012 by Drs. McCauley and Kaufman to address the health threats endangered wildlife face in their native habitats.

For years, tremendous efforts – and millions of dollars – have been invested to protect critical habitat, reduce wildlife trade and poaching, and educate communities. However, wildlife health has been overlooked as a conservation issue. Many of our most magnificent endangered animals, like the Bengal tiger or Asian One-horned Rhino, continue to struggle for survival. Their future will remain precarious unless we make sure that the species we are protecting are healthy. Wildlife health is the missing piece in the global conservation strategy.

It has been well documented that endangered wildlife share diseases with domestic animals and people. In zoos globally, veterinarians have successfully prevented and treated endangered wildlife from disease and illness by applying best practices in diagnostics, treatment, and management. This proven approach can also be applied in the field to our free-roaming wildlife. The veterinary and medical community have the tools, technology, and expertise to help our most fragile populations. VIEW is on the front lines, applying known science and established best practices to build sustainable wildlife health programs that are scalable and replicable.

VIEW's conservation efforts are guided by three operating principles:

1. **Local collaboration**
   We work closely with countries and partners to ensure efforts are effective and efficient, using existing local networks and opportunities to investigate wildlife health threats in a particular setting. This approach respects local ecosystems, history, culture and conservation efforts, and developing conservation approaches to meet the needs of local communities.
2. **Evidence Based.** Our methods and approaches are scientifically justifiable, time sensitive, and sustainable, representing universal practices. We use the most appropriate and available tools to design, monitor, and evaluate the outcomes of our programs.
3. **Sustainability.** We support local wildlife professionals, veterinarians, and non-governmental agencies in creating and sustaining comprehensive wildlife health programs. We strive to transfer knowledge, skills and critical infrastructure to create self-sustaining wildlife health programs in the areas where we work.

Our work emphasizes critical areas of capacity building: **training** wildlife veterinarians and managers, supporting the development of much needed **wildlife health infrastructure**, and facilitating **research** to understand wildlife health risks for population recovery. We launched our first program in Nepal, and its success is building the foundation for a much broader impact for all of Nepal's wildlife into the future – and a sustainable model for other countries around the world.

II. Executive summary

VIEW began working in Nepal with the aim of building capacity for a Wildlife Health Program. We saw a need to address the country's limited resources in disease surveillance, including their ability to diagnose infectious and non-infectious disease in wildlife, and the means to care for injured and ill wildlife. Little was known about the health of Nepal's wildlife, because the knowledge, skills and tools needed to understand this issue were not well developed.

Nepal's wildlife challenges arose as the human population shifted, shrinking and fragmenting wildlife habitats, and putting pressure on fragile populations of endangered species. Nepal has one of the highest ratios of livestock to humans in Asia -- 5.8 heads of livestock and poultry per household. Today, millions of people and their animals live in close proximity to some of the most important wild habitats for endangered species which has created the potential for spreading and sharing diseases.

When VIEW began their work, Drs. McCauley and Kaufman already had professional experience in Nepal. Dr. McCauley had worked on wildlife capture and immobilization and field surgery while Dr. Kaufman had been working with the university and conservation communities in wildlife health research and helped to establish the Nepal Elephant TB program since early 2001. They were both familiar with the country's rich biodiversity and commitment to protecting their endangered species, and shared a concern for rising health threats that wildlife face due to population changes.

At the outset, VIEW worked to build a program with Nepal Government, and in 2012, signed a Memorandum of Understanding (MOU) with the National Trust for Nature Conservation (NTNC), a wildlife conservation organization in Nepal. Whether conducting education and training, building infrastructure, or directing research, VIEW always works through local partnerships to build the skills and tools necessary to successfully manage the health of their own wildlife. Since 2012, VIEW has worked with its partners and has trained over 200 wildlife veterinarians, technicians, and Park staff in multiple aspects of wildlife health in order to empower local professionals to address wildlife health threats.

For the past five years, VIEW has supported the salary of a wildlife veterinarian stationed at the NTNC BCC and has provided additional important one-on-one training and expert consultation on a continual basis. This field veterinarian works closely with Dr. Gairhe, the DNPWC Senior Veterinary Officer, to respond to wildlife emergencies, participate in wild animal sample collection, treatment and rehabilitation, support the ongoing elephant TB program, and conduct small research studies. Dr. Suraj Subedi held the position for two years, followed by Dr. Amir Sadaula. During this period, Dr. Sadaula completed his Masters' degree in Biotechnology at the nearby Agriculture and Forestry University and is developing a molecular genetics laboratory on the second floor of the BCC which will expand the capacity for wildlife disease surveillance and research. NTNC has assumed Dr. Sadaula's salary and VIEW is currently seeking another young Nepali veterinarian to fill his previous role.

Baby Asian One-Horned Rhinoceros in Chitwan National Park

In 2015, VIEW engaged Nyatapol, a technology company, to help build a wildlife health database for Nepal. Prior to VIEW's involvement, all critical data had been recorded by hand on ledger paper. With the implementation of an electronic wildlife health database, detailed information will be easy to collect in the field, record, and access in a comprehensive centralized database system. In 2018, VIEW hopes to complete beta testing and present the wildlife health database to the DNPWC for implementation across the entire county.

Beginning in 2012, VIEW funded and provided equipment to upgrade space in the NTNC BCC for a wildlife disease field laboratory and necropsy facility. In 2015, VIEW began collaborating with NTNC on the design and construction of Nepal's first wildlife health hospital in Sauraha. VIEW now plans to help raise funding to outfit the hospital with supplies, medical equipment and to build necessary holding facilities for Bengal tigers and young rhino.

In 2016, as part of the World Wildlife Fund (WWF) Nepal led Hariyo Ban I project, VIEW played a significant role in stakeholder meetings and subsequent drafting of a National Wildlife Health Management Strategy and Action Plan currently under consideration by the Ministry of Forests and Soil Conservation. VIEW continues to offer expert consultation and technical assistance to realize the goals of this ambitious plan.

In 2017, VIEW was granted a blanket CITES permit that allows biological samples of endangered wildlife to be brought into the United States for analysis. While the goal is to create the capacity for sample analysis and disease diagnosis within Nepal, until this is achieved, disease diagnosis can proceed by utilizing top notch laboratories in the U.S.

Our partnership has already made several advances that address threats to the health of Nepal's rhinos, elephants and tigers. In 2015, Nepal detected the first case of tuberculosis in a wild greater one-horned rhino in the world. This finding will lead to further diagnostic analysis and development

of a program to monitor and prevent ongoing threats. Also in 2015, our VIEW Veterinary Fellow (Sadaula) successfully treated the first case of elephant herpes virus in an elephant calf in Nepal. In 2017, we successfully analyzed serum samples from eleven tigers for eight diseases and will soon be publishing the first wild tiger serological survey in Nepal.

Protecting endangered wildlife not only serves Nepal's conservation goals, but also contributes to Nepal's economy and livelihoods. Wildlife nature tourism is a major industry in the country and one targeted to draw two million annual tourists by 2020. Health programs to protect Nepal´s critically endangered wildlife will play an important role in sustaining these valuable animals and are of utmost importance for Nepal´s economy, heritage, world standing, and future growth.

We look forward to working together with our partners to create a strong, sustainable National Wildlife Health program within the Department of National Parks and Wildlife Conservation. We welcome closer engagement with the Department in meeting their needs and look forward to collaborating to achieve our common goals. Wildlife health is an essential part of any conservation strategy. In Nepal, it is now a national priority and will serve to ensure the future of Nepal's precious heritage.

III. VIEW Nepal Partners

Strong alliances with existing wildlife agencies and organizations with mutual concerns about potential disease threats to conservation are the best way to advance wildlife health in Nepal. VIEW recognizes that any activity that involves Nepal's wildlife or that takes place in proximity to protected areas requires oversight by the Department of National Parks and Wildlife Conservation (DNPWC). Both VIEW veterinarians (and founders), Dr. Gretchen Kaufman and Dr. Deborah McCauley, have spent years working with the Senior Veterinary Officer of DNPWC, Dr. Kamal Gairhe, to establish priorities and maintain transparency with the department. VIEW is committed to a strong, positive, and collaborative relationship with DNPWC.

For the last five years, VIEWs primary partner in Nepal has been the National Trust for Nature Conservation (NTNC). VIEW also has a partnership with the Institute for Agriculture and Animal Science/Agriculture Forestry University (IAAS/AFU) veterinary program and has trained over 50 veterinary students in wildlife health. Veterinary students have attended wildlife health workshops, participated in research, and attained hands-on training in basic veterinary practices. In addition, VIEW has worked with the Center for Molecular Dynamics Nepal (CMDN) in our pursuit of advanced diagnostic testing for priority diseases. We have a close working relationship with Elephant Care International (ECI), and since 2012, we have shared the field laboratory at BCC and a veterinary position. VIEW and ECI have continued to advance conservation through speaking engagements, research, and sharing ideas and best practices. Other partners are:

- University of California at Davis
- Royal Veterinary College (RVC)
- World Wildlife Fund
- US Department of Fish and Wildlife
- Montana State University
- GREFA de Rehabilitacion de la Fauna Autoctona y su Habitat (GREFA)

V. Education and Training in Nepal

Education and hands-on direct training are critical to empower local staff to better understand and respond to health risks facing endangered wildlife populations. VIEW and its partners conduct one to two workshops annually to give park staff and wildlife veterinarians the necessary skills to treat injured and ill wildlife and respond to signs of disease. VIEW, in collaboration with NTNC and DNPWC, has led six workshops and training sessions involving **200** wildlife professionals and students since 2012. Subjects have focused on wildlife capture, immobilization, post mortem examination and wildlife health.

Training – Impacting 200 wildlife professionals in Nepal on wildlife health and wildlife capture.

Workshops/Courses delivered

2013 – One five-day and one ten-day workshop; 55 participants.

2014 – Three one-day workshops; 95 participants.

2015 – One-day workshop; zoo staff.

2016 – One three-day workshop; 35 participants.

One-on-One Trainings delivered

2012 – Training sample collection for veterinary technician

2013 – Training laboratory protocols, necropsy techniques and sample collection for Arjun Pandit and Suraj Subedi.

2014 – Training necropsy techniques and medical care of tigers for technicians, visiting veterinarian, and Suraj Subedi.

2015 – Training biosafety and necropsy techniques for three veterinarians and one veterinary student; clinical training on wildlife cases for a veterinary student, wildlife technicians, and Amir Sadaula.

2016 – Training tiger and rhino necropsy for veterinary technicians and park rangers at Kasara.

- **Capture and Immobilization Training**: Tiger, rhino and other wildlife immobilizations present an invaluable opportunity to investigate disease. VIEW has focused on training veterinary staff to routinely conduct biological sample collection during any capture and immobilization procedure; we have presented information on immobilization drugs and how to manage animals under anesthesia; the importance of safety and emergency measures for people involved in these types of procedures; and, we have included sessions on immobilization drugs, handling dart equipment and supervised target practice.

- **Wildlife Health, Post Mortem Examination Training**: All wildlife professionals can contribute to monitoring Nepal's wildlife health. This can be done through direct observation of animals in the wild and through routine post-mortem examination of animals that have died. Post-mortem examination is one of the simplest and most fundamental ways to gather important wildlife disease information: we believe a complete postmortem examination should be performed on every endangered species found. VIEW has conducted workshops and individual sessions for wildlife professionals and veterinary students in post-mortem examination, biological sample collection, and ability to recognize signs of disease through field observation. We have also educated veterinary professionals on strategies for prevention and treatment of wildlife diseases.

- **Clinical Wildlife Medicine Training:** Veterinarians and wildlife health technicians benefit from hands-on experience with domestic animals or wildlife to strengthen their skills in clinical and preventative medicine. VIEW has provided training for staff in rehabilitation and care of injured and/or ill animals on a case by case basis. Clinical assistance is also given directly when VIEW veterinarians are present and via remote consultation at any time in between. In some cases, VIEW

personnel have made special trips to attend to specific high priority cases. For example, when the DNPWC veterinarian was not available, Dr. McCauley flew to Nepal in March of 2014 to help with wound care on an orphaned rhino that had been attacked by a tiger. This animal would not have lived without special care. Attending technicians and veterinary students were trained in wound care management and medical treatments, and the animal is now happily living in the Central zoo.

We have been working with the DNPWC director and other veterinary staff to develop standardized and reliable protocols for disease diagnosis, treatment, rehabilitation, and capture procedures. Documentation is key to successful operations and the generation of meaningful data for monitoring health over time. The most recent protocol is for detection and treatment of calves with the deadly elephant herpes virus.

- **Advanced Educational Opportunities:** VIEW has supported many Nepalese students seeking further training through mentorship, letters of recommendation, and financial support. Five years ago, VIEW established a special scholarship at the Yale School of Forestry and Environmental Studies to enhance the skills of early-to-mid-career professionals who aspire to lead conservation management in Nepal and neighboring countries of Bhutan and Myanmar. These students, such as Timila Dhakhwa from Patan, Nepal, will be part of a new generation of leaders prepared to solve a range of resource management and development challenges.

  VIEW continues to provide training to strengthen skills in disease surveillance, chemical immobilization, and medical therapies. VIEW looks forward to the construction of new wildlife hospital, which also will serve as an excellent location to expand on the clinical and surgical training that VIEW has begun. In the coming years, VIEW plans to expand training by and inviting more international lecturers to Nepal, conducting advanced training and sponsoring veterinarians for further training in key areas abroad.

Infrastructure – Creating facilities to support wildlife health

Wildlife disease investigation lab

2012 – Began development of wildlife disease investigation laboratory (three rooms) at NTNC BCC.

2013-2017 – Continued laboratory development, financed generator and battery backup system, added new freezer and refrigerator for sample storage; developed protocols and policy recommendations; supplied post mortem field kits to park staff, darts for immobilization, reference books.

2016 – Construction of post mortem facility, installed solar panel power system, added additional batteries to laboratory.

Chitwan Hospital

2015 – Provided expert consultation and recommendations for wildlife hospital project in Sauraha.

V. Infrastructure Development: building critical facilities for wildlife health

- **Wildlife Disease Laboratory:** In partnership with NTNC and Elephant Care International (Dr. Susan Mikota), VIEW expanded the capabilities of the existing elephant TB program's space at the BCC to function as a basic field wildlife disease investigation laboratory in Sauraha, Chitwan. This involved the purchase of diagnostic equipment and supplies, additional freezers, a large diesel generator, a backup battery system, and solar panels. We helped design and supported the construction of an animal necropsy area at the BCC, adjacent to the lab, to be used by Dr. Gairhe

and other veterinary staff. This will significantly improve their ability to conduct more thorough examinations safely and will reduce disease transmission from wildlife (increased biosecurity).

The field laboratory represents the only wildlife disease surveillance and diagnostic laboratory in Nepal. The work in the lab supports multiple research projects as well as routine data collection and sample storage and has served as a base for some important discoveries in the last 5 years. For example, VIEW-supported NTNC veterinarian, Amir Sadaula, helped discover the first case of tuberculosis in a wild greater one-horned rhino found dead in the Park.

- **Chitwan Wildlife Hospital:** VIEW supports the development of a wildlife hospital in Chitwan. A modern clinical veterinary facility located in Sauraha will be an asset to not only perform life-saving medical and surgical procedures for Nepal's wildlife but also will serve as an important training center in wildlife medicine for veterinarians and technicians. It will significantly enhance current wildlife disease surveillance and research programs.

Field training on a tiger in Chitwan National Park

VIEW made an initial financial contribution and provided recommendations for the hospital design, necessary capital equipment and budget recommendations. The hospital will meet standards of a modern veterinary facility, with basic equipment such as portable digital radiography and ultrasound, a modern surgical facility with gas anesthesia for small and large animals, and more. In addition, it will include a small laboratory for conducting simple bench top clinical diagnostic tests and secure areas for a pharmacy and immobilization equipment storage. Finally, but most importantly, adequate and secure animal holding facilities will be included within and nearby the hospital to house animals of all types during treatment and recovery. Animal holding facilities are essential for critically ill patients of all types, a variety of small birds, reptiles and small mammals (flexible indoor space), and for management of large, dangerous mammals such as large cats (leopard and tiger) and large ungulates (elephants

and rhinos). Adherence to strict specifications will be critical to ensure humane stress free and secure holding that allows safe transfer and handling of these species.

VI. Research and Disease Surveillance: building the evidence for policy and action

Wildlife health has an important role to play in managing critical wildlife populations. In 2012 Nepal lacked the tools to understand this issue. However, VIEW has been building local capacity for:

- Dedicated well-trained wildlife health professionals (managers, veterinarians, epidemiologists, research scientists dedicated to wildlife disease investigation)
- Diagnostic capacity to generate accurate data
- An appropriate database to store and analyze health information, and
- Policies that support and encourage data collection and analysis.

Our focus is to collaboratively devise mechanisms to collect and analyze information – through routine activities or through targeted research. Management decisions and policy makers must be well informed to institute appropriate responses or prevention strategies that minimize the risks from disease. Some of our activities involve: assisting with the capture of Bengal tigers and greater one-horned rhinos and facilitating biological sample collection; initiating a study of canine distemper virus in the buffer zone of Chitwan National Park; collaborating with the Elephant TB Management Plan and research directed by Elephant Care International; developing tools for studying elephant herpes virus and tuberculosis; encouraging and providing resources for routine sample collection, storage and processing; and, most recently, initiating the development of a wildlife health database for the use of the DNPWC to track disease data.

- **Establishing Priorities.** Priorities need to be established to maximize limited resources and generate the most valuable information, because it is impossible to monitor for every disease in every wild animal that exists in a given country. With Drs. Gairhe and Sadaula, VIEW developed a tool to prioritize the species and diseases of most importance in Nepal. Specifically, endangered and threatened animals, like tigers and rhinos, have been prioritized based on Nepal's official species designation, CITES, and the IUCN Red List. Diseases were selected based on species level knowledge and known presence in livestock and/or wildlife in Nepal. This tool is open and available as a google document[1] and was presented by Dr. Kaufman at the International Wildlife Disease Association meeting in 2016.

- **Creating a Database:** VIEW is helping Nepal invest in wildlife disease surveillance infrastructure to better understand and protect species that are important to the country. When wildlife health data is collected, it must be handled in the most efficient and responsible manner to lead to evidence-based research and policy development. In addition, a database system is essential for a disease surveillance program to understand the disease dynamics of the target species and be able to manage disease outbreaks. VIEW has spearheaded the creation of a wildlife health database system with a Nepalese software company. Customized to local needs, the database is now being beta tested and will be demonstrated to the DNPWC once all elements are proven to be working

[1] See Species and Diseases of Concern in Nepal Open Access here: https://docs.google.com/spreadsheets/d/1TKfqjYlSWxs0al1dbEKX9_btaE7vRzu5svNrP0SVG4s/edit?usp=sharing)

properly. All data is considered property of the Government of Nepal and access will be bound by strict confidentiality agreements determined by the DNPWC or Ministry.

- **Conducting and Supporting Research**. VIEW's research activities entail training and mentoring opportunities for our partners. For example, a novel study of the disease **canine distemper** was conducted in the buffer zone of Chitwan National Park to investigate whether domestic dogs carry this disease and could potentially transmit it to wildlife in the park. Canine distemper has been identified in other regions (e.g. India, Siberia) as a threat for wild tiger populations. VIEW engaged Nepalese veterinary students and veterinarians to work in the buffer zone communities of Kolhuwa, Jagatpur, Sauraha/Bachhouli, and Madi to collect samples from domestic dogs; the teams also provided 500 rabies vaccinations for community dogs. The students benefited from gaining practical skills and confidence and our veterinary team (VIEW and NTNC) collected data efficiently with their help. The results from this pilot study found that 27% of dogs in the buffer-zone carry antibodies to canine distemper virus which may present a risk for wild carnivores, including tigers, in the park. This work was presented at the 2015 meeting of the Asian Society for Conservation Medicine in Myanmar.

Research and Disease Surveillance – building systems and skills for creating new knowledge

2013 – Initiated CITES permit process to allow diagnostic testing outside Nepal, approved 2016/2017.

2014 – Conducted canine distemper study in dogs in the CNP buffer zone.

2015 – Tuberculosis diagnosed in dead rhino in Chitwan National Park, first report ever in Asian One-horned rhino.

2015-2017 – Initiated development of wildlife health database for Nepal, currently in beta testing phase

2016 – Produced guidelines for disease surveillance priorities Species and Diseases of Concern for Nepal

2016 – Initiated serology study of tiger diseases. 11 samples analyzed at Cornell University, results under review.

Over the past 5 years, significant numbers of tigers have died of natural or unknown deaths. Investigation into the cause of death requires diagnostic evaluation. During that time, blood samples were collected from 11 tigers encountered for a variety of reasons: translocation, conflict, injury, etc. All samples were collected under the supervision of Dr. Kamal Gairhe, Senior Veterinary Officer, DNPWC. Samples were prepared, serum was extracted, frozen, and stored at the BCC/NTNC field laboratory. In May, Dr. McCauley traveled to Cornell University to submit the samples for disease diagnoses. Significant elevated serum titers were found in the majority of tigers for Leptospirosis (a disease that is shared with humans and domestic animals), CPV2 a parvo virus (further testing needs to be done to determine if this is a dog or cat strain) and one tiger elevated titer of CDV (Canine Distemper Virus) which will need to be investigated against tissue samples. Further testing of diagnostics at BCC against the serum are in process.

Another priority research area of VIEW focus is the threat to wildlife from tuberculosis. Significant strides have been made through the Elephant TB Control and Management Action Plan by Drs. Gairhe, Kaufman and Mikota (Elephant Care International). The primary goal of that program is to minimize the risks of TB spreading from captive elephants to the wild. So far, no wild elephants have been identified with TB in Nepal, although this disease has been seen in wild elephants in India and other countries. In fact, a recent review of the program has found that no

captive elephants have died from TB in Nepal in the last 4 years. This is real evidence that health management can work to protect both captive and wild populations from devastating disease.

Dr. Amir Sadaula caring for a baby Asian elephant.

However, the threat from TB is still very real and if not handled aggressively, Nepal could experience serious consequences as seen in many other countries when TB becomes established in wild populations. We see this threat most acutely in the recent finding of TB in a wild rhino in Chitwan. As alarming as this was, we were pleased that our capacity building efforts resulted in this important discovery by a VIEW trained veterinarian (Dr. Sadaula), the first case ever found in Asia. Dr. Jeewan Thapa and Dr. Sarad Paudel, both former Elephant TB Project veterinarians completing their PhDs in Japan, took the lead on publishing this work and are continuing to conduct research on this issue (see journal article: Mycobacterium orygis–Associated Tuberculosis in Free-Ranging Rhinoceros, Nepal, 2015. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4766909/)

We would like to continue to investigate and support research into serious health threats such as canine distemper and tuberculosis in free-ranging wildlife. Some other research areas that we have explored and supported include elephant endotheliotropic herpesvirus, foot-and-mouth disease (FMD), and Peste-de-petite-ruminant (PPR), the latter originating in livestock with potential threats to wild ungulates, and impacts from poisoning in wildlife. Dr. Gairhe provides guidance on which disease issues are the most important.

VII. Broader Impacts and Outreach: spreading the message

- **On-the-ground impacts:** Since 2013, VIEW has employed a Nepali veterinarian at BCC and helped in training this BCC veterinarian in hopes that the candidate would eventually lead the wildlife health program. In December 2016, the VIEW veterinarian Dr. Amir Sadaula has done just that. Dr. Sadaula and NTNC were able to secure funding for a molecular laboratory, now built above the VIEW laboratory, which is the next step in diagnostics from a field laboratory. NTNC has committed to employing Dr. Sadaula, and VIEW is currently looking to fill the field veterinary laboratory.

- **Community Outreach:** VIEW includes community outreach in their work on the ground. During a research project to sample and vaccinate dogs in the buffer zone, veterinary students discussed the risks of domestic dog diseases to endangered wildlife with the community. VIEW sampled over 100 dogs and vaccinated 500 dogs for rabies while actively engaging with locals on the risks dog diseases can pose to humans and wildlife. This project reached over 500 community members in four locations in the buffer zone. Throughout his work at BCC, Dr. Amir has also participated in conservation outreach projects in the buffer-zone with NTNC and has reached over 600 people to share wildlife health in the community.

- **Economic impact:** Another positive consequence of our work is the impact that wildlife health protection has on the Nepal's tourist industry. Tourism provides a valuable source of foreign exchange dollars in an ongoing non-extractive means (in contrast to mining), and permeates across multiple sectors of Nepal´s economy -- air and land travel, hotels, restaurants, retail, banking, and livelihoods in local communities. As of 2014, Nepal derived the majority of its tourism traffic from wildlife visits, whereas trekking and mountaineering accounted for only 12% of tourist visits. While tourism dropped sharply after the earthquake, wildlife driven tourism remained relatively resilient. Wildlife oriented tourism attracts high value tourists. Nepal´s vision to increase tourism traffic to 2 million visitors per year by 2020 will need to come

Outreach – supporting development of national wildlife health policy and sharing Nepal's successes on the world stage

Presentations

2013 – Presented "Status of Wildlife Health in Nepal", ASCM, Singapore.

2015 – Shared Nepal work at Vaccines for Conservation meeting at WCS, New York.

2015 – Presented "Canine distemper virus in the bufferzone of Chitwan National Park, Nepal", ASCM, Yangon, Myanmar.

2016 – Presentations on "Establishing priorities for wildlife disease surveillance in Nepal"; poster "Sustainable Conservation & Wildlife Health in Action in Nepal", WDA, Ithaca, New York.

2017 – Presented "Tuberculosis: a One Health and Conservation Medicine Issue for Nepal", Workshop on Zoonotic Disease Pandemic Preparedness for South Asia, Using One Health Platform, Kathmandu Nepal.

2017 – Presented poster, "Sustainable Conservation and Wildlife Health in Action" WDA, Chiapas, Mexico.

2017 – Presented "Preserving and Sharing Critical Wildlife Health Information in Nepal", ASCM, Kuching, Malaysia.

Policy

2016 – Participated in "Strategic Planning Workshop for Improving Wildlife Health Capacity in Nepal", and presented "Zoonotic Disease Risk to Humans and Livestock: Important Shared Diseases of Wildlife, Livestock and Humans.

2017 – Ongoing participation in development of National Wildlife Health Management Strategy and Action Plan (WWF).

2017 – Participated in "Review of the Nepal Elephant TB control and management action Plan"; ongoing participation in preparation of draft documents.

primarily from increases in wildlife-oriented tourism: the preservation of Nepal´s key endangered wildlife will be critical in realizing this goal.

- **Policy advances** (and workshops): VIEW training has impacted over 200 wildlife professionals in Nepal on wildlife health and wildlife capture. Since 2012, VIEW has collaboarated to develop protocols and provide policy recommendations that have been adopted by the Nepalese government and national parks. Most recently, VIEW played a significant role in developing a draft of a National Wildlife Health Management Strategy and continues to be involved in preparing the final version for submission to the Ministry. In collaboration with Dr. Susan Mikota, an elephant TB expert, VIEW's investigations led to the successful Nepal Elephant Tuberculosis and Health Care Program and Action Plan – which has continued to this day.

- **Outreach and presentations:** VIEW intends to continue to provide outreach both locally in Nepal and globally to spread the message how wildlife health is a critical component to conservation. Internationally VIEW has brought veterinarians to Nepal to assist in training in wildlife health and will continue international exchanges both in Nepal and abroad.

IX. VIEW's Strategic Direction: building on achievements and relationships

In 2012, VIEW set out to assist DNPWC build a Wildlife Health Program that employed science-based disease investigation methods and wildlife treatment. However, due to a lack of trained support staff, weak infrastructure and an ambitious conservation strategy prioritizing wildlife health, VIEW focused heavily on education and training, establishing a field laboratory to store biological samples and implementing research projects. Throughout the past five years, VIEW has been solidifying partnerships and collaborating with leaders in wildlife health both locally and globally.

- **National Wildlife Health Management Strategy:** The new phase of wildlife health management in Nepal represents a leap forward in understanding and supporting wildlife health as part of the country conservation goal. We look forward to the new National Wildlife Health Management Strategy and Action Plan and value our participation in its development. This strategy will protect and ensure the welfare of endangered wildlife of Nepal as well as be a gift to the world's natural heritage.

- **Database Platform**: The database is designed to document health information for wild animal species of concern in Nepal. It is intended to provide important health surveillance data to be used by government wildlife authorities to detect/respond and prevent disease outbreaks that pose risks to livestock, people, and wildlife species. Data is entered by veterinary staff and approved by designated senior staff before being finalized. Access to data is restricted and controlled through a user management system. The data contained in this platform is the "property" of the government of Nepal and can be shared only with specific permission or agreement with the government. VIEW looks forward to ensuring that the platform is adapted and utilized across the country.

- **Education and Training**: VIEW will expand training capture techniques and disease surveillance to other National Parks throughout Nepal. We will provide annual workshops and

one-on-one sessions. Once construction of the wildlife health hospital is completed, there will be multiple opportunities for training in veterinary medical and surgical techniques.

- **Infrastructure**: VIEW will support a field veterinary position at the NTNC/BCC field laboratory in Chitwan. This position will assist Dr. Gairhe, run basic diagnostic tests, input and train others on the database platform. VIEW also ensure the operational needs for a fully functioning wildlife health hospital are clearly identified including enclosures for recovery of endangered wildlife, particularly carnivores and rhinos.

- **Research and Disease Surveillance**: Using the knowledge we have gained from our previous research, VIEW, with our local partners, will conduct further investigations that expand on the priority species we have outlined and encourage wildlife students to participate in the research. In late 2017, VIEW acquired a blanket CITES for all endangered species of Nepal to be submitted to appropriate laboratories.

- **Outreach:** VIEW will continue our outreach programs and guidance to integrate the Wildlife Health Strategy Plan under the direction of DNPWC veterinarians and personnel in wildlife health. VIEW recommends an annual stakeholder meeting on wildlife health.

Dr. McCauley treating a Greater One-Horned Rhinoceros

Conclusion: Impacts of VIEW's Work in Nepal

VIEW maintains an unwavering commitment to the development of a robust and sustainable wildlife health program through training, infrastructure development, and support for research and knowledge acquisition. Five years of focused training for over 200 wildlife professionals and students, assistance and continued support at NTNC for wildlife health infrastructure, research targeted at some of the most pressing wildlife health issues, and ongoing guidance and expert consultation to those committed to strengthening wildlife health in Nepal demonstrate our commitment.

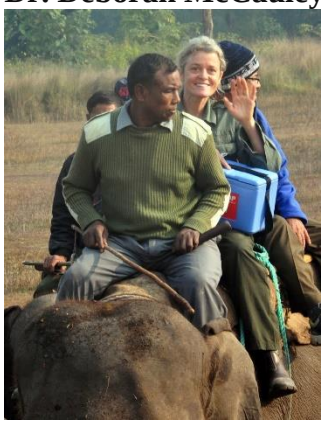
Since 2012, VIEW has partnered with local veterinarians, technicians, students and organizations to provide the knowledge, skills and resources to Nepal's wildlife professionals to best serve their important wildlife populations. However, it also is important to have proper tools and equipment so veterinarians can implement the education and training they receive. VIEW has been instrumental in the development of a diagnostic laboratory, medical equipment and supplies, the new wildlife health hospital and construction of special holding facilities. Wildlife Health protocols and policy recommendations have been adopted by the Nepalese government and national parks, and a draft of a National Wildlife Health Management Strategy is pending submission to the Ministry. Indeed Nepal is becoming a model of a successful wildlife health conservation strategy for the rest of the world.

Another positive outcome of Nepal's Wildlife Health Program has been its impact on tourism. Nepal has an amazing natural heritage valued by all of Nepali society and the world that also is a critical economic resource. Tourism has the potential to be the number one economic driver in Nepal, and many tourists visit the parks for wilderness experiences, wildlife and adventure tourism, far more than those visiting Nepal for trekking. If high profile wildlife species decline, so will nature tourism along with loss of livelihoods and critical revenues for a large part of the country. Conservation is critical for preservation of this important national resource.

We look forward to working together to create a strong, sustainable National Wildlife Health program within the Department of National Parks and Wildlife Conservation. We welcome closer engagement with the Department in meeting their needs and look forward to collaborating to achieve our common goals. Wildlife health is an essential part of any conservation strategy. In Nepal, it is now a national priority and will serve to ensure the future of Nepal's precious heritage.

Who's Who at VIEW: A Glimpse at some of VIEW's Leaders

Dr. Deborah McCauley, Executive Director/co-Founder of VIEW



Dr. McCauley is a wildlife veterinarian who has worked in wildlife disease surveillance, wildlife capture and immobilization, field surgery, field research, disease prevention and response in the United States and internationally. She graduated from the Royal Veterinary College, University of London, and worked as a contract wildlife veterinarian in the US at Wildlife Conservation Society specializing on high-elevation capture, immobilization and surgery in the field; at US Fish Wildlife Services with capture, immobilization, disease surveillance, training teams of wildlife professionals in wildlife health and capture techniques, post mortem examination and conducting research; at ZooMontana performing surgery, heading the clinical treatment and preventive measures for the Zoo as well training Zoo staff on emergency response and reducing zoonotic transmission and implementing a new digital medical records system. Prior to veterinary school, Dr. McCauley worked at Cornell University School of Veterinary Medicine managing a nutritional research program with performance sled dogs. Dr. McCauley has worked in conservation with endangered animals in North America, African and Asia. She won the Ashoka Fellowship for Social Entrepreneurs in 2017.

In 2010, the World Wildlife Fund (WWF) invited Dr. Deborah McCauley, who has expertise in tigers and high elevation capture, to assist them with tiger capture in Shuklaphanta National Park, Nepal. She returned in 2011 and 2012 to perform surgery on a tiger in Kasara and to assist the DNPWC and NTNC team in a tiger capture and a workshop on wildlife capture and immobilization. Her experiences globally helped form the foundation at VIEW, that wildlife health is the missing piece to conservation.

Dr. Gretchen Kaufman, Associate Director/co-Founder of VIEW

Dr. Kaufman is a wildlife veterinarian and One Health educator who has had leadership positions at the Paul G. Allen School for Global Animal Health at Washington State University and the Tufts University's Center for Conservation Medicine. She has worked on veterinary medical research and service projects in Nepal since 2001, beginning with a collaborative project at IAAS that developed a rabies education and dog surgical sterilization training program for their veterinary students. She also received a Fulbright Senior Fellowship to work with Dr. IP Dhakal to develop a course on wildlife health and conservation medicine in their Masters' degree program in veterinary medicine and taught the course for two years. (Dr. Gairhe is a graduate of this program). During this time, Dr. Kaufman also mentored both American and Nepali veterinary students on a variety of short research projects, conducted in or around Chitwan National Park in association with Dr. Gairhe and with official permission from the DNPWC. Projects were designed to assist Dr. Gairhe's program and further his defined objectives and included: elephant TB risk factors, elephant infrasound, operant conditioning for trunk wash procedure, establishing Asian elephant blood pressure ranges in situ, elephant herpesvirus PCR, elephant chemistry reference values, captive elephant diet

analysis, elephant TB PCR. In 2006, Dr. Gairhe brought his concerns about elephant tuberculosis to Dr. Kaufman, she began investigation with the help of Dr. Susan Mikota, a world famous elephant TB expert, which led to the successful Nepal Elephant Tuberculosis and Health Care Program and Action Plan – which has continued to this day. Combined, the Elephant TB and VIEW's expanded wildlife health programs, have enabled employment through NTNC for additional Nepalese wildlife veterinarians to assist Dr. Gairhe, including: Dr. Sarad Paudel, Dr. Jeewan Thapa, Dr. Suraj Subhedi, and now Dr. Amir Sadaula. This builds greater wildlife health capacity in Nepal. In addition, student research projects have resulted in the development of a TB PCR technique to differentiate *M.tb* from *M. bovis* and a PCR technique to aid in diagnosis of elephant herpes, where both tests are still in use at CMDN.

Dennis Keller, VIEW Board of Directors

Dennis Keller is a VIEW board member and cofounder and retired chairman/CEO of DeVry Education Group, an international science and technology Education Group which includes Ross University Veterinary School. He has served many education and conservation non-profits, both nationally and internationally, such as serving as the Chairman of the Board of African Wildlife Foundation to leading the capital campaign for a wildlife veterinary hospital at Lincoln Park Zoo in Chicago that is part of Ross University.

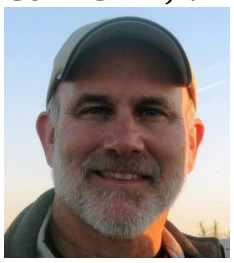
David Loseff, VIEW Board of Directors

David manages private investment and oversees the Canyon Creek Foundation, which supports charitable projects and non-profit organizations in the U.S. and abroad. David previously served as the head of Bank of America's private equity investment group for Asia which made and managed a diverse portfolio of equity investments throughout Asia, previously set private equity and was Bank of America's Managing Director for Global Equity Investments which made and managed a diverse array of private equity investments throughout Asia. He is particularly interested in VIEW because it seeks to tackle a very significant and largely unaddressed wildlife conservation issue with proven science by applying best practices to have high impact in a program which can be subsequently scaled both regionally and cross-species. David earned his Bachelor Degree from Yale University and his Masters Degree from Chicago Business School. He travels between Asia where he resides in Chiang Mai, Thailand and his home in Bozeman, Montana.

Raina Plowright, VIEW Scientific Advisor

Raina Plowright is an infectious disease ecologist, epidemiologist, and wildlife veterinarian. She has worked as a domestic animal and wildlife veterinarian in Europe, Asia, Australia, Africa, and Antarctica. She is currently an Assistant Professor at the Department of Microbiology and Immunology at Montana State University and is working on developing a Wildlife Health Investigation group in the Greater Yellowstone area.

Colin Gillin, VIEW Scientific Advisor



Colin Gillin is the state wildlife veterinarian for the Oregon Department of Fish and Wildlife in charge of a large wildlife health agency. He is also a past-president of the American Association of Wildlife Veterinarians, chairs the US Animal Health Association Committee on Wildlife Diseases, and chairs several wildlife health working groups for the Association of Fish and Wildlife Agencies. Dr. Gillin came to Nepal in February 2016 to assist with a VIEW workshop on Wildlife Immobilization and Health and assisted with a rhino necropsy in the field.

Tierra Smiley Evans, VIEW Scientific Advisor

Tierra Smiley Evans is a wildlife veterinarian and epidemiologist. She has worked in Uganda, Rwanda, Nepal and Myanmar on wildlife health monitoring, diagnostic development and veterinary capacity strengthening projects. She is currently conducting an NSF funded project in Myanmar to look at disease issues at the human-wildlife interface.

Key Staff

Ahna Machan | Communications and Development Officer

Ahna Machan brings 21 years of nonprofit development leadership including 15 in global philanthropy. Her career spans regional, national and international philanthropy in 21 countries, ranging from start-ups to institutions, and communications with 70. Ahna recently served on the The Carter Center's Senior Director, building strategic partnerships and revenue generation on the West coast – a new market for the Center taking a leadership role working in Liberia, Kenya, Guyana and Burma/Myanmar.

Natalie Pence | Office Manager

Natalie started working for VIEW in 2016. She was Deputy Director of Head to Toe, a school in Addis Ababa in Ethiopia. Natalie has a graduate degree in Human Resource Management and her primary focus is structuring organizations and building teams. Natalie joined VIEW to manage office operations including human resources, communication, community outreach, and executive assistance.