



One Health principles for sustainable tourism in protected and conserved areas

Accompanying principles to the guidelines for prevention, detection, response and recovery from disease risks in and around protected and conserved areas



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Acronyms

AFD	French Development Agency
ASAP	Life Alien Species Awareness Programme
BMZ	German Federal Ministry for Economic Cooperation and Development
COVID-19	Coronavirus disease 2019
DNA	Deoxyribonucleic Acid
FAO	Food and Agriculture Organization of the United Nations
GIZ	Deutsche Gesellschaft für Internationale Zusammenarbeit
GmbH	Gesellschaft mit beschränkter Haftung
IHR	International Health Regulations
IPBES	Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services
IPLCs	Indigenous Peoples and Local Communities
IUCN	International Union for Conservation of Nature
Norad	Norwegian Agency for Development Cooperation
OECD	Organisation for Economic Co-operation and Development
PCAs	Protected and conserved areas
PEP	Post-Exposure Prophylaxis
PPE	Personal Protective Equipment
SARS	Severe Acute Respiratory Syndrome
SARS-CoV-2	Severe Acute Respiratory Syndrome Coronavirus 2 of the genus Betacoronavirus
SDC	Swiss Agency for Development and Cooperation
Sida	Swedish International Development Cooperation Agency
SSC	Species Survival Commission
TAPAS	Tourism and Protected Areas Specialist Group
U.S.	United States
UN	United Nations
UNEP	United Nations Environment Programme
UNWTO	World Tourism Organization
WCPA	World Commission on Protected Areas
WHO	World Health Organization
WOAH	World Organisation for Animal Health

Introduction

The wide-reaching effects of the COVID-19 pandemic have included immense loss of life and serious health and economic consequences across communities and ecosystems. One key message made clear from the pandemic crisis has been that sustainability must be a leading priority across all sectors to ensure a healthy and safe future. Tourism, which itself suffered a sharp disruption in the pandemic, is among the industries that have a strong interest to reduce risks and increase resilience toward a more sustainable model in line with a One Health approach. Protected and conserved areas (PCAs) are an especially important setting for sustainable tourism and can serve as a catalyst for wider adoption of best practices anchored in One Health principles that help to sustainability balance the health of people, animals, and ecosystems.

The *One Health principles for sustainable tourism in protected and conserved areas* present six core principles, which have been developed and refined through a series of workshops and expert consultations. They provide practical strategies for tour operators and wider tourism industry stakeholders in PCAs. They are intentionally broad, allowing for use and adaptation in any PCA context. They complement the wider *Healthy people and wildlife through nature protection: Guidelines for prevention, detection, response and recovery from disease risks in and around protected and conserved areas*, shining a focused look at tourism in PCAs and taking stock of lessons learned from PCAs and the tourism sector from recent disease events. The principles are as follows:

1. Promote and protect the health of humans and other species
2. Proactively manage health threats in ways that minimize degradation of ecosystems or produce co-benefits for nature
3. Take into account context when designing or adapting disease risk reduction and resilience approaches
4. Empower visitors and tour operators to be good stewards of their health and the health of the local communities and ecosystems they visit
5. Ensure the equitable sharing of knowledge and benefits from tourism-based research and surveillance
6. Coordinate and collaborate across sectors to support prevention, detection, response, and recovery from disease threats

Practical strategies and examples are reviewed under each principle, followed by application to different sustainable tourism contexts: national parks, small-scale community-based tourism, or private enterprises. An illustrative list provides guidance on overarching, site-specific, and tourism industry and tourist-directed approaches, where One Health approaches can improve assessment and outcomes, among them in: site selection; setting the carrying capacity for visitors; ensuring investments promote diversified sources of income generation to support resilience; maintaining communication channels between tourism, human and animal health, and environment authorities to promote timely and efficient information flow and consistent messaging; developing visitor code of conduct and encouraging pre-travel medical consultations; providing employee health and safety programmes; and making sustainable forms of tourism the standard in PCAs. Together, the principles convey that considering trade-offs for environment and health need not come at the expense of tourism activities and livelihoods; rather, a One Health approach can provide practical strategies and help balance multiple objectives across sectors to achieve optimal outcomes.

Part I: Risks and opportunities for health related to tourism

Overview

The COVID-19 pandemic put the world on hold, with immense loss of life, increased pressures on public health, communities, and ecosystems, and a halt to tourism among its wide-reaching consequences. The pandemic experience, as well as other recent epidemic and pandemic tragedies, highlight that unsustainable practices are leading to the loss of biodiversity and climate change, driving pandemic risk and affecting many of the activities, ecosystem services, and health outcomes that depend on an intact environment (IPBES 2020). A key message from these and other planetary crises is that sustainability must be a leading priority across all sectors to ensure a healthy and safe future. A One Health approach is increasingly recognized a necessity to tackle threats at the human-animal-environment interface (see Box 1), with concrete guidance and action needed to help put One Health into practice (World Bank 2018; World Bank and FAO 2022; WHO Regional Office for Europe 2022).

Tourism was one of the most impacted human and economic activities in the COVID-19 pandemic. As such, the tourism industry has a strong interest to advance the One Health approach to reduce risks and increase resilience. Tourism can contribute meaningfully to overall sustainability objectives, including transitioning away from mass tourism practices that drive degradation of human, animal, and environmental health to more sustainable and healthy models.

Box 1. Definition of One Health

One Health is an integrated, unifying approach that aims to sustainably balance and optimize the health of people, animals and ecosystems. It recognizes that the health of humans, domestic and wild animals, plants, and the wider environment (including ecosystems) are closely linked and interdependent. The approach mobilizes multiple sectors, disciplines and communities at varying levels of society to work together to foster well-being and tackle threats to health and ecosystems, while addressing the collective need for clean water and sanitation, energy and air, safe and nutritious food, taking action on climate change, and contributing to sustainable development.

Adapted from the Working Definition from the One Health High-Level Expert Panel endorsed by the “Quadripartite” partners, the Food and Agriculture Organization of the United Nations (FAO), United Nations Environment Programme (UNEP), World Health Organization (WHO) and World Organisation for Animal Health (WOAH) in December 2021 (One Health High-Level Expert Panel 2022)

The tourism sector can generate many benefits, including contributions to the conservation of biodiversity, community livelihoods, and visitor wellbeing. At the same time, some tourism practices present risks of adverse outcomes, among them the potential for disease exposure and transmission in humans and other species and ecosystem degradation. For these reasons, a One Health approach is needed to help identify the links between human, animal and environmental health and manage potential threats or impacts related to tourism; and to do the same for conservation and tourism to ensure it contributes to sustainable development. Indeed, the need for the industry to improve resilience has been stressed in the ‘One Planet Vision for a Responsible Recovery of the Tourism Sector’, which has been met with political will through the Recommendations for the Transition to a Green Travel and Tourism Economy that the G20 (Group of Twenty) Tourism Ministers welcomed in 2021 (World Tourism Organization 2020; World Tourism Organization 2021).¹ This is especially important in protected and conserved areas, to ensure their long-term resilience and protection of the health of human and animal populations and ecosystems (Reaser 2021).

¹ Several World Conservation Congress 2020 motions also reinforce this general direction (e.g., motion 130 on “Strengthening sustainable tourism’s role in biodiversity conservation and community resilience”)



Tourism has a broad definition² and may involve a wide range of purposes, ecosystems, populations, and practices. These may present both co-benefits as well as trade-offs, with health a key sustainable development priority that needs to be considered. Because tourism can put people into new settings and may involve new or increased interactions, potential health implications should be considered for both existing and potential tourism activities.

Protected and conserved areas (PCAs)³ are an important setting for tourism, and are the focus of this document. They typically contain areas with high biodiversity value. If humans are present in these areas, the interaction between wild animals and humans can present risk of zoonotic disease;⁴ wildlife may serve as reservoirs or hosts for zoonotic pathogens, and may also be susceptible to infections from human or domestic animals (see e.g. IPBES 2020).⁵ Tourism may bring new activities into these areas and may increase the number of people and other species (e.g., pets, invasive species) in wildlife habitat, both factors that could increase disease risk and have adverse impacts on the environment. This can have serious consequences to a population or even species at large, as the superficial, often porous borders between protected and non-protected areas leaves populations susceptible to wider spread outside of a site's formal boundaries and vice versa.

At the same time, protected area-based tourism may generate vital revenue for conservation activities and may have local and national governance mechanisms that integrate multiple sectors and stakeholders in decision making and management. PCAs can facilitate the set up and implementation of the One Health approach, for example through integrating disease risk reduction strategies and wider One Health considerations into existing site management plans (see the accompanying *Guidelines for Prevention, Detection, Response and Recovery from Disease Risks in and around Protected and Conserved Areas*). This existing capacity can offer a valuable starting point for implementation and the future wider benefits sharing, including with local communities and areas not currently under protected status.

Collectively, the One Health principles reinforce that sustainable tourism provides a well-balanced approach in PCAs, minimizing potential trade-offs and optimizing co-benefits. Sustainable tourism is defined as: “*Tourism [to a protected area] that takes full account of its current and future economic, social and environmental impacts, addressing the needs of visitors, the industry, the environment and local (host) communities*” (UNWTO and UNEP 2005).⁶

² As defined by the World Tourism Organization: “Tourism is a social, cultural and economic phenomenon which entails the movement of people to countries or places outside their usual environment for personal or business/professional purposes. These people are called visitors (which may be either tourists or excursionists; residents or non-residents) and tourism has to do with their activities, some of which involve tourism expenditure.” <https://www.unwto.org/glossary-tourism-terms>

³ As defined by the IUCN: “A clearly defined geographical space, recognised, dedicated and managed, through legal or other effective means, to achieve the long-term conservation of nature with associated ecosystem services and cultural values.”

⁴ Zoonotic pathogens (or “zoonoses”) refer to those transmitted between animals and humans.

⁵ For additional background, case studies, and references on disease threats and risk reduction strategies in PCAs, please see the accompanying *Recommendations*.

⁶ For more information on this definition, please see Leung et al. 2018, *Tourism and visitor management in protected areas : guidelines for sustainability*

Disease threats

The health of humans, animals, and ecosystems is associated with many determinants and many communicable and non-communicable disease outcomes (both positive and negative). A One Health approach provides a lens to capture the array of factors and outcomes that are important to stakeholders. For example, recreation and other forms of tourism can have physical, emotional, and mental health benefits from time spent in nature. At the same time, the introduction or exposure to pathogens or toxins linked to tourism activities and tourism infrastructure (e.g. transportation such as cruises) can be detrimental to the health of humans, other animals, and ecosystems. Through, for example, poor waste management, encroachment into wildlife habitat, and the overexploitation of wildlife and natural resources, human activities can also lead to degradation of ecosystems with consequences such as reduced function and provision of ecosystem services. Some short and long-term human health outcomes may be seen from degradation, such as damage to coral reefs or mangroves that protect coastal communities against storms (thereby preventing injuries and vector-borne diseases linked to flooding) and provide vital habitat for fish important for nutrition.

Infectious diseases are an important aspect of health monitoring and health outcomes. Under the International Health Regulations (IHR), countries have a legal obligation in the case of public health emergencies of international concern (WHO 2016),⁷ but can also be proactive about prevention at source to minimize risks of spillover occurring and effectively managing local epidemics.

As seen with the COVID-19 pandemic, infectious disease outbreaks have the potential to spread rapidly, in multiple species, with severe consequences on lives as well as economies. The tourism industry has been clearly impacted directly and indirectly from this pandemic, reinforcing the need for adequate prevention and resilience measures for global pandemics as well as more local epidemics and endemic diseases. Tourism inadvertently can facilitate the introduction of diseases to new places, with the dimension of international travel having contributed significantly to the global spread of many diseases over recent years, decades, and centuries. In addition to disease spread, tourism activities may also involve activities that increase the risk of known and novel disease spillover between species – a source of novel and known zoonotic diseases (see Box 2). At the same time, the tourism industry can play a crucial role in disease detection and risk reduction, being part of the solution.



While disease screening requirements may be highly visible in airports, many aspects of tourism can utilize a One Health approach to promote healthy and sustainable outcomes. Credit: Wikimedia Commons.

⁷ The IHR is a legally-binding international instrument. Country implementation of the IHR seeks to “limit the spread of health risks to neighbouring countries and to prevent unwarranted travel and trade restrictions.” More information can be found at: <https://www.who.int/health-topics/international-health-regulations>

Box 2. Overview of tourism and zoonotic diseases

Prior **zoonotic disease** spillover events have been linked to tourism, as seen, for example, with several cases of Marburg virus disease. Certain practices in tourism drive pathogen spillover risks between species, particularly if adequate distancing is not maintained. Development or expansion of tourism operations may be associated with increasing access to sites or changes in other practices that could affect disease risk (such as livestock rearing to support increased food supply needs), as well as land use changes that drive disease emergence (IPBES 2020). Tourists may be offered wildlife encounters and experiences in wild or captive settings, where they hold, touch, or feed wildlife. This physical interaction may lead to transmission of infectious diseases between people and animals. Even localized disease threats or events may affect perceptions about wildlife as well as tourism demand, so proactive risk communication and risk management are essential.

From a biodiversity lens, risks and impacts are not limited to human health; humans can unknowingly introduce invasive species as well as pathogens of concern to other species with devastating effects. A key example is the transmission of life-threatening respiratory diseases from humans on trekking tours to endangered gorilla populations (Macfie and Williamson 2010). In addition to zoonotic infections, human activity can also be mechanical vector: the introduction of the fungus *Pseudogymnoascus destructans* into caves, likely from a visitor's boots, has resulted in serious bat declines from White Nose syndrome in North America.

Purpose and audience

This document provides six core One Health principles for sustainable tourism in Protected and Conserved Areas (PCAs) that can be applied and adapted to the specific context. The key audience is tour operators and wider tourism industry stakeholders as they relate to PCAs (e.g., a government tourism or protected area authority granting tourism concessions, local community-based tourism businesses, or larger commercial enterprises).

The principles are provided as an accompanying document to the *Guidelines for Prevention, Detection, Response and Recovery from Disease Risks in and around Protected and Conserved Areas (IUCN 2022, In Press)*, which provide more general disease risk reduction strategies targeted specifically to PCA managers for ten key topics aligned to the overarching approaches in the Green List Standard:

- **Sound Design and Planning:** 1) Disease risk assessment; 2) Animal release; 3) Site use planning and buffer zones
- **Effective Management:** 4) Monitoring and Surveillance; 5) Disease reporting and investigation; 6) Safe wildlife viewing, handling, and use; 7) Biosafety and Biosecurity; 8) Control measures
- **Good Governance:** 9) Risk communication; 10) One Health coordination

Illustrative examples and case studies are presented to demonstrate proof of concept of the six One Health principles for sustainable tourism and practical strategies in different contexts, such as national parks, small-scale community-based tourism, or private enterprises. These principles are intentionally broad and are not intended to replace more detailed disease or species-specific guidelines.

Part II: One Health principles for sustainable tourism

Principle 1: Promote and protect the health of humans and other species

The tourism sector has a responsibility to promote and protect the health of humans and other species affected by its operations. This includes managing potential exposures related to time spent in wildlife habitats or interactions with other species, susceptibility from no or low prior immunity to local or introduced pathogens, and sources of environmental degradation that affect the health of humans, animals, and the environment.

Health promotion encourages healthy behaviours by tourists. Health protection avoids or minimizes risky practices that can result in poor health status of people and animals. With respect to zoonotic and vector-borne diseases, this means a risk reduction stance that takes steps to limit exposures to animals and vectors that can present risk. In tourism operations, visiting persons could have low immunity to the pathogens that may be circulating locally. Similarly, foreign visitors may bring new pathogens that are not present in local populations of humans or other species. Furthermore, wildlife may have low immunity to pathogens circulating in humans, being susceptible to infection and disease.

During the COVID-19 pandemic, spillover of SARS-CoV-2, the coronavirus that causes COVID-19, has been reported in a number of wild animals,⁸ presumably from tourists visiting zoos and rescue centres initially and then to some free-ranging populations (likely via waste management or other exposures). This transmission has been reported at sites in both rural and urban areas, and sheds light on the potential implications of spillover into free-ranging wild animals (including in PCAs). A major consequence of such spillover could be the establishment of new reservoirs that could lead to future disease introductions, as well as serious health implications for some wild species that can undermine conservation efforts in PCAs. Good practices should be maintained that promote and protect health at all times, given the many infections known to be transmissible between humans and other species, but increased vigilance may be necessary during active epidemics, for example, through testing, masking, and/or immunization requirements for visitors, depending on the circumstance. Specific guidance on *Tourism and visitation to protected areas amid COVID-19* has been prepared to assist PCA managers in safe tourism operations during the pandemic (European Commission, Directorate-General for International Partnerships, Spenceley, A. 2021).

Because of the potential for disease transmission between species, predation of wild fauna, and contamination of aquatic and terrestrial ecosystems (e.g. impacts on water quality from dog faeces), it is necessary to adequately manage the presence of domestic animals in relation to tourism in and around PCAs. For example, horses and other domestic and wild animals (e.g., camels, elephants) are sometimes involved in tourist transportation in and around PCAs, livestock rearing sometimes occurs in and around PCAs, and visitors may seek to bring pets with them for recreation and other tourism activities. Policies vary by site; for example, some PCAs prohibit visitors from bringing domestic animals (including pets) into protected and conserved areas, whereas others allow dogs if they are leashed. Ultimately, the appropriate actions to take will depend on the context, informed by risk assessment as part of an overall risk analysis.



Visual signage can help educate visitors about responsible practices.
Credit: C. Machalaba

⁸ For latest information on COVID-19 in animals, please visit: <https://www.woah.org/en/what-we-offer/emergency-preparedness/covid-19>

The specific transmission route for infection will shape the necessary prevention and control measures (for example, in the case of norovirus and a respiratory disease, both warrant isolation but also benefit from additional prevention and control measures; with norovirus, proper hygiene measures in food preparation are critical; for a respiratory disease, proper masking of people's nose and mouth and distancing are crucial). It is important that tourism enterprises stay up to date on guidance from public health authorities, and where available and relevant, animal health authorities (Box 3).

Box 3. Rabies virus: a threat requiring attention from tour operators

A bite or scratch from a rabid animal in a location where rabies virus is endemic can be life-threatening, as rabies is virtually 100% fatal without rapid access to post-exposure prophylaxis (PEP). By the time symptoms develop, it is too late to treat. For this reason, starting on a PEP regimen (involving a rabies vaccine series and immune globulin dose) within ~24 hours is critical. Thorough washing of the wound is also important to reduce the risk of rabies as well as other infections. Because the consequences of infection with rabies virus are so serious, it is typically recommended that people having close contact with an infected patient also receive PEP. While tourist providers themselves may not typically be expected to have PEP on hand, forming partnerships with local health facilities and human and animal health authorities can help to ensure the appropriate response is put into motion in the event that a possible rabies exposure does occur. Because the vast majority of rabies cases in humans come from domestic dogs, for the safety of tourists it is also important that canine vaccination campaigns be in place in and around tourist areas in rabies-endemic countries. In areas where wild animals are at risk of rabies virus introduction, canine vaccination campaigns (for both pets and stray dogs) in the proximity of PCAs can also help to protect wildlife.

Maintaining a **safe distance** between people, wildlife, and domestic animals is a priority to avoid transmission of disease to and from humans and other species, and should be emphasized in PCAs. Safe distancing when viewing wildlife is already recommended as best practice in sustainable tourism, particularly for species that are highly susceptible to human infections or known to transmit zoonotic diseases, with appropriate distances varying by species. For Great Apes, which share more than 98% of our DNA, a viewing distance of 7 metres or more is typically required for visitors (see IUCN *Best Practice Guidelines for Great Ape Tourism*) – and latest recommendations suggest that this should increase to 10 metres in light of the COVID-19 situation (IUCN SSC Primate Specialist Group 2021). Reducing the number of visitors can also allow for risks to be more controlled. Distancing should also consider animal behaviours and movements, such as locating trails adjacent to, rather than directly under, bat roosts or migratory corridors. Clearly marked trails or roads, signage, designated viewing areas, and the use of guides can help to promote visitor flow to maintain safe distancing. Tourists and tour guides should stay alert to distancing; certain practices may result in lapses in judgement that put humans and animals at risk. For example, in a study conducted prior to the COVID-19 pandemic, an analysis of over 800 wildlife “selfies”⁹ found that 86% were within 4m of gorillas; some also involved direct contact, and masking was found to be inconsistent across sites (Van Hamme et al. 2021). In addition to conservation and welfare considerations, such practices can result in scratches and bites, or even serious injuries. Animals may also be stressed or in poor condition, resulting in weakened immune status that further puts them at risk. Additionally, the process of sourcing animals for photos can perpetuate extraction practices associated with zoonotic disease risks. Observational studies can identify where guidance is not being followed and help to design safer practices. In this case, specific guidance could be provided by guides on designated safe locations for photos during a trek, or other solutions that promote consistent good practices. Over time, habituated animals (particularly associated with where feeding occurs) may be increasingly comfortable around tourists, requiring continuous risk assessments and possible adjustments of tourism offerings to keep both humans and other species safe.

⁹ A selfie is generally defined as a photograph taken of oneself, typically using a smartphone and shared on social media, in this case displaying the person and wildlife in proximity.



Tourism activities should take into account larger ecological connections, including the management of water resources and wildlife habitats. Credit: Magdy Aly

In some cases, sustainable tourism, volunteerism, education, and/or research go hand-in-hand and closer interactions with wildlife may be warranted. Not all species and taxonomic groups present equal risk of transmitting or being affected by zoonotic diseases, and the pathways for transmission and appropriate risk reduction strategies may vary. In PCA settings where reptiles and amphibians, birds, livestock, and several other taxonomic groups known to harbour *Salmonella* or other pathogens that can cause gastrointestinal illness may be handled, accommodations should be in place to facilitate handwashing with soap and water as well as care in cleaning and disposing of animal waste and housing materials. For contact with Great Apes in free-ranging settings or rescue centres, a suite of protocols are likely to be relevant, such as appropriate personal protective equipment, a quarantine period, and proof of a negative tuberculosis test result.

Limiting or halting visitors can have significant economic consequences for businesses and local communities dependent on tourist-related income. During high-risk periods of the COVID-19 pandemic many PCAs sought to develop alternative revenue streams to support park operations and affected communities while avoiding in-person visits, such as through virtual or photo tours (European Commission 2022). Increasing domestic tourism can also provide vital economic resources, and promote broader local and national stewardship and awareness about sustainable and healthy practices in PCAs. Proactively developing conservation-compatible options that promote resilience is ideal as part of sustainable tourism investments.

Beyond infectious diseases, tourism offerings can potentially raise other health concerns. An **assessment of health impacts** for humans, animals, and ecosystems should be conducted. For example, tourism could inadvertently lead to ecosystem contamination (via laundry detergents or other contaminants in wastewater, human sewage and trash, plastic or electronic waste, or lead used in hunting). These can have wide-ranging and long-lasting impacts for PCAs.

Overall, while some tour operators may have valid concerns that tourists will be overly fearful of disease risks, being proactive about health promotion and prevention is advantageous, as tourism demand can suffer if there is a loss of confidence about the perceived or actual safety of an operation or location. Travel-associated food and waterborne infections are common examples of disease threats that can deter business from repeat or new visitors. Risk assessment and wider risk analysis can be a helpful input when examining legal liabilities and informing risk reduction and business continuity strategies (see Principles 2 and 3).¹⁰

¹⁰ See the *Guidelines* for specific risk analysis steps and tools.

Principle 2: Proactively manage health threats in ways that minimize degradation of ecosystems or produce co-benefits for nature

As part of sustainable tourism efforts, tourists, tour guides, and tour operators should follow low- or no- environmental impact practices in PCAs to reduce disease spillover and transmission risks. Ideally, this will prioritize avoiding exposures or utilize responsible protective measures for prevention and control, waste management, and in the design of trails and other access points. PCAs should evaluate their **carrying capacity** for visitors, with ongoing monitoring and adjustment of visitor number allowances per site (and for each tourist attraction) as needed.

There may be a need to **assess and balance environmental trade-offs** presented by well-intentioned health protection measures. For example, mask wearing is a key strategy used for preventing the respiratory spread of COVID-19 between people as well as to other species. However, the increasingly common sight of masks in wild settings, including along beaches and rivers, reinforces the challenges of waste collection – particularly in PCAs which may already be strained for financial resources and do not have waste collected to centralised waste management systems. For persons going into settings with high exposure to wildlife excreta, adequate personal protective equipment (PPE) including masking is important. Making mask wearing compulsory in these situations can help to reduce risk, but contaminated masks (and other PPE) also create new sources of waste, potentially in high volumes. Making responsible waste management easy for visitors (such as by using designated waste bins at the exit of a cave or rescue centre) can help to limit littering. Selecting the right PPE, balancing life cycle and protection, is also important and is an evolving field.



Responsible waste management is an important aspect of sustainable tourism. Credit: C. Machalaba

As another example of balancing trade-offs, the use of sunscreen is a key preventive measure against skin cancer in humans. To protect environmental health too, blue economy enterprises are beginning to require that visitors use “reef-safe” or “reef-friendly” sunscreens which do not contain ingredients linked to coral reef bleaching, such as oxybenzone and octinoxate. To encourage compliance, there is a role for messaging to visitors before their visit for awareness to bring safe products, as well as collaboration with local sellers to ensure wide availability so that consumers can access and prioritize safer products.

In some cases, tourism offerings are thoughtfully designed to be minimally disruptive to wildlife. However, the introduction of human populations into wildlife habitat is often accompanied by temporary or permanent housing settlements, food storage sites, and agricultural production. With these changes, some wildlife may be displaced or may increase in abundance from the availability of resources such as crops, food scraps, and waste that attract such animals. This may lead to them being viewed as nuisance animals or pests, particularly those that present infectious disease risk or other harms (for example, snake bite from venomous snakes). As a main solution, steps should be taken to discourage unwanted wildlife or feral animal presence around these areas, such as

by rodent-proofing grain bins, securing waste to prevent wildlife access, and avoiding supplemental feeding by protected area staff and visitors. As a secondary safeguard, persons should be made aware about the importance of personal measures to reduce exposures – such as appropriate footwear to protect against snakebite. If animal control measures are pursued, they should be closely studied for careful assessment of adverse consequences and ongoing monitoring. For example, poison bait for rodents can lead to serious effects on non-target species and ecosystems.

Depending on the risks, changes in tourism attractions may help to reduce exposures. **Ecological and epidemiological information** can help to guide options. For example, if mosquito-borne diseases are an issue, understanding whether the species of concern are primarily active during the day or night can guide potential options (e.g. shifting from day or night tours, use of bed nets, etc.)

Even in tours designed to be low-impact, new health and sustainability concerns may be identified over time and with changing conditions. For example, boat cruises may allow for site viewing while helping to keep the number of visitors that come onto land low. However, ships may potentially facilitate the introduction of invasive species and other biofouling. A number of factors, such as the location and duration of stay, the invasive potential of a species, decontamination practices, and waste management strategies may reduce or increase such impacts. In some cases, including for ships visiting or traveling through PCAs, risk reduction strategies such as decontamination and inspection of ships may be easiest to implement in departure ports (McCarthy et al. 2022).



The risk of invasive species introductions should be considered in tourism offerings, including boat excursions. Credit: C. Machalaba

In some cases, responses to disease risks or outbreaks have targeted wildlife or wildlife habitat in ways that are detrimental to biodiversity. In general, such response are inappropriate, often targeting the wrong species, wasting resources, potentially increasing disease risk, and having longer-term effects on the species or ecosystem. Better options may include redesign of tourism activities to deliver recreational benefits, generate new or alternative livelihood opportunities, and avoid degradation of health-benefitting ecosystem services (Box 4). Tourism operators can provide important input in risk assessment and larger risk analysis processes undertaken by public health and protected area management authorities to guide appropriate action (see Principle 3, next section).

Box 4. Managing disease risks in ways that support livelihoods and ecosystems

In Queen Elizabeth National Park's Maramagambo forest, python cave hosts millions of bats and is a popular tourist attraction. The presence of humans in the cave created the potential for exposure to bat-borne viruses, particularly via bat urine and excreta from bats roosting and flying overhead. After Marburg virus was contracted by a tourist, a safe viewing platform was constructed in partnership with the U.S. Centres for Disease Control and Prevention to allow visitors to view the bats without entering the cave. Using an enclosed glass area, this creative solution ensures visitors stay safe while also allowing tourism to continue and reducing degradation of a sensitive ecological habitat – a triple win for health, tourism, and conservation.

The known infection potential of Marburg virus to both human and non-human primates also means that tourism involving great apes or other non-human primate viewing should be mindful about the mix of tourism activities offered. For example, on the basis of this disease risk to humans and wildlife, great ape tours should ideally avoid cave excursions or be designed to ensure great ape viewing occurs prior to visiting cave sites (Macfie and Williamson 2010).



Tourism offerings should avoid entry into areas in close proximity to bats, or require sufficient risk reduction measures to keep people and bats safe. Credit: Shutterstock

Principle 3: Take into account context when designing or adapting disease risk reduction and resilience approaches

There is no one set way to effectively reduce disease risk and strengthen preparedness across all PCA settings. Since potential solutions could have trade-offs, particularly for local communities, approaches should be tailored to the needs and priorities relevant to the particular context. Buy-in, incentives, and empowerment to implement and enforce proposed approaches all must be considered. Even if sustainable tourism activities cannot eliminate health risks, they can be substantially reduced.

A practical way to get started is to identify the key **“interfaces”** where exposure is most likely to occur. For zoonotic diseases, this includes the settings or practices that increase close contact with wild or domestic animals or their bodily fluids (e.g., blood, faeces, saliva, and urine). Exposures may be direct (e.g., via bites) or indirect. Examples include entry into cave sites where bats are present, markets where live animals are kept or slaughtered, restaurants serving wild animals, or physical interaction with wildlife in zoos or via experiences such as feeding, petting, or holding. Some of these may be outside of official boundaries but near PCAs. For human-human spread, this may include places where many tourists congregate in close proximity, or practices like food preparation where a sick employee could contaminate food consumed by many visitors. Understanding what these interfaces are allows for prioritization and targeted risk reduction measures.

It is important to be mindful that operators may be serving tourists with different cultural norms, languages, or health literacy levels, which may require adapting risk communication and risk management strategies. For this reason, **continual monitoring and evaluation** are necessary, to determine what is working and what requires refinement. Before designing a possible intervention, conducting knowledge, attitudes and practices studies or stakeholder consultations can help to understand the current status and root causes of issues and identify likely acceptable alternatives or enabling factors needed for success.

The need for action is often informed by a **risk assessment**, which can be quantitative, qualitative, or a mix of both. Risk assessments can help look more closely at specific interfaces and the evidence base for a specific question of concern (see Box 5). It is important to note that while one group of stakeholders may conduct a risk assessment, an entirely different may be responsible for, or best suited to, taking action. For this reason, involvement of tourism stakeholders is advantageous – and necessary – to ensure a clear understanding of a potential health threat and achieve the best possible outcome that balances the various needs and priorities of stakeholders.



Cultural and other contexts shape risks as well as appropriate solutions. Credit: C. Machalaba

Box 5. The role of risk assessment in managing threats to visitor health and safety

The question examined for a risk assessment can be as specific or broad as needed, ranging from a particular pathogen of concern or zoonotic disease risk more broadly. For example, consider the potential question: “*What is the risk of disease spillover from a cave used for tourism activities?*” In this case, examples of relevant information would include the species present in and around the cave, the type and frequency of interactions with humans, and the likely pathogenicity of known and novel pathogens (based on findings locally or elsewhere), and knowledge of the types of pathogens circulating in different species and taxonomic groups and human susceptibility to them. The assessment could also theoretically identify protective factors that people are already taking to reduce their exposure, such as people only going into caves during seasons when certain species are not present.

A risk assessment can help piece together the general understanding to estimate risk as well as identify important knowledge gaps. If the findings indicate a need for action, stakeholder consultations, including with those in the tourism sector, are the next step to identify and select viable strategies, considering possible trade-offs and co-benefits under a One Health approach. Risk reduction strategies may end up being led or supported in meaningful ways by the tourism sector, whether through their financing, use, or enforcement. For more on risk assessment processes and tools, and how it fits into risk analysis more broadly, please see the accompanying *Guidelines*.

In addition to disease risk reduction, context plays an important role in appropriate **resilience strategies** if local or global epidemics occur. For example, some countries rely heavily on tourism revenue to support PCA management in addition to local livelihoods. The COVID-19 crisis demonstrated the challenges with this high level of dependence, as the sharp decline in international tourism left many sites vulnerable to extended economic losses. An eventual increase in domestic tourism helped see a tourism rebound that partially compensated for losses from reduced international visitors, including in some PCAs (OECD 2020; Spenceley et al. 2021). Important lessons and key takeaways have been identified from sites with Great Ape tourism, which were doubly affected by both the tourism slowdown while also contending with serious concerns about COVID-19 transmission risk between humans and Great Apes – which required additional safeguards as well as resources to adequately manage the threat of disease. One key takeaway is the importance of establishing diversified income sources to reduce direct reliance on one specific tourism activity (e.g., Great Ape tourism), reducing vulnerability to complete revenue loss and providing greater ease of minimizing close contact between species when warranted (Conservation through Public Health and International Gorilla Conservation Programme 2022). Contingency planning exercises should be conducted with this in mind.



Important risk reduction and resilience strategies have been developed for Great Ape tourism. Credit: Michael D. Kock

Principle 4: Empower visitors and tour operators to be good stewards of their health and the health of the local communities and ecosystems they visit

Visitors have a **personal responsibility** to look after their own health as well as for the places they visit; and the tourism industry should be required to ensure this stewardship in their operations via **relevant laws**. We can assume that the majority of, if not all, operators and tourists visiting PCAs are there to appreciate the natural environment and generally wish to be good stewards. However, a lack of awareness can be a barrier for translating this positive intent into action. Effective risk communication and behaviour “nudges” can help to make stewardship easy and the norm.

Posting a **visitor code of conduct**, and ideally asking visitors to agree to it, can help set expectations in advance about acceptable behaviour. On site, visual signage can help reinforce good practices (and may help to overcome language or literacy barriers). Tour operators and site employees should also be sure to model good behaviour and promote accountability, celebrating tour guides and leaders who are the ambassadors on the ground. Laws and certifications relevant to each country may help incentivize these good practices - for example, as a requirement to obtain a tour operator license. Tourism marketing should also be careful to promote responsible practices to appropriately shape tourist expectations.

The correct framing of **risk communication** is important. It is crucial that communication strategies raise awareness, while providing constructive and practical ways to reduce risk. Otherwise, visitors may feel a lack of empowerment about what they personally can do to promote and protect their own health and the health of others. Additionally, miscommunication of information can result in people developing negative perceptions about wildlife, which is counterproductive and can have consequences for biodiversity. Overall, messaging should convey that wildlife and nature themselves are not an inherent threat to health (and indeed play a critical role to good health through the many ecosystem services they provide), but human activities can increase risk of disease spread between humans and animals. Advice should be provided on ways to be safe when in/around wildlife habitats and reduce our environmental footprint.

A visitor code of conduct helps to set expectations for good practices. Credit: C. Machalaba



In enterprises primarily serving international tourists, one valuable way to support the health of visitors and protect the health of communities and wildlife visited is to recommend they have a **travel medicine appointment in advance of their trip** (Box 6). This way, they can receive public health and medical guidance on keeping safe in their destination. Such advice usually reflects the entry requirements of a location (such as yellow fever vaccination, which some countries require) as well as guidance tailored to the specific locations a tourist plans to travel to. The environmental conditions and the status of critical infrastructure may vary significantly based on urban or rural location, altitude, and other factors. To the extent possible, good practices can be taken proactively, such as staying up to date on vaccinations, taking prophylactic medicines (e.g., anti-malarial medications), and following local guidance (like boiling water before consumption). Because of the potential for spread of infectious diseases, such actions are necessary to protect oneself and others.

Tourists should also be encouraged to **report changes in their health status**. This can contribute to early detection and facilitate appropriate treatment and containment measures. When seeking healthcare services, relevant exposures to wild and domestic animals, mosquitos and ticks, and environmental conditions should also be disclosed to support diagnosis and ensure healthcare providers keep themselves safe when caring for the patient. To encourage good visitor practices and avoid penalizing (and thus disincentivizing) honesty, tourism operators may allow free re-booking if guests are ill. Health checks (conducted or verified by a health official where possible) can provide another layer of safety prior to, for example, gorilla viewing and other excursions.

In PCAs, **employee health programmes** are important to protect members of our own and other species. Occupational health and safety procedures in the tourism industry may encompass a wide scope, from infrastructure for physical safety to standard operating procedures dictating hygiene practices to avoid foodborne illness. During active epidemics and in general, it is essential that workers have the information and empowerment needed to keep themselves and visitors safe and healthy. For tourism involving wildlife in some form, there are likely to be several dimensions of occupational health and safety. Providing a reliable protein source to reduce worker reliance on wild meat is important when it comes to addressing sources of zoonotic disease risk. Depending on the size and type of the tourism operation, protocols should be in place to reduce the spillover and spread of disease, including avoiding physical interaction with guests or other staff when ill and being relieved of animal care taking duties as needed. Paid sick leave policies, free vaccinations, and access to healthcare are also important to incentivize staff to isolate when ill, protect themselves, and seek care as appropriate.

Box 6. Correct and consistent information access and risk communication

While travel agencies will often have thorough information about relevant offerings for tourists, they may not necessarily have sufficient knowledge about disease and other risks, nor correct information about the availability, timing, and dosing of preventive measures or treatment regimens. In fact, one study found that travel advice was at times inconsistent with travel and health guidance published by the World Health Organization (Villanueva-Meyer et al. 2015). For this reason, tour operators should be encouraged to regularly seek health information from health authorities, including written materials to share with tourists to promote consistent and up-to-date understanding, and refer travellers to a travel medicine clinic.

Well-designed risk communication campaigns may utilize creative slogans, visuals, and other tools to reach tourists effectively. In Italy, the Life Alien Species Awareness Programme (ASAP), supported in collaboration with the European Union, was targeted at travellers to reduce the spread of invasive species.¹¹ The motto “Be aware, think, travel”, was paired with “10 rules for the aware traveller”. An information desk at Rome Fiumicino Airport provided information in a variety of formats. The programme team involved biologists, park rangers, and communication experts as well as European tour operators who helped reinforce the message on the ground.

¹¹ To learn more about the Life ASAP program and access its materials, please visit: <https://www.lifeasap.eu/index.php/en/project/asap-project>

Principle 5: Ensure the equitable sharing of knowledge and benefits from tourism-based research and surveillance

In addition to livelihoods, sustainable tourism in PCAs can bring important benefits to local communities and the world, including the exchange of knowledge and resources related to cultural heritage and environmental protection, such as attention to the practices used by Indigenous Peoples to protect wild areas. Tourism enterprises should seek equitable sharing of training, information, and financial and other resources that can be beneficial to a community or country, including its health and biodiversity.

Some specific aspects to consider include:

- Equitable knowledge exchange to benefit local stakeholders requires attention to the potential users of the data or information and the best format to share it in;
- Opportunities to share benefits via sustainable tourism operations could include training, capacity strengthening, and information flow about biodiversity and health protection;
- Tourists getting sick from travel-associated exposures may be the first detection and contribute important information to the surveillance system, but requires information flow mechanisms;
- Research conducted as part of scientific, academic, volunteer, or educational tourism – including citizen science contributions - should be accessible to local stakeholders and contribute to addressing local priorities;
- Tour experts have significant expertise and solutions that can contribute to the capacity of local communities regarding health protection and overall stewardship;
- Sharing of tourism-linked financial benefits can encourage community stewardship, conservation, and resilience that preserves the natural assets that drive sustainable tourism interest.

An example of inequitable **knowledge exchange** is the holding of data without considering the need to know, and best format to share it in, for local stakeholders. The publication of a significant research finding in a scientific journal may reach other international researchers but may not be accessible to local stakeholders who could benefit the most directly. Barriers such as technology access, the cost of journal subscriptions, language, or relevant prior knowledge to put the finding into context all play a role in this inequity. For any of these reasons, it is important that some level of ownership of research project is built into the design, ideally as part of research priority setting, the data collection and interpretation process, and in driving policy and practice recommendations. For training programmes, enlisting local research experts and/or enrolling local students can promote research capacity strengthening.

It is also important to think about the ways information could potentially be used; for example, photos posted to social media or citizen science platforms with geotagged information (e.g. iNaturalist) by tourists or scientists of a rare plant or animal could have inadvertent outcomes – such as perpetuating demand and leading to poaching. If local biodiversity managers are left unaware, they may not have the resources to address an increased threat. Similarly, information about disease occurrence may not necessarily flow from tourists who return to their home country to those in the host country that could also be at risk. Finally, given the protected status of sites, no-go or no-take zones should be respected by tour operators, with adherence to appropriate **permitting and approval** (e.g., animal welfare and human subject ethical standards) processes for scientific research as determined by national laws and international best practices.

In some cases, information about a disease threat does not warrant immediate action; in other cases, it could be an important and urgent input to support disease prevention. Having some structure in place makes it easier for tourists and tour operators to efficiently and effectively share information with relevant authorities, particularly if it is something time-sensitive like disease detection. As emphasized in Principle 6, relevant authorities (such as the ministry overseeing tourism or protected area site managers) should engage with the national or sub-national One Health Coordination Platform to support timely flow of information (Box 7). Guidance specific to PCA managers to handle such information is provided in the accompanying Guidelines for Prevention, Detection, Response and Recovery from Disease Risks in Protected and Conserved Areas.

Box 7. Reaching key stakeholders for information exchange

In Liberia, One Health Conservation Centres are being developed around protected and conserved areas.¹² These are intended to serve as a hub for education about the conservation value of local ecosystems, shine light on local research priorities, provide a pathway to support research dissemination, and reinforce responsible conduct and stewardship by visitors, tour operators, and local communities alike. These are envisioned as a central place for information sharing, whether virtual or physical.

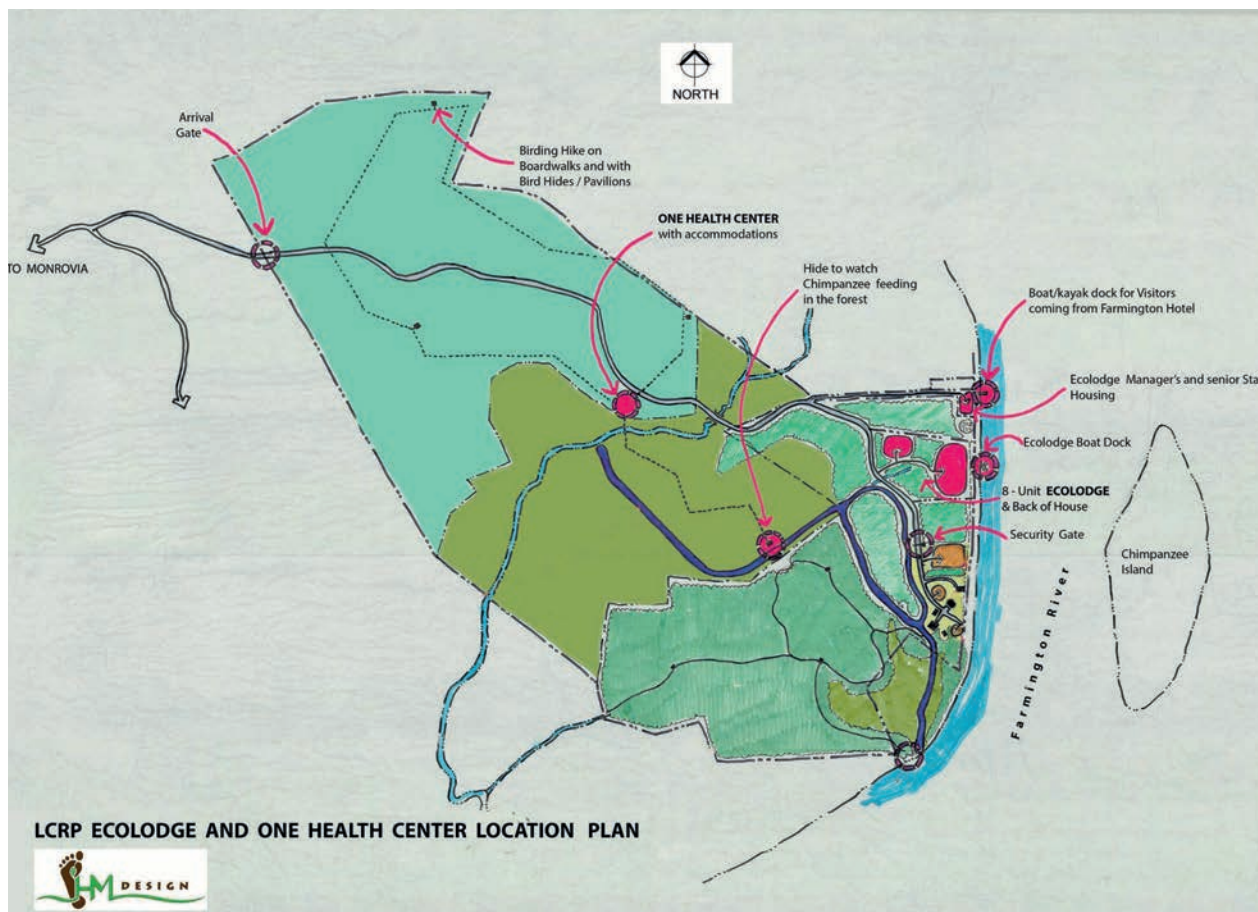


Figure 1: One Health Conservation Centre rendering for LCRP, Marshall Wetlands, Liberia. The design takes into account safe wildlife viewing and other features.
Credit: Hitesh Mehta, HM Designs.

Sharing of benefits can also include allocation of tourism revenue to the management of PCAs and for community stewardship to reduce threats to biodiversity. For example, allocating a portion of funds from sustainable tourism to compensate households against wildlife-linked losses – such as predation of livestock or crop destruction – can help to reduce human-wildlife conflict with communities in and around PCAs to preserve natural assets and ensure local communities are beneficiaries (World Bank 2021).

Clearly, the situations and best approaches may vary widely, but the intent of equitable knowledge and benefit sharing should be a goal in the design and delivery of sustainable tourism programmes.

¹² For more information, please visit:
<https://www.solimarinternational.com/project/liberia-conservation-works/>

Principle 6: Coordinate and collaborate across sectors to support prevention, detection, response, and recovery from disease threats

Tourists and tour operators are a source of information for disease early warning systems, but capturing their inputs requires having communication channels and plans in place to prompt appropriate action. A key example is citizen science monitoring, including reporting of sick or dead wildlife that could be indicative of a larger disease outbreak. The governance structure of PCAs will typically allow for tour operators to identify a designated contact in case of suspected disease in a visitor, employee, or animal.

Whole-of-society, multi-sectoral involvement is needed to support comprehensive disease risk assessment and management, including with the human health, animal health, and environmental sectors (as well as education, finance, and actors across the tourism industry) (Table 1). This **“One Health” coordination** and collaboration is also crucial to ensure detrimental consequences to biodiversity are proactively considered and minimized. Stakeholder mapping can help identify relevant actors that should be involved in participatory approaches, particularly with those who are likely to be impacted by a proposed intervention or may be key to its success.

Table 1. Illustrative examples of cross-cutting considerations for tourism with other sectors. These reinforce the need for a One Health approach in tourism and site use planning, implementation, and evaluation.

Sector/Topic	Key considerations (select examples)
Communication	Effective design and delivery of risk reduction messages
Education and employment	Training opportunities for guides; Occupational health and safety
Environment	Threats to biodiversity and ecosystems
Finance and economics	Multi-sectoral costs and benefits of options; Resilience measures for economic shocks
Food and agriculture	Food sourcing; Food scarcity
Geology	Flooding susceptibility and threat to critical infrastructure
Health (human and animal)	Pathogen exposures; Disease prevention and detection; Recreation and physical activity
Sanitation	Waste management
Social inclusion	Priorities of Indigenous Peoples and Local Communities, including site use, cultural values, and livelihoods
Water management	Water sourcing; Water scarcity

Source: Information compiled by the report authors

In line with a One Health approach, it should be an expectation that tourism authorities maintain ongoing coordination with environment and public health authorities (among others as relevant), to ensure access to the latest information and clear communication channels.¹³ This can also help ensure that other sectors are aware of – and can take action on – the ripple effects of reduced tourism revenue and human presence in and around PCAs, including those related to conservation, livelihoods, and environmental crime, as seen in the COVID-19 pandemic (European Commission, Directorate-General for International Partnerships, Spenceley, A. 2021).

Many countries are beginning to establish national One Health coordination platforms. These play an important – and previously lacking – role in convening multiple ministries to improve information sharing and collaboration on issues including zoonoses. In addition, they are helping to secure political will, with involvement and support of national leaders. While these platforms typically bring together authorities responsible for human health, animal health and agriculture, and the environment at a minimum, many other sectors are also participating, such as ministries of education and finance. It is imperative that the tourism sector, including representatives of its national authority (e.g. the ministry of tourism) and tour operators or associations, also actively participate. Doing so can create efficient pathways for **flow of information** in emergencies and as well as general guidance that may evolve based on new evidence and knowledge, among other opportunities where enhanced coordination may be beneficial (see Box 8). Relevant roles of the tourism sector should be built into national plans and strategies, such

¹³ As a global resource, the UN World Tourism Organization compiles trade and travel guidelines related to major public health emergencies. Targeted advice for the tourism sector and links to additional information sources are listed to access the latest information from public health, civil aviation, and other relevant authorities. These can be found at: <https://www.unwto.org/influenza-recommendations>

as National Action Plans for Health Security. It is likely that the more such coordination happens routinely, the more the needs of the tourism sector will be taken into account proactively.



National One Health coordination platforms are helping to bring stakeholders together to increase coordination in planning and implementation. The tourism sector can play an active role in these multi-sectoral coordination structures. Credit: Sandra G. Samuels

Lastly, formalizing a site's **protection status** gives it greater ability to apply governance mechanisms consistent with sustainable tourism, including to minimize trade-offs for health and conservation. PCA establishment signals stability and long-term commitment to preserving natural assets that may encourage sustainable tourism investment (World Bank 2021). Tourism operators can therefore reinforce the value of proposed PCA establishment by emphasizing the expected benefits to and from the sector.

Box 8. Examples of possible One Health coordination could include:

- Clarifying institutional mandates and chain of command, as well as identifying any key gaps
- Identifying recipients in the tourism industry for information alerts about cases of disease in humans and animals
- Designated channel for information sharing from the tourism sector (or related stakeholders, such as national park rangers), including reports of disease in visitors or wild animal disease and mortality
- Answering question about appropriate risk reduction measures (e.g. appropriate PPE)
Collaboration in developing/refining codes of conduct and on-site signage
- Development and refinement of laws, regulations, and policies that may affect disease risk, biodiversity, and tourism
- Proactive risk communication to provide time-sensitive, accurate, and consistent information, helping to reduce unnecessary fear and economic consequences
- Training for tour operators on risk reduction practices, for their own health and for visitors and local populations
- Simulation exercises to “practice” a system or protocol and inform any necessary refinements or additional training needs
- Contingency planning and investments to promote resilience, including for diversified revenue generation if tourism has to be temporarily halted or reduced due to disease risk or travel bans

Part III: Applying the One Health principles in a sustainable tourism context in protected and conserved areas

Tourism in PCAs can look quite different based on several factors, including the specific purpose, region, ecosystem, infrastructure, governance structure, regulatory oversight, and available resources. In this section, three tourism contexts are used to illustrate how the above principles can be applied, highlighting specific One Health considerations relevant to each context. These contexts may overlap in practice and are not exhaustive. They are intended as a starting point; it is anticipated that application of the One Health principles will identify other important health-related issues as well as solutions.

National or sub-national parks



Credit: Shutterstock

Depending on protected status designation, tourism activities are common in some types of PCAs, including national or sub-national parks or other protected areas under government oversight. These sites may be in rural or urban settings. The extent of park management presence may vary widely, along with infrastructure, capacity, and operating budgets for monitoring and enforcement. Private enterprises may be common (for example, in the running of hotels, restaurants, concession stands, trinket shops, or excursions – as discussed further below). Tourist visits may be entirely guided or completely independent, or a mix of the two.

For a given park or protected area landscape, a helpful starting point may be to conduct an interface assessment to identify the potential practices or locations where wildlife-human and vector-human exposures occur in a way that presents disease risk. Depending on diseases circulating in the region, similar assessments may need to be conducted for other types of exposures: domestic animal-human, domestic animal-wildlife, and human-human transmission. The significance of these interfaces may be dynamic; for example, an active outbreak of rabies virus in domestic dogs could pose a threat to wild canids and humans. Depending on the site and structure of tourism activities, interventions can then be developed to reduce risk (Box 9). For example, if tourists are permitted to camp across a large terrain, closing off access to some sections or stationing park staff at select “critical control points” where risk is highest may be pragmatic ways to intervene. A centrally located entrance may help to ensure all tourists receive standard information that can assist in risk reduction.

Box 9. Interventions to reduce disease risk

In the western United States cases of plague have occurred in visitors to national parks. Avoiding feeding or touching of living or dead wildlife, keeping a distance from burrows when camping and preparing food, and wearing insect repellent are all important measures to reduce risk (U.S. National Park Service, 2018). Tour operators can provide important information about such measures – based on materials often already freely available online - to the tourists they serve to promote awareness and uptake of risk reduction strategies.

For sites assessing a user fee, a portion could be allocated to health promotion and health protection, for example, to provide potable drinking water, toilets and waste management services, risk communication signage, and disease surveillance and wildlife mortality monitoring activities. Another important aspect requiring resourcing is occupational health and safety, such as providing education on risk reduction for tour operators and purchasing personal protective equipment for staff handling wild animals.

Rangers, researchers, and tourists alike may already contribute to biodiversity monitoring in PCA sites. In addition to this valuable information for conservation, observations may be important for wildlife health monitoring. Even for relatively well-staffed parks, ranger patrols may not always have existing capacity or resources for reporting of all wildlife mortality events. For this reason, tourists can potentially play a valuable role in citizen science for reporting of disease observations in wildlife. However, these should be limited to visual/photographic observations to ensure visitor safety, and should be reported to appropriate park authorities, who can notify veterinarians or other qualified staff to conduct a disease investigation if warranted. Because of the potential public health implications, PCAs serving visitors should have this reporting channel in line with a One Health approach as a minimum standard for their health and safety efforts (Box 10). Additional information on contributions from PCAs to disease risk reduction can be found in the accompanying *Guidelines for prevention, detection, response and recovery from disease risks in protected and conserved areas*.

Box 10. Access to information for health protection and reporting

The U.S. National Park Service website includes a list of some relevant disease risks (zoonotic disease, tick-borne disease, mosquito-borne disease, water-borne disease, harmful algal blooms, and foodborne-illness), with specific information on species identification, transmission pathways, symptoms, and prevention and control measures.¹⁴ Disease reporting links are provided, including contacts to reach public health authorities.

In general, the above considerations will also apply to the following two contexts.

Small-scale or community-led

Within or around PCAs, small-scale or community-led tourism operations may be common and may contribute importantly to income generation. These are often marketed as authentic experiences, sometimes involving homestays that put visitors and local populations into close contact. Thus, the potential for human-human disease transmission may be heightened. Limiting close contact can help reduce disease risk during active epidemics. Activities involving multiple people gathering in close spaces should occur in open-air settings.

In many ways, these tourism experiences can convey a sense of community stewardship, gaining inspiration from Indigenous Peoples and Local Communities (IPLCs) and their ways of living. In this way, they have many possible benefits, and may help to minimize pressures on PCAs in terms of utilizing existing infrastructure and land versus building new housing and infrastructure. However, some communities live in close proximity to wildlife, including through hunting, butchering, consumption, and other uses of wild animals. Without acquired immunity to circulating pathogens, tourists may be particularly susceptible to infection. For this reason, and for the health and welfare of animals, it is advised that tourists not directly handle or consume animals that present elevated risk for emerging infectious diseases, particularly species of bats, rodents, and non-human primates. Wildlife selfies are an example of such practices that can endanger both visitors and individual animals.

Some tourism experiences may be located in remote areas where access to modern healthcare services may be limited or days away by boat, poor road conditions, or infrequent flights or trains. This reinforces the importance of preventive measures to avoid injury or illness. For example, in the era of COVID-19, viral testing is advisable before travel to remote sites.

¹⁴ Please see: <https://www.nps.gov/subjects/healthandsafety/disease-prevention.htm>

One important context factor is that individual tour operators or communities may not always have a sense of the norms and laws that their visitors are used to. Social and cultural factors (e.g. concerns about being impolite) or economic determinants (e.g. reliance for income) may mean that workers are not empowered to promote healthy and sustainable tourism. This can present potential challenges for the enforcement of good practices, particularly if visitors demand practices that may be detrimental to the health of humans, animals, or the environment. In this case, it is important to set tourist expectations in advance, including through a code of conduct, and ideally reinforce it through broader system changes that reduce enforcement demands on individual operators (Box 11).

Box 11. Sustainable tourism offerings to reduce ecosystem degradation and ease enforcement demands on tour operators

In the case of **coral reef degradation** from tourist activities, possible solutions could include only offering glass bottom boat tours or only allowing access to reef sites at appropriate depth versus from the shore if corals are harmed in the process of getting in and out of the water. Requiring boaters to adopt certain practices – such as use of fixed (or “mooring”) buoys instead of anchoring on coral reefs – and reinforcing these with visual cues, laws, and potentially penalties from authorities - can also help to reduce degradation and take enforcement pressure off of individual operators. Issuing guidance (ideally using effective messaging and behavioural nudges) to people prior to dives can promote awareness, and ensuring divers and snorkelers are accompanied by a guide can help with enforcement of good practices. Requiring that visitors use “reef-safe” or “reef-friendly” sunscreens can also help limit harm to reefs. Programmes such as the GreenFin certification options also help to promote environmental stewardship by dive and snorkel guides as well as recreational divers.¹⁵

Large-scale private enterprises

Within national or sub-national parks, large private enterprises, such as game reserves, lodges, rescue centers, or zoos, may serve tourists via direct bookings or via independent tour guides that bring a group. These may operate under a public-private partnership mechanism (such as a fixed contract for services or a concession with a commercial entity, or a non-profit run rescue center), with the specific terms potentially affecting regulatory oversight. Practices affecting human, animal and environmental health should be examined under these arrangements to ensure appropriate safeguards are implemented. Behavioural nudges, such as setting standard practices as a condition of entry (for example, universal masking or use of foot baths for disinfection of footwear) may encourage compliance.

Privately-owned or managed wilderness areas are typically still connected to surrounding habitat that allows for ongoing movement of animals in and out of a specified boundary, which could potentially facilitate introduction of disease. Trade of animal stock can also be a source of disease introduction. For this reason, private owners can benefit from being aware of disease risk from season to season and stay alert to reported outbreaks in the surrounding area. This can guide risk reduction measures related to activities that may involve close contact with animals, such as hunting, food preparation, taxidermy, confiscations, and other handling practices such as wildlife selfies and feeding of animals in zoo/sanctuary settings. Protected area managers should be aware of the importance of this interface and incorporate relevant considerations into outreach materials, protocols, and participatory stakeholder mapping exercises and engagement of relevant actors.

¹⁵ For more on GreenFins, please see: <https://greenfins.net/green-fins-diver/>

Depending on the scale and type of tourism operations and the specific environmental conditions, natural resource use and emissions at sites may have adverse environmental effects, including on the availability of safe drinking water for local communities and the health of aquatic ecosystems and species (Box 12).

Box 12. Managing water resources to avoid scarcity exacerbated by tourism

Tourism is an important economic sector in the European continent. The potential adverse impacts of tourism activity on the environment have been summarized in three themes: pressure on natural resources; pollution; and physical impacts (Halleux, 2017). For example, a key area of concern for the over-use of natural resource is water consumption. Tourism-related water use often occurs in seasons and destinations that face water scarcity. Water consumption by tourists visiting the region has been estimated at approximately triple or quadruple what a permanent resident consumes. Certain tourism activities may place high demand on the water supply, such as irrigation of golf courses, spas and swimming centres, and snowmaking for skiing - which in some cases are located near or in protected and conserved areas. Additionally, tourism could increase the flow of contaminants into aquatic environments (for example, as part of increased agricultural activities supplying food to visitors), threatening freshwater and marine ecosystems and humans and animal dependent on the food and drinking water they provide. A One Health approach can ensure the right stakeholders are consulted: for example, hydrologists who can advise on surface water flows, conservation managers who can advise on wildlife migration and watering hole visitation, and human health experts who track waterborne illness. Like other interventions, nudges and incentives can play a role in reducing water consumption – such as programmes that encourage guests to reuse linens and towels in their lodging. The continuous monitoring of water quality and availability in relation to tourism can help guide carrying capacity determinations for sites and inform corrective action when needed.



Water resources should be considered in the design and monitoring of site usage and carrying capacity. Credit: C. Machalaba



Conclusion and key actions

These One Health principles for tourism reinforce the importance of sustainable and healthy tourism in PCAs, to generate the benefits sustainable tourism can bring while reducing health and economic trade-offs and protecting biodiversity. They are intentionally broad and intended as a starting point, allowing for adaptation to the specific situation and needs of tourism-related stakeholders. Clearly, all tourism operations in PCAs should be sustainable, in order to align with their conservation objectives. Applying a One Health approach in support of sustainable tourism operations in PCAs, which often already have site management plans and governance structures in place, can also serve as a catalyst and potentially support expansion beyond PCAs in the future.

This document has presented information specifically for consideration by tour operators and other stakeholders in the tourism sector. To facilitate effective implementation in PCA settings, accompanying, broader guidance has also been developed for PCA managers. The IUCN *Guidelines for prevention, detection, response and recovery from disease risks in protected and conserved areas* focus on specific aspects of disease risk management, structured by 10 topics that match functions typically recognized in national human and animal health and environmental management services (Disease risk assessment, Animal release, Site use planning and buffer zones, Monitoring and Surveillance, Disease reporting and investigation, Safe wildlife viewing, handling, and use, Biosafety and Biosecurity, Control measures, Risk communication, and One Health coordination). Tour operators are invited to view these accompanying larger Guidelines when they can be useful.

At a national and subnational level, tourism stakeholders and other sectors can help provide locally relevant guidance and ideas to support sustainable and healthy tourism in line with a One Health approach. Implementation strategies can be shared via the PANORAMA – Solutions for a Healthy Planet partnership initiative to promote knowledge exchange and upscaling of effective strategies. Sustainable tourism, zoonotic disease risk reduction, and One Health approaches are all individually a focus of the PANORAMA partnership and also intersect in several solutions that have been shared to date.¹⁶ While there is a need to improve on current practices, those working in the tourism industry should feel confident that they can do their part in contributing to the health of humans, animals, and ecosystems.

Overall, it is time to re-think the holistic approach of tourism. We cannot continue with ‘mass tourism’ or ‘overtourism’, especially in protected areas; the negative health impacts to humans, animals, and ecosystems must be proactively managed and curbed; and we must orient the industry towards a more human-scale, well-managed and sustainable tourism activity that sufficiently balances the risks and benefits.

¹⁶ <https://panorama.solutions>

Putting the One Health principles into action: examples of key approaches

Overarching approaches

- Pursue sustainable forms of tourism as the standard in PCAs
- Ensure investments promote diversified sources of income generation (including domestic tourism) to support resilience against tourism-impacting epidemics, and proactively develop contingency plans
- Develop and maintain emergency and routine communication channels between the tourism sector and human and animal health authorities (and/or wider One Health coordination platforms) to promote timely and efficient information flow and consistent messaging
- Assess risks and analyse trade-offs and co-benefits of possible disease prevention and control strategies to identify viable solutions tailored to the specific context
- Make available (and accessible) training and certification opportunities for tour operators
- Consult and work with local stakeholders, including communities, to find solutions that promote and protect health and environment while also serving livelihood needs
- Manage water resources, keeping in mind issues related to water scarcity, water quality, and water-borne diseases

Site-specific approaches

- Provide a visitor code of conduct to set expectations regarding safe and healthy practices and visitor stewardship for oneself and others as well as animals and the environment
- Develop occupational health and safety protocols and trainings and offer employees incentives to encourage uptake of practices that reduce disease risk
- Evaluate carrying capacity for visitors and adjust visitor number allowances at sites as needed
- Encourage international visitors to seek a pre-travel medical consultation, maintain up-to-date immunizations, and take prophylactic medicine where appropriate
- Identify key interfaces where disease risk is elevated to help prioritize risk assessment and identify possible risk reduction strategies
- Design or re-engineer visitor attractions/visitor flow to avoid direct contact or close proximity with wildlife and other sources of disease exposure
- Incentivize sustainable and healthy tour offerings by promoting operators with stewardship training and/or certifications (as relevant)
- Ensure proper waste management to avoid environmental contamination and degradation
- Use visual signage and other effective risk communication methods to reinforce good practices and overcome literacy or language barriers

Tourism industry and tourist-directed approaches

- Provide a visitor code of conduct to set expectations regarding safe and healthy practices and visitor stewardship for oneself and others as well as animals and the environment
- Provide training for tour operators and tour managers to support operational strategies
- Develop occupational health and safety protocols and trainings and offer employees incentives to encourage uptake of practices that reduce disease risk
- Encourage international visitors to seek a pre-travel medical consultation, maintain up-to-date immunizations, and take prophylactic medicine where appropriate
- If entering areas with high exposure to wild animals/wild animal bodily fluids, ensure use of adequate personal protective equipment and disinfection of clothing (including footwear) to avoid transmission to and from animals and onward environmental spread
- Design or re-engineer visitor attractions/visitor flow to avoid direct contact or close proximity with wildlife and other sources of disease exposure

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