EDITORIAL ESSAY:
PROTECTED AREAS AND ONE HEALTH

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ABSTRACT

Land-use change, globalisation and climate change are rapidly altering wildlife–livestock–human interfaces, increasing the rate of disease emergence and spread. To combat these risks, land managers and policymakers at all scales are increasingly aligning their activities with the One Health framework: "an integrated, unifying approach that aims to sustainably balance and optimise the health of people, animals, and ecosystems". One Health policy should explicitly incorporate protected and conserved areas (PCAs), because PCAs are widespread and important wildlife–livestock–human interfaces. PCAs vary in their priorities, resources, disease risks and other challenges, so there is an urgent need for research, funding and support that will allow PCA managers and planners to implement context-specific actions for minimising, mediating and monitoring infectious disease risks. This will require collaborations between health and environment ministries and PCA managers of all kinds. Therefore, IUCN WCPA has established a two-year Task Force on Protected Areas and One Health. Following careful evaluation, the Task Force will make recommendations regarding how WCPA and PCA managers can maintain or improve efforts to integrate One Health, and how One Health policy can better incorporate PCAs – both urgent needs for reducing the spread of pathogens among wildlife, domestic animals, and people.

Keywords: zoonotic, infectious disease

Whether pathogens spread more or less frequently in the coming decade will be largely determined by landscape and ecosystem management. Land-use change, globalisation and climate change are rapidly altering wildlife–livestock–human interfaces, increasing the rate of disease emergence and spread (Jones et al., 2008; Morand, 2022; Nova et al., 2022; Plowright et al., 2021). There is an urgent need to reduce or mediate these processes and thereby limit pathogen sharing among wildlife, domestic species and humans, which has negative impacts for all three groups (see examples in Table 1). Therefore, land managers and policymakers, from local to international scales, are increasingly aligning their activities with the One Health framework: "an integrated, unifying approach that aims to sustainably balance and optimise the health of people, animals, and ecosystems" (OHHLEP et al., 2022). Here, we overview how protected and conserved areas (PCAs) can be a nature-based solution for reducing pathogen spread, with emphasis on the relevance, challenges and untapped opportunities for integrating PCAs with One Health.

One Health policy is now widespread in international and national policy arenas. In 2022, the Quadripartite

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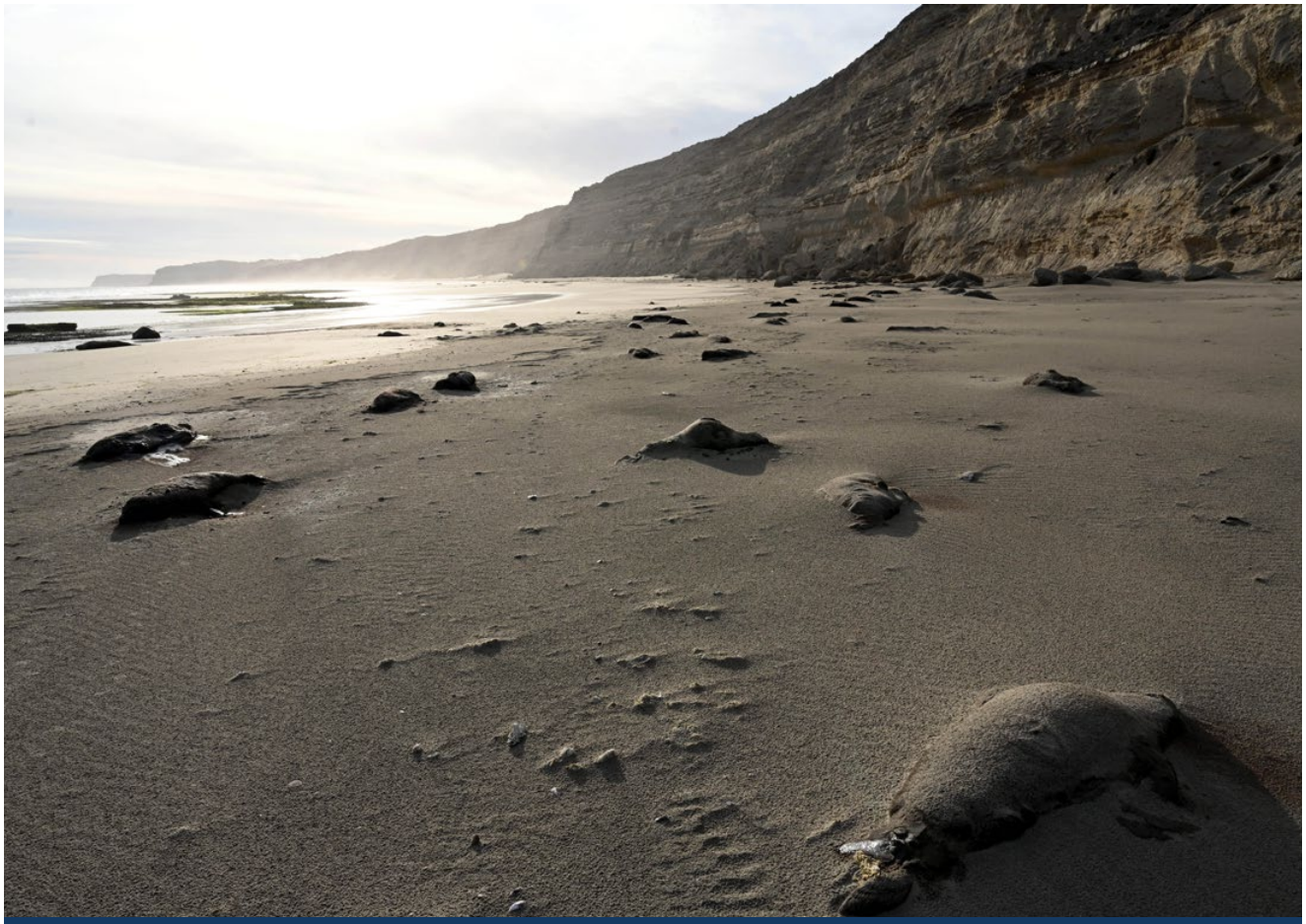
Table 1. Examples of infectious diseases shared between humans, domesticated animals and wildlife that have had major impacts on at least one of those groups.

Example	Representative References
Canine distemper virus can be deadly in canids and has spread from dogs to endangered African carnivores, causing population declines.	(Marino et al., 2017; Viana et al., 2015)
Depending on the region, rabies virus may be primarily spread from domesticated dogs to wildlife and people, or from wildlife to domesticated species and people. Rabies has caused population declines for endangered species, economic burdens associated with lost livestock, and major loss of human life annually.	(Benavides et al., 2017; Marino et al., 2017)
Viruses and other pathogens can be spread from humans to endangered great apes, causing ape mortality.	(Kaur et al., 2008; Kondgen et al., 2017)
Mange spread from domesticated livestock to Vicuñas caused a population collapse in Argentina, with downstream impacts on vegetation, Pumas and Condors.	(Monk et al., 2022)
Peste des Petits Ruminants Virus causes economic losses due to sick livestock and causes population declines in wild ungulates, such as Saiga.	(Fine et al., 2020)
Before it was eradicated, rinderpest caused devastating plagues in livestock and wild ungulates, transforming ecosystems through the impacts on ungulate grazers.	(Cáceres, 2011; Holdo et al., 2009)
Anthrax has caused major historical plagues for livestock and humans, and continues to cause mortality in wildlife, livestock and humans in several regions.	(Bengis & Frean, 2014)
Several pathogens that spilled over from wildlife into human populations became leading global causes of human morbidity and mortality, such as HIV/AIDs and *Mycobacterium tuberculosis* (tuberculosis).	(Bos et al., 2014; Hahn et al., 2000)

Secretariat for One Health – comprising the Food and Agriculture Organization of the United Nations (FAO), the World Health Organization (WHO), the World Organisation for Animal Health (WOAH) and the United Nations Environment Programme (UNEP) – signed the One Health Joint Plan of Action, which outlines plans to reduce the risk of zoonotic spillover and new emerging infectious diseases; control existing infectious diseases; improve food safety; and reduce the risk of antimicrobial resistance (FAO et al., 2022). The Joint Action Plan emphasises the critical importance of the environment to One Health, and the UN even declared that a healthy environment is a human right (Resolution A/76/L.75). Concordantly, more than 20 countries have implemented national One Health strategic plans (One Health Commission, 2024). These developments represent a paradigm shift in how governing bodies tasked to preserve human health and well-being consider ecosystem protection and management, which has created new pressures and opportunities for ecosystem managers to achieve health outcomes.

Conservation-oriented organisations have also launched international policy efforts that emphasise connections between ecosystem and human health. Examples include the Convention on Biological Diversity Global Action Plan on Biodiversity and Health (CBD, 2017) and the "healthy planet, healthy people" framework (Redford et al., 2022) for the Global Environment Facility (GEF), a multi-donor trust fund for generating global environmental benefits. The IUCN is also taking One Health action, following resolution WCC_2020_RES_135: "Promoting human, animal and environmental health, and preventing pandemics through the One Health approach and by addressing the drivers of biodiversity loss" (IUCN, 2020). Therefore, at the highest policy levels, there is clear messaging that human health and ecosystem health are linked, setting the stage for multi-sector collaborations to advance One Health at regional, national and local levels.

PCAs should be included in these One Health policy efforts due to their importance for ecosystem, animal and human health (IUCN & EcoHealth Alliance, 2022a; Terraube et al., 2017). For example, PCAs can support large wildlife populations with high genetic diversity, which are less likely to be decimated by infectious diseases than small or fragmented populations (de



Avian Influenza caused a massive die-off of Southern Elephant Seals along 300 km of the Patagonia coastline in Argentina in 2023

Castro & Bolker, 2005; Heard et al., 2013). In turn, healthy wildlife populations may be less likely to pass their infectious diseases on to people or livestock, a concept recently referred to as "landscape immunity" (Reaser et al., 2022). PCAs can also create barriers to between-species transmission simply by separating most wildlife from most livestock and people, whereas new encroachment into habitats with limited human or livestock presence may create high risks for spillover of novel pathogens from wildlife to livestock/humans or vice versa (i.e., "land use induced spillover") (Plowright et al., 2021). For these reasons and more, protecting and conserving ecosystems is a nature-based solution that can simultaneously promote the health of ecosystems, animals and people (Herrera et al., 2017; Hopkins et al., 2022; Vora et al., 2023).

However, we must also recognise and manage potential infectious disease risks associated with PCAs. For example, for some infectious diseases, protected and conserved areas may be the places where people are most likely to be exposed through direct or indirect interactions with wildlife. This could include exposure to rodent or bat excrement in remote cabins or on cave tours (IUCN & EcoHealth Alliance, 2022b; Núñez et al., 2014); exposure to disease vectors such as ticks and mosquitos (Eisen et al., 2013); or exposure to wild animals attracted to human food or water sources (Atuheire et al., 2024; Reaser et al., 2021). Similarly, in areas where humans or domestic species are present, wildlife may experience especially high disease risks (e.g., ecotourism and great apes) (IUCN & EcoHealth Alliance, 2022b; Mitani et al., 2024). Importantly, wildlife and habitat conservation per se do not pose threats to health, rather it is human activities in and near PCAs that can exacerbate or mediate infectious disease risks. Given these risks and the above-mentioned health benefits of PCAs, it is critical to overcome traditional silos between public health and conservation. One Health needs to be incorporated into PCA management and planning at all scales, and PCAs need to be incorporated into regional, national and international One Health policies.

For PCA managers, there is already some published guidance on evidence-based methods for reducing infectious disease risks, which we summarise as "Minimise, Mediate and Monitor" (Figure 1). Minimising interactions between humans, wildlife and domestic animals may be the most effective way to reduce

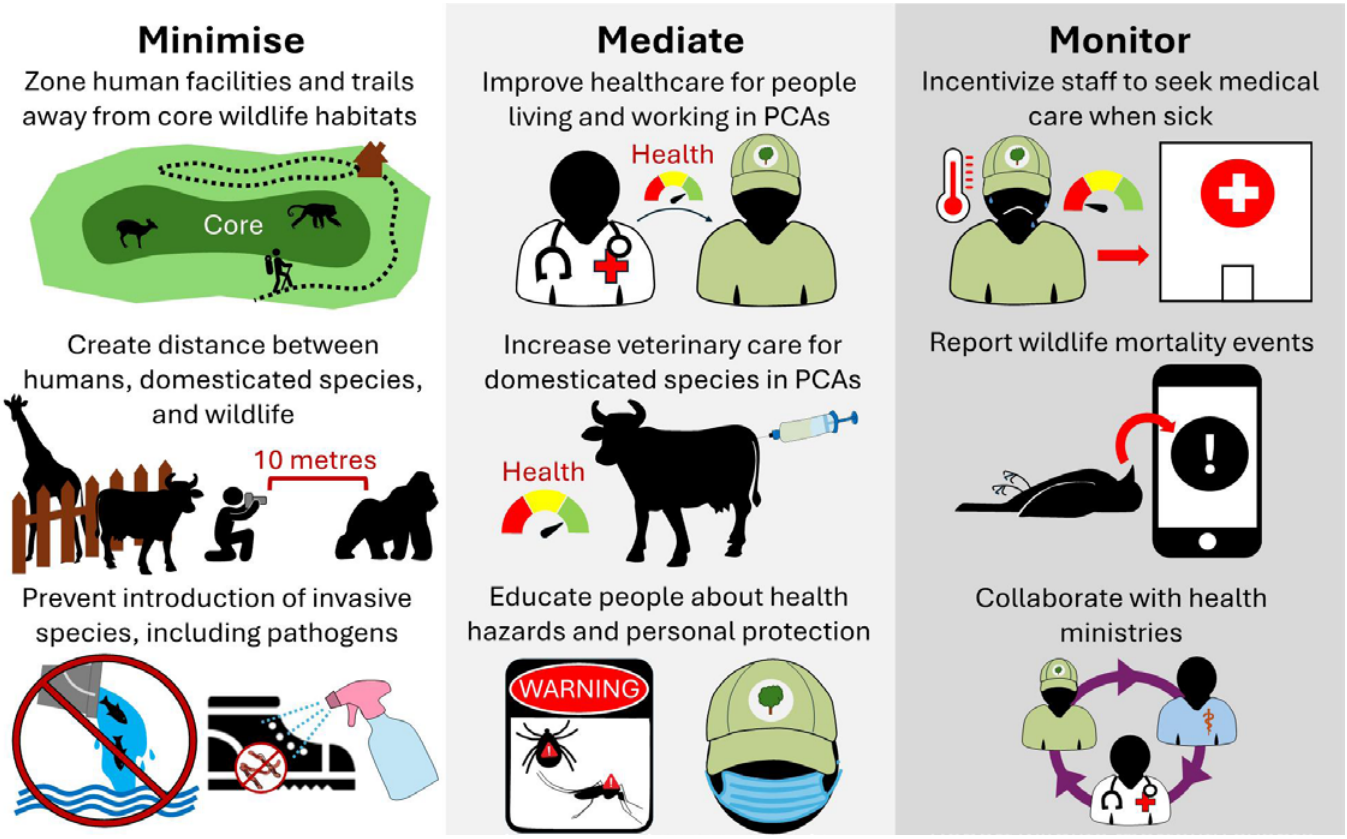


Figure 1. Examples of actions that PCA managers might take to minimise, mediate and monitor infectious disease risks.

pathogen sharing, including spillover of novel pathogens from one species to another (IUCN & EcoHealth Alliance, 2022a; IUCN & EcoHealth Alliance, 2022b; Plowright et al., 2021; Reaser et al., 2021). However, minimisation is not always feasible or socially acceptable, and in cases where human–livestock–wildlife interactions cannot be reduced or eliminated, management actions can mediate the outcomes of these interactions by making the interactions safer. Minimisation and mediation are critical because preventing epidemics is always cheaper and more effective than controlling epidemics after they begin (Bernstein et al., 2022; Dobson et al., 2020; OHHLEP et al., 2023). Yet even when prevention is prioritised, some rare spillover events may still occur, and some endemic diseases will still persist. Therefore, it is also critical to monitor the health of wildlife, domestic species and humans in and near PCAs to rapidly identify outbreaks and to design effective disease control programmes (King et al., 2024; Pruvot et al., 2023; Stolton et al., 2023; Worsley-Tonks et al., 2022). There are many actions that might be used to minimise, mediate or monitor infectious disease risks in PCAs, and we provide a few examples in Figure 1.

Importantly, we do not expect there to be a "one-size-fits-all" approach for minimising, mediating and monitoring infectious disease risks in PCAs. PCAs vary widely in their priorities, the pathogens that circulate locally, the external pressures that are present (e.g., livestock grazing, poaching), and other factors, and approaches should be tailored to each context-specific scenario. This highlights a clear need for PCA management guidance documents informed by PCA managers' diverse experiences, which should address the practical challenges associated with balancing One Health with other priorities and with limited resources (Appleton et al., 2022; Stolton et al., 2023). Additionally, while most guidance has focused on management actions for existing PCAs, efforts to minimise, mediate and monitor infectious disease risks should also be built into planning efforts for the many new PCAs being created to achieve ambitious global area-based conservation goals, such as Target 3 of the Kunming-Montreal Global Biodiversity Framework (i.e., 30% of land, freshwater and sea conserved by 2030). This includes an urgent priority to understand how creating PCAs by restoring previously degraded or destroyed habitats (GBF Target 2) may shift pathogen dynamics, because there is limited evidence and sometimes conflicting evidence regarding how various restoration actions will impact disease risks and other outcomes (Prist et al., 2023; Reaser et al., 2021; Terraube et al., 2017). These are not issues that PCA managers can tackle alone, highlighting the need for collaborations between health and environment

Visitors to a national park decontaminate their boots to prevent the spread of Rapid ʻŌhiʻa Death (ROD), an invasive fungal pathogen that kills a keystone tree species on Hawai'i Island © M. Watanabe; released to the public domain by the US National Park Service.

ministries and PCA managers to develop context-specific actions that maximise the One Health benefits of ecosystem conservation and restoration.

Future multi-sector collaborations may be informed by successful efforts where PCA managers, NGOs, ministries of health, and local and Indigenous communities have already been working together to improve the health of people, wildlife and ecosystems. For example, co-designing health, livelihood and/or economic support programmes with local and Indigenous communities has both improved the well-being of local peoples and reduced logging and/or poaching in nearby PCAs (Jones et al., 2020; Kalema-Zikusoka & Byonanebye, 2019; Novick et al., 2023). Importantly, these efforts have not prioritised reducing novel zoonotic spillover risks from wildlife to people; reducing spillover is unlikely to be a top priority for PCA managers or people living in rural poor areas and experiencing other stressors, such as food insecurity or high burdens of endemic diseases (e.g., malaria, diarrhoeal diseases) (Lehman et al., 2017). But establishing programmes that support staff and communities living in or near PCAs may have co-benefits, including reducing spillover risks and building public support for conservation (Hopkins et al., 2022; Vora et al., 2023). These examples are particularly important because responsibilities were not laid solely on already overburdened PCA managers, who have limited resources and limited power outside PCA boundaries. Instead, these examples illustrate how capacity building, coordination, collaboration and communication among government agencies, NGOs and communities can have sustained One Health impacts.

Given the importance and urgency of the One Health issues described above, IUCN WCPA has established a two-year Task Force on Protected Areas and One Health with support from the Gordon and Betty Moore Foundation. This Task Force will assess how PCAs are currently being incorporated into One Health policy and initiatives at all levels, and then make recommendations for how to maintain or improve the inclusion of PCAs in the One Health policy landscape. The Task Force will also assess how One Health is already being incorporated into PCA management, including the challenges, opportunities and successes associated with these efforts.

To accomplish these goals, we will be synthesising published and grey literature, as well as connecting with policymakers, practitioners and stakeholders who impact or are impacted by One Health and PCAs, all to better understand their experiences and needs. This includes not only PCA managers at all levels, but also local and Indigenous peoples, NGOs, health and environment ministries, and One Health academics. Following careful evaluation, the Task Force will make recommendations regarding how WCPA and PCA managers can maintain or improve efforts to integrate One Health, and how One Health policy can better incorporate PCAs – both urgent needs for reducing the spread of pathogens among wildlife, domestic animals and people.

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RESUMEN

Los cambios en el uso del suelo, la globalización y el cambio climático están alterando rápidamente las interfaces entre la fauna salvaje, el ganado y el ser humano, lo que aumenta la tasa de aparición y propagación de enfermedades. Para combatir estos riesgos, los gestores del territorio y los responsables políticos a todas las escalas están alineando cada vez más sus actividades con el marco "Una sola salud": "un enfoque integrado y unificador que pretende equilibrar y optimizar de forma sostenible la salud de las personas, los animales y los ecosistemas". La política de "Una sola salud" debe incorporar explícitamente las áreas protegidas y conservadas (APC), ya que estas zonas son importantes y están muy extendidas como interfaz entre la vida salvaje, el ganado y el ser humano. Las áreas protegidas y conservadas varían en cuanto a prioridades, recursos, riesgos de enfermedad y otros retos, por lo que existe una necesidad urgente de investigación, financiación y apoyo que permita a los gestores y planificadores de las áreas protegidas y conservadas aplicar medidas específicas para cada contexto con el fin de minimizar, mitigar y controlar los riesgos de enfermedades infecciosas. Para ello será necesaria la colaboración entre los ministerios de sanidad y medio ambiente y los gestores de PCA de todo tipo. Por ello, la CMAP de la UICN ha creado un Grupo de Trabajo de dos años sobre Áreas Protegidas y Una Salud. Tras una cuidadosa evaluación, el Grupo de Trabajo formulará recomendaciones sobre la forma en que la CMAP y los gestores de las ACP pueden mantener o mejorar los esfuerzos para integrar "Una sola salud", y sobre la forma en que la política de "Una sola salud" puede incorporar mejor a las ACP, ambas necesidades urgentes para reducir la propagación de patógenos entre la fauna silvestre, los animales domésticos y las personas.

RÉSUMÉ

La modification de l'utilisation des sols, la mondialisation et le changement climatique modifient rapidement les interfaces entre la faune sauvage, le bétail et l'homme, augmentant ainsi le taux d'émergence et de propagation des maladies. Pour lutter contre ces risques, les gestionnaires des terres et les décideurs politiques à toutes les échelles alignent de plus en plus leurs activités sur le cadre One Health : "une approche intégrée et unificatrice qui vise à équilibrer et à optimiser durablement la santé des personnes, des animaux et des écosystèmes". La politique "Une seule santé" devrait explicitement intégrer les zones protégées et conservées (ZPC), car ces zones sont des interfaces importantes et largement répandues entre la faune, le bétail et l'homme. Les priorités, les ressources, les risques de maladies et les autres défis varient d'une APC à l'autre. Il y a donc un besoin urgent de recherche, de financement et de soutien qui permettra aux gestionnaires et aux planificateurs d'APC de mettre en œuvre des actions spécifiques au contexte afin de minimiser, d'atténuer et de surveiller les risques de maladies infectieuses. Cela nécessitera des collaborations entre les ministères de la santé et de l'environnement et les gestionnaires d'APC de toutes sortes. C'est pourquoi la CMAP de l'UICN a mis en place un groupe de travail de deux ans sur les zones protégées et One Health. Après une évaluation minutieuse, le groupe de travail fera des recommandations sur la façon dont la CMAP et les gestionnaires d'APC peuvent maintenir ou améliorer les efforts d'intégration de One Health, et sur la façon dont la politique de One Health peut mieux intégrer les APC - deux besoins urgents pour réduire la propagation des agents pathogènes parmi les animaux sauvages, les animaux domestiques et les personnes.