

Ecology and conservation: contributions to One Health

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Summary

Although One Health is widely promoted as a more effective approach towards human, animal and ecosystem health, the momentum is still driven largely by health professionals, predominantly from the veterinary sector. While few can doubt the merits of interdisciplinary One Health approaches to tackle complex health problems, operating across the disciplines still presents many challenges. This paper focuses on the contributions of partners from ecology and conservation to One Health approaches, and identifies four broad areas which could act as a focus for practical engagement and bring ecological and conservation objectives more to the forefront of the One Health agenda: *i)* developing initiatives with shared conservation and health objectives, particularly in and around protected areas and including programmes addressing human reproductive health and mental health; *ii)* broadening concepts of health to extend beyond indicators of disease to include the assessment of ecological impacts; *iii)* the integration of ecological and epidemiological monitoring systems within protected areas to support conservation management and wildlife disease surveillance; *iv)* building partnerships to bring conservation, health, development and animal welfare agencies together to combat threats to global biodiversity and health from the international trade in wildlife and wildlife products.

Keywords

Conservation – Ecology – Epidemiology – Mental health – Nature – One Health – Protected area – Reproductive health – Wildlife – Wildlife trade.

Introduction

The emergence of new infectious human disease epidemics, particularly those with zoonotic origins, such as human immunodeficiency virus (HIV), severe acute respiratory syndrome (SARS), and highly pathogenic avian influenza, has generated a strong impetus for the concept of One Health. Several major initiatives and partnerships have been established to promote more holistic approaches towards preventing emerging diseases in humans and domestic animals. These include the tripartite agreement between the World Health Organization (WHO), the World Organisation for Animal Health (OIE) and the Food and Agriculture Organization of the United Nations (FAO). This agreement aims to improve the coordination of global

activities to address health risks at the animal–human–ecosystems interface and offers a vision of ‘a world capable of preventing, detecting, containing, eliminating, and responding to animal and public health risks attributable to zoonoses and animal diseases with an impact on food security through multi-sectoral cooperation and strong partnerships’ (1). This agreement represents a major step forward in facilitating involvement among human and animal health professionals and policy-makers within international organisations, and also reflects a recognition of the important links between sustainable agriculture and health. However, while the agreement advocates wider interdisciplinary engagement, the absence of specific reference to conservation objectives suggests that these priorities still remain rather peripheral in global One Health initiatives.

Most other One Health partnerships have similarly focused on developing links between medical and veterinary institutions. For example, in 2007, a collaboration between the American Veterinary Medical Association and the American Medical Association called for the formation of a One Health Commission to work towards the 'establishment of closer professional interactions, collaborations, and educational opportunities across the health sciences professions, together with their related disciplines, to improve the health of people, animals, and our environment' (2). The reference to environmental health indicates that there is room to extend notions of health by drawing on ecological principles.

Much of One Health's interest in wildlife has been in relation to its role as a reservoir or source of infectious diseases that threaten human and livestock health. The majority of novel human pathogens have their origins in wildlife (3), with disease emergence events associated with areas of high biodiversity and anthropogenic activity (4). Furthermore, most of the transboundary animal diseases that are a concern for public health and livestock economies are caused by pathogens that can also infect wild animal host species (5). Where wildlife populations act as reservoirs and sources of infection, conflicts can arise. Difficult trade-offs may need to be considered in the management of protected areas that include both livestock and wildlife, as illustrated by the complex issues surrounding the establishment of transfrontier conservation areas (6, 7).

The focus of attention on emerging disease threats and objectives centred on human health or livestock economies can result in wildlife populations being perceived primarily as the cause of a disease 'problem' that needs to be controlled or monitored, not for the wild animals' health but for the potential risk posed to humans and their food animals. Consequently, the involvement of conservationists with public health and veterinary sectors may be motivated by the need to minimise potentially harmful impacts on wildlife due to negative public perceptions or disease interventions. At worst, these defensive interactions can result in antagonistic viewpoints and a polarisation of attitudes, as seen with the culling of badgers as part of the control measures against bovine tuberculosis in the United Kingdom (8). The need to balance the concerns of human, animal and ecosystem health in the control of bovine tuberculosis exemplifies the type of dilemma that demands a One Health approach, which embraces socio-ecological and economic principles, including cross-sectoral stakeholder engagement.

It has long been recognised that human health and well-being are closely tied to biodiversity, which underpins the ecosystem services that are the foundations of life and health (9). These include the services that directly affect people, including provisioning services (e.g. food, water, fuel), cultural services (e.g. spiritual, aesthetic values) and

regulating services (e.g. buffering against disease outbreaks, climate and flood regulation), as well as the supporting functions that are needed to maintain ecosystem services (e.g. primary production, nutrient cycling). However, it is also clear that, despite these interdependencies, few human health initiatives include biodiversity conservation or ecosystem health in their strategies. This may be because ecosystem services are taken for granted and therefore not valued in terms of health investment. Furthermore, the causal links between environmental change and health are complex, influenced by a range of interacting factors, and can often be temporally and spatially disconnected, and therefore difficult to recognise and evaluate. Given these complexities, it is perhaps inevitable that policies and strategies that address proximate causes of disease and generate short-term health gains provide easier targets for investment than those resulting in more dispersed long-term health benefits and requiring a longer-term vision.

To broaden its focus to include conservationists and ecologists, One Health needs to build equitable partnerships to develop a shared vision for 'health' that not only addresses proximate causes of disease, but also recognises the benefits of ecological services and the intrinsic values of nature, wildlife and wilderness. While these principles have long been a component of One Health (10, 11) and conservation medicine (12), this paper identifies several key areas and recommendations (Box 1) that could act as practical foci for greater engagement between health professionals, social scientists, ecologists and conservationists, and for more integrated ecological thinking within the human and animal health sectors.

Integration of health and conservation programmes

One Health provides a useful platform for coordinating programmes that include both human health and biodiversity conservation as their core objectives, and the Manhattan Principles specifically recognise that human health programmes can contribute to conservation efforts (Principle 4) (11). The issues surrounding biodiversity conservation, sustainable resource management, poverty and health are highly complex (13, 14) and there is a growing realisation that trade-offs between development and conservation may be inevitable (15). However, One Health approaches provide an opportunity for achieving mutually beneficial health outcomes.

The most direct links between conservation and human health come from initiatives that address the transmission of diseases that threaten both humans and wildlife. In

Box 1**Practical steps towards greater engagement between conservation and health**

- Strengthen partnerships of donors and international organisations in health and conservation sectors to prioritise programmes in and around the key conservation areas that protect the high biodiversity that supplies vital and sustainable ecosystem services.
- Create coalitions of funding agencies that span the conservation, human health and livestock health sectors to support integrated programmes.
- Ensure that the environmental, conservation and human and animal health components of projects are integrated and strengthened rather than addressed independently. Where trade-offs have to be made, ensure that balanced decisions attain at least environmentally neutral outcomes.
- Encourage representation from the environment and conservation sectors in the development of policies and regulations related to human and livestock health, at both the national and international levels.
- Encourage partnerships between conservation, health and welfare organisations to reduce and regulate the scale of the international trade in wildlife and wildlife products, particularly the sourcing of wild animals for pets and aquaculture from wild populations.
- Develop and make accessible guidelines for integrating ecological and epidemiological monitoring in and around protected areas, from simple systems that involve shared recording and use of observational data through to systems that incorporate more complex monitoring of diseases and pathogens, and socio-economic indicators.
- Develop themed publications and sessions at medical and veterinary conferences that enhance awareness among health practitioners of the important links between health and conservation and the benefits of One Health engagement.

these situations, ‘win-win’ scenarios can be identified that benefit wildlife and human health simultaneously; for example, One Health initiatives that focus on the conservation of great apes in Gombe Stream National Park (Tanzania), the Virunga Volcano Region (including protected areas in Uganda, the Democratic Republic of the Congo and Rwanda), and the Bwindi Impenetrable Forest (Uganda) (10, 16, 17, 18). These initiatives have included health schemes for park employees, and improved health services and sanitation in local communities, which not only resulted in human health benefits but also reduced the risks of disease transmission to endangered great ape populations. Similarly, mass dog vaccination campaigns around the Serengeti National Park, Tanzania, and the Bale Mountains National Park, Ethiopia, which were initially a response to disease threats to endangered wild carnivores, have generated tangible benefits for human health (19, 20, 21). In addition, the research outputs of these programmes, established by conservationists and ecologists, have made a major contribution to raising awareness among international human and animal health organisations as to the feasibility of canine rabies elimination (22, 23), and rabies control is now considered an exemplar of the One Health approach (24).

While these examples relate to the control or mitigation of specific disease threats, there is substantial scope for broader collaboration between the health and conservation sectors. The establishment of public health programmes in areas with high biodiversity and wilderness have enormous potential for wide-ranging benefits for both human health and environmental sustainability. The need to build these collaborative approaches is acute. Protected areas remain the cornerstone for protecting biodiversity, ecosystem

services and human well-being, supporting the livelihoods of over one billion people (25). At the same time, these areas are home to some of the world’s most impoverished communities, who have little access to health care and experience some of the highest rates of population growth (26, 27). The current health and economic well-being of Africa’s poorest people are highly dependent on economic goods and services supplied by the wilderness areas (14). Biodiversity provides the poor with a form of cost-effective and accessible insurance against risk, particularly food security risks, risks from environmental hazards, and health risks (14). If wilderness and biodiversity continue to erode, then the future prospects for health and economic prosperity will disappear, particularly for the significant majority of people who live in rural areas. At the same time, human population growth places increasing pressure on the limited natural resources in these biodiversity ‘hotspots’ (26). A more holistic and integrated approach to rural development and conservation is the only viable long-term strategy for the survival of Africa’s last wilderness areas and the rural communities that are part of these systems. The maintenance of healthy natural ecosystems is at the centre of the three objectives of the United Nations’ Convention on Biological Diversity (CBD): the conservation of biological diversity; the sustainable use of its components, and the equitable sharing of benefits (28). Health, in its broadest context, therefore serves as a logical entry point for engagement between public health and conservation professionals (27, 29, 30). Integrating health programmes into the ‘Ecosystem Approach’ (31) promoted by the CBD would provide a holistic framework to achieve objectives related to human livelihoods and well-being while promoting environmental stewardship and healthy ecosystems.

Human population growth, health and gender issues are complex but intimately connected, and it has long been recognised that population and development policies need to enhance the status and rights of women (32), as reflected in at least four of the Millennium Development Goals (MDG 2: Achieve universal primary education; MDG 3: Promote gender equality and empower women; MDG 4: Reduce child mortality; MDG 5: Improve maternal health) (33). Reproductive health programmes provide a broad framework to achieve improved human health outcomes, a decline in rates of human population growth, and the empowerment of women (34). As women in many developing countries have primary responsibility for managing water, wood and grazing areas, a greater involvement of women in decision-making is likely to be a crucial component of environmentally sustainable development that will further contribute to the Millennium Development Goals (MDG 7: Ensure environmental sustainability).

The establishment of linked population–health–environment programmes in biodiverse ecosystems thus has potential for many synergies. For example, an integrated project in the Mahale ecosystem, Tanzania, involving agencies concerned with population health (Pathfinder International) and ecosystem conservation (the Nature Conservancy and Frankfurt Zoological Society), has been established with health objectives (e.g. improvements in maternal-child health leading to improved reproductive health and reduced population growth) that complement its conservation objectives to support sustainable natural resource management (35). Within this programme, empowering women by giving them access to reproductive health services is complemented by the establishment of community conservation banks, which are often managed by women and enhance their role as resource managers. In combination, these health and conservation initiatives have great potential to reduce pressures on environments and to enhance sustainability.

Bringing health and conservation partners together within this type of One Health programme optimises the use of scarce resources, and could achieve cost-effective benefits for both conservation and human well-being. As well as extending the potential for ‘added value’ that is needed to achieve One Health outcomes (36), such initiatives would also be consistent with the ecosystem management approach of the International Union for Conservation of Nature, and the Biosphere Reserves of the United Nations Educational, Scientific and Cultural Organization (UNESCO), in which core protected areas are surrounded by multiple-use, but sustainably managed, buffer zones. Only when human health, particularly reproductive health, and environmental sustainability are placed together at the core of development and conservation initiatives will we be able to ensure that human development gains are not made at the expense of the planet’s unique and irreplaceable biodiversity.

Mental health and the natural environment

An important opportunity for greater engagement between human health and conservation professionals is in the area of mental health and the environment. Mental health disorders currently comprise 7.4% of the global burden of disease (37), with estimates that this is likely to rise to 15% by 2020 (38). Mental and substance use disorders are also the leading global cause of the non-fatal burden of disease, with depressive disorders accounting for most of the disease burden, followed by anxiety disorders (37).

The growing lack of connection with nature and the wilderness can be a major factor contributing to mental health problems. A growing body of empirical, theoretical and anecdotal evidence suggests that human contact with nature has great potential as an effective and affordable health intervention to address depressive and anxiety disorders (39). The ‘biophilia’ hypothesis proposes that, as a result of our genetic make-up and evolutionary history, humans have a universal, instinctive bond with the natural world and need to feel connected to natural environments (40, 41). Two major theories have been proposed to explain the restorative power of nature, both drawing from evolutionary perspectives. The attention-restorative theory (42, 43) suggests that interactions with natural environments use involuntary patterns of concentration, which allow replenishment of the neural mechanisms required for tasks involving focus, concentration and memory (directed attention). This replenishment can improve the performance of other tasks and, at the same time, reduce levels of depression and stress. The second, the stress recovery theory, proposes that interactions with natural places, particularly those that, in our evolutionary past, may have been seen as safe havens (such as those with visible horizons, water and vegetation), result in unconscious physiological and psychological responses that reduce stress (44).

While there is strong empirical evidence that interactions with nature can improve cognitive function and well-being (43), the reverse is also true, with evidence that declines in mental health can be triggered by damage or destruction to natural environments (45). Negative emotions of grief and distress can be particularly acute when degradation occurs in those places to which people have formed attachments and in which there is a sense of well-being (46, 47, 48). In addition, eco-psycho-social issues are emerging within the context of widespread ecosystem change, with climate change being identified as a determinant for increasing mental illness, and increased incidences of post-traumatic stress disorder diagnosed in people who have been affected by extreme natural disasters (such as flooding) (49).

These relationships clearly indicate an important opportunity for simultaneously achieving ecological and health gains, and highlight a key role for conservationists within One Health, but their application will require shifts in perception and practice. Human and animal health sectors have yet to fully recognise the valuable resource that nature provides, as well as the negative psychological impacts of ecological degradation. Conversely, conservation science, with its emphasis on biodiversity measures and economically important ecosystem services, has yet to fully recognise the value of nature for mental health and well-being, sometimes termed 'psychological ecosystem services' (50), and to exploit public health arguments to support investments in nature and the wilderness.

Broadening concepts of health

One step towards the greater engagement of wildlife ecologists with One Health would be the development of more integrated notions of health that include the broader concepts of the health and well-being of animals and ecosystems. While the WHO definition of health for humans has been reformulated as 'a complete state of physical, mental and social well-being, and not merely the absence of disease or infirmity' (51), and notions of health have been extended to incorporate ecosystem health (11, 52) and associations with nature (53), health outcomes are still often defined on the basis of the presence or prevalence of specific diseases.

The One Health framework provides a useful context for more integrated thinking about the links between ecology and animal health, including concepts of wildlife health that are linked to issues of resilience and the sustainability of populations. However, these concepts are still not well aligned with the regulatory frameworks that shape much of the activity of health and veterinary authorities, in which health is still often defined in terms of the absence of pathogens and diseases.

In a review of the inquiry into the decline of sockeye salmon (*Oncorhynchus nerka*) in the Fraser River, Canada, Stephen (54) argued that, rather than a health impact assessment, an ecological impacts assessment would provide a better framework for examining disease risks. In comparison to conventional disease risk assessments, which focus on demonstrating freedom from a specific infection or disease, ecological risk assessments are concerned with broader ecological health outcomes that include population survival, biodiversity and ecosystem health (55). Similarly, many of the conflicts that arise between veterinary and wildlife interests in relation to bovine tuberculosis have been driven by the imperative for disease eradication and the economic

implications for livestock trade, whereas a shift in focus away from eradication (which is likely to be epidemiologically unfeasible in many settings) would result in greater consideration being given to strategies that minimise human and livestock health risks, while optimising ecosystem health outcomes.

The area where these issues intersect most acutely is that of transboundary animal diseases in areas of high biodiversity. For example, the economic imperative to maintain freedom from foot and mouth disease (FMD) in parts of southern Africa has resulted in the construction of veterinary game fences to prevent the spread of Southern African Territories (SAT) strains of the FMD virus (maintained by buffalo) to livestock. The purpose is to allow access to beef export markets that are assumed to be lucrative. However, these fences have had detrimental consequences for wildlife and local human populations across broad swathes of southern Africa, causing the obstruction of migration routes, disruption of ecosystem dynamics and large-scale declines in wildlife populations (56, 57). Furthermore, there is increasing recognition of the economic importance of wildlife, which now contributes more to the economies of many southern African countries than agriculture and fisheries, and the economic potential represented by developing local markets rather than the international livestock trade. Furthermore, there is a growing political and conservation momentum towards the removal of game fences to create transboundary conservation areas (58, 59). As a result, consideration is now being given to other approaches to controlling FMD. These include options for wildlife–livestock co-existence (e.g. through livestock vaccination strategies) and managing FMD risks in livestock products rather than in the living animals (60, 61), which have the potential to improve socio-economic conditions, create opportunities for local, national and regional trade, and safeguard the integrity of wild populations and ecosystem dynamics (62).

The example of FMD and game fences highlights the need for engagement between the conservation and livestock sectors. However, this engagement must be reciprocal. Recognition of the ecological consequences of disease control measures by the livestock sector needs to be reciprocated by acknowledgement among conservationists that livestock health programmes can also play an important role in maintaining the integrity of protected area systems. For example, poor livestock productivity threatens the livelihoods and food security of livestock-keeping communities next to the Serengeti and Tarangire protected area systems in northern Tanzania, and this has been a major driver behind the recent expansion of crop cultivation into crucial buffer zones and wildlife corridors (63). Constraints to livestock production also fuel the demand for wild animal meat to meet the dietary protein needs of poor communities in the western Serengeti (64, 65). Although there has been

much debate about competition between pastoral livestock and wildlife, and the appropriate context in which to investigate the effects on people's livelihoods and protected areas (66, 67), several studies point to potential synergies between livestock and wildlife, particularly at moderate levels of grazing intensity (68, 69). Furthermore, to identify the best solutions, we need to consider the consequences of alternative forms of land use that might be more harmful to biodiversity conservation than traditional livestock systems. For example, displacing traditional pastoralism with large-scale cultivation has led to significant declines in wild ungulate populations in areas beside the Masai Mara National Reserve in Kenya (70, 71) and the disruption of migratory corridors around the Tarangire National Park in Tanzania (72, 73).

These examples highlight the fact that One Health must be considered in its broadest sense, and that we need to understand social processes and values alongside scientific knowledge to develop effective and integrated human, animal and ecological health interventions. Achieving the 'triple wins' that are promised by sustainable development, i.e. the social, economic and environmental benefits, is undoubtedly challenging, and is likely to be accomplished only through a more integrative ecosystems approach that addresses the health of humans, animals and the environment within linked social and ecological systems (74, 75).

Integrating ecological and health monitoring

Ecological monitoring remains a core activity of conservation management and a vital component of integrated conservation and development projects (76). Disease monitoring and surveillance similarly remains a key activity of human and veterinary health services, and many commonalities exist between ecological and epidemiological monitoring. Indeed, some definitions of veterinary disease monitoring explicitly mention environmental factors (e.g. 'Monitoring is the making of routine observations on health, productivity and environmental factors and the recording and transmission of these observations') (77). Similarly, while ecological monitoring has traditionally focused on key ecological attributes and principal ecosystem components, socio-economic factors are increasingly being incorporated into ecosystem monitoring systems.

In the Serengeti National Park, ranger-based monitoring routinely includes the collection of data on the location, species and age of carcasses observed, primarily with the aim of monitoring poaching activities (78). However, these observations also have great value for descriptive

epidemiological analyses, generating data on the type of individuals affected, and the time and location of events – the starting point for understanding patterns of disease and mortality, and providing early warning of unusual mortality events. A greater integration between ecological policy, veterinary departments and park services, as well as exchanges between wildlife authorities and public health authorities, could result in substantial added value in terms of information exchange, shared resources and cost savings, and the establishment of effective cross-sectoral relationships. Establishing these mutually beneficial relationships through simple routes of engagement, and at relatively modest costs, could lay the foundation for developing more sophisticated and detailed data collection systems, including the establishment of sampling methodologies and ranger training to build systems for pathogen detection, diagnosis and monitoring. The integration of ecological and epidemiological monitoring within adaptive management processes would also aid the implementation of timely responses that are likely to be crucial for both effective conservation (79) and the mitigation of disease threats (80).

Wild animal meat and wildlife trade

The fifth Manhattan Principle calls for a reduction in the human demand for wildlife and wild animal products and argues that this can provide conservation benefits and reduce public health risks (Principle 5) (11). The links between wildlife and novel and emerging human infections have been well documented (5, 81), with many well-known examples: the emergence of HIV/AIDS from wild primates, associated with butchering and consumption (82, 83); the emergence of SARS in wildlife market and restaurant workers in southern China (84); and outbreaks of Ebola haemorrhagic fever linked to the hunting and handling of great apes and other animals (85). These insights are driving global efforts to work on policy at the human-wildlife interface to directly tackle significant sources of pandemic disease threats and biodiversity loss caused by the wildlife trade (86). However, the demand for wild animal meat is a highly complex issue, not only linked to the immediate needs of some of the poorest communities, who derive many benefits from wildlife consumption and have few alternative livelihood options (87), but also driven by the cultural preferences of increasingly affluent urban populations, including high levels of demand among populations in North America and Europe (88). The complexity of issues around the drivers and consequences of the wild animal meat trade emphasises the importance of engagement between ecologists and conservationists in One Health, with intersectoral and interdisciplinary

approaches clearly required to address cross-cutting themes of livelihoods, ecology, human health and policies (89).

More generally, the global trade in wildlife and wildlife products poses one of the world's greatest conservation challenges and raises widespread concerns about the emergence and spread of zoonotic infections (90, 91, 92). The scale of the global wildlife trade is massive, estimated at \$21 billion annually (11) and involving hundreds of millions of individual animals every year (93, 94), driven by high levels of demand from both high and middle-income countries. The scale of and risks associated with the wildlife trade require concerted efforts by conservationists and health professionals, with important contributions also needed from animal welfare and development agencies. The partnership between the Centers for Disease Control and Prevention, the Wildlife Conservation Society and the EcoHealth Alliance (95) serves as an exemplar of this kind of inter-agency cooperation. However, there is still an urgent need for the shared concerns of conservationists, health professionals and animal welfare organisations to be harnessed more effectively to reduce the demand for wildlife and wildlife products and to ensure sustainable sourcing of products. For example, much greater consideration needs to be given to prohibiting the international trade in exotic pets, particularly those that are sourced from wild populations, to avoid the depletion of wild populations and unnecessary risks of disease emergence and spread.

Conclusion

As we build upon the Millennium Development Goals towards the establishment of new Sustainable Development Goals, there is a clear need to acknowledge the benefits of

biodiversity protection for global health, including that of the most vulnerable populations of the world (96). At the same time, ecologists need to recognise the conservation benefits that can be attained from improving human and livestock health. One Health can provide a framework for integrating expertise from all these different perspectives; however, greater involvement across the sectors will be essential to translate these aspirations into concrete actions that can help to meet the challenges and needs of future generations. The obligations and opportunities are too important to be ignored.

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Les contributions de l'écologie et de la protection de la nature aux objectifs « Une seule santé »

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Résumé

Bien que le concept « Une seule santé » soit largement mis en avant en tant qu'approche plus efficace de la santé humaine, animale et environnementale, les principaux initiateurs de cette évolution restent les professionnels de la santé et en premier lieu ceux du secteur vétérinaire. Alors même que la capacité des approches interdisciplinaires « Une seule santé » à venir à bout de problèmes sanitaires complexes n'est guère contestée, les possibilités d'agir concrètement en franchissant les frontières de chaque discipline se heurtent encore à de grandes difficultés. Les auteurs examinent ce que les partenaires intervenant dans les domaines de l'écologie et de la protection de la nature peuvent apporter aux approches « Une seule santé » ; ils présentent quatre grands axes thématiques susceptibles de renforcer cet engagement opérationnel et de mettre

les objectifs de l'écologie et de la protection de la nature au cœur des priorités « Une seule santé » : *i)* la mise en place d'initiatives avec des objectifs communs de conservation et de santé, en particulier à l'intérieur et à proximité des zones protégées, et intégrant des programmes axés sur la santé génésique et mentale des populations humaines ; *ii)* l'élargissement du concept de santé au-delà des seuls indicateurs de maladie, afin d'inclure l'évaluation de l'impact écologique ; *iii)* l'intégration de systèmes de suivi écologique et épidémiologique dans les zones protégées en appui de la gestion de la protection de la faune sauvage et de la surveillance des maladies affectant ces animaux ; *iv)* la mise en place de partenariats entre les agences chargées de la protection de la nature, de la santé, du développement et du bien-être animal pour une lutte concertée contre les dangers liés aux échanges internationaux d'animaux sauvages et de produits issus de ces animaux qui menacent la biodiversité de la planète et la santé.

Mots-clés

Échanges internationaux d'animaux sauvages – Écologie – Épidémiologie – Faune sauvage – Nature – Protection de la nature – Santé génésique – Santé mentale – Une seule santé – Zone protégée.



Aportaciones a «Una sola salud» de la ecología y la protección de la naturaleza

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Resumen

Aunque el concepto de «Una sola salud» va ganando predicamento en muchos ámbitos como un modo más eficaz de trabajar sobre la salud humana, animal y ecosistémica, sus principales impulsores siguen siendo en gran medida los profesionales de la salud, principalmente los del sector veterinario. Pocos dudan del interés que ofrecen las soluciones interdisciplinarias de «Una sola salud» para abordar problemas sanitarios complejos, pero el trabajo transversal entre disciplinas sigue presentando muchas dificultades. Centrándose en las aportaciones de la ecología y la protección de la naturaleza a los planteamientos de «Una sola salud», los autores señalan cuatro grandes ámbitos de trabajo que podrían aglutinar un compromiso práctico y a la vez dar más preeminencia a los objetivos de la ecología y la protección de la naturaleza dentro de los programas de «Una sola salud»: *i)* concebir iniciativas con objetivos comunes de salud y protección de la naturaleza, especialmente en el interior y los alrededores de áreas protegidas y con programas que aborden cuestiones de salud reproductiva y salud mental; *ii)* ampliar los conceptos relativos a la salud para trascender los meros indicadores de enfermedad y dar cabida a la evaluación del impacto ecológico; *iii)* introducir en las áreas protegidas sistemas de seguimiento ecológico y epidemiológico para apoyar la ordenación de los espacios naturales y la vigilancia de las enfermedades de la fauna salvaje; y *iv)* forjar alianzas para lograr que los organismos que se dedican a temas de protección de la naturaleza, salud, desarrollo y bienestar animal trabajen conjuntamente para combatir las amenazas para la biodiversidad mundial que trae consigo el comercio internacional de animales salvajes y sus derivados.

Palabras clave

Área protegida – Comercio de animales salvajes – Ecología – Epidemiología – Fauna salvaje – Naturaleza – Protección de la naturaleza – Salud mental – Salud reproductiva – Una sola salud.



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