



# Linking humans, their animals, and the environment again : a decolonized and more-than-human approach to “One Health”

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## **Title**

Linking humans, their animals, and the environment *again*:  
A decolonized and more-than-human approach to 'One Health'

## **Abstract**

This article considers a broad perspective of 'OneHealth' that includes local and animal knowledge. Drawing from various colonial efforts to link human, animal, and environmental health, it first shows that the current 'OneHealth' initiative takes its roots during the colonial engagement and coinciding with a need to secure the health of administrators (controlling that of local populations) while pursuing exploitation of resources. In our contemporary period of repeated epidemic outbreaks, it then discusses the necessity for greater inclusion of social scientists works for a better understanding of complex socio-ecological systems. The paper shows how taking anthropology and allied sub-disciplines (anthropology of Nature, medical anthropology and human-animal studies), highlights local knowledge on biodiversity as well as the way social scientists investigate it in relations with other forms of knowledge. Acknowledging recent approaches developed, notably multispecies ethnography, it then purposes to include not only local knowledge but also non-human knowledge for a better prevention of epidemic outbreaks. Finally, the conclusion stresses the need to put on a same symmetrical line scientific and profane knowledge as a way to decolonize One Health, as well as to engage in a more-than-human approach including non-human animals as object-subject of research.

**Keywords:** One Health, (multispecies) ethnography, knowledge, decolonization , global health

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22   **Résumé:** Cet article envisage une perspective élargie de 'One Health' qui inclut les  
23   connaissances locales et celles des animaux. S'inspirant de divers efforts coloniaux pour relier  
24   la santé humaine, animale et environnementale, il montre d'abord que l'initiative "One Health"  
25   prend ses racines durant la période coloniale et coïncide avec la nécessité de garantir la santé  
26   des administrateurs (contrôlant celle des populations locales) tout en poursuivant l'exploitation  
27   des ressources. Dans notre période contemporaine d'épidémies à répétition, il aborde ensuite la  
28   nécessité d'une plus grande inclusion des travaux des chercheurs en sciences sociales pour une  
29   meilleure compréhension des systèmes socio-écologiques complexes. L'article montre  
30   comment la mobilisation de l'anthropologie et des sous-disciplines connexes (anthropologie de  
31   la nature, anthropologie médicale et études homme-animal), met en évidence les connaissances  
32   locales sur la biodiversité ainsi que la façon dont les chercheurs en sciences sociales l'étudient  
33   en relation avec d'autres formes de connaissances. Prenant en compte les approches récentes  
34   développées dans le domaine, notamment l'ethnographie multi-espèces, il vise alors à inclure

non seulement les connaissances profanes mais aussi les connaissances non-humaines pour une meilleure prévention des épidémies. La conclusion souligne la nécessité de mettre sur une même ligne symétrique les connaissances scientifiques et profanes comme moyen de décoloniser One Health, ainsi que de s'engager dans une approche désanthropocentrée en incluant les animaux non humains comme objet-sujet de recherche.

## **b. Introduction: The colonial root of “One Health”**

The “One Health” initiative, a tripartite collaboration launched in 2008 between the World Health Organization (WHO), the World Organisation for Animal Health (OIE), and the Food and Agriculture Organization of the United Nations (FAO), advocates a rapprochement between human and veterinary medicine for a better understanding of infectious diseases that spread across species and how they interact in the environment. While tracing the history of such convergence, scholars often acknowledge American veterinary epidemiologist Calvin W. Schwabe [42] for his proposal of ‘One Medecine’ [58]. Actually, what is currently referring to the One Health initiative traces its root longer back, during the colonial era. This period is rich in attempts to link human, animal and environmental health. And one has to recall that it is also a period marked by a strong distinction between the colonial science administrators and the local populations they controlled.

In this paper we first intend to dig further into this colonial origin and show how the current holistic approach as initially promoted resonates in our contemporary period. Let us precise that we are not veterinarian nor medical doctor by ourselves, but an anthropologist interested in human-animal relations and a health ecologist sharing a common interest in studying the links between health, societies, and biodiversity. Drawing on recent development in Social Sciences methodologies, we then aim at initiate a preliminary reflexion on how the entanglement of all living beings in a socio-ecological system could be better taken in consideration for future research in this area.

Back in 1959, a striking quote from Thomas Logan, a doctor of the Californian “New Frontier”, highlights the fact that complex links between the environment and health were early recognized in public health: *“A knowledge of the etiology of diseases can best be attained by studying the affections of different localities in connection with every condition and circumstance calculated to operate prejudicially or otherwise upon the health of the*

inhabitants. Such philosophical investigation is particularly useful in tracing the modifications diseases may undergo from the agency of causes of a local or special character; and being also calculated to elucidate the relationship of diseases to climate, to the prevailing geological formations— the fauna, the vegetables, the minerals, the waters, which vary with the earth's crust,..." (Thomas Logan, Transactions of the American Medical Association, 1859, quoted in Nash [35]). At that time, Thomas Logan and its colleagues were confronted with diseases affecting their fellow European citizens who were colonizing the "New Frontier" habitats -that is to say without including native Amerindian populations. To tackle with diseases Logan proposed an environmental and geographical approach to human health. He was certainly aware and inspired by the writings of Alexander Von Humboldt, the founder of the modern biogeography with his *"Essay on the Geography of Plants"* [55].

As remind by Tilley [50] the era of "interventionist" colonialism encompassed agriculture, public health, natural resource use, disease control, labor recruitment and conservation measures culminated in the first half of the twentieth century.

As for forest exploitation, colonial administrations introduced scientifically based policies for the management of their Empires. As remind by the Indian historian Ravi Rajan the settings of forest departments, and other agencies, *"resulted in the creation of a homogeneous and assertive pancolonial community of foresters"* [38]. Indeed, as demonstrated by the environmental historian Richard Grove, the colonial forestry has to be seen as the root and origins of environmentalism [15]. At that time, all European foresters shared a common representation that new forestry should preserve forests from the mis-management by local populations, who were blamed for forest degradation, a discourse that has continued until recently, taking the form of neocolonialism conservation. For example, French foresters saw themselves as "engineers" concerned with the impacts of deforestation on watersheds by putting forward the connection between "forest cover, healthy watersheds, and agricultural productivity" [38], an interesting link echoing the more recent "healthy landscapes" [1].

Looking at the socio-economic development of colonies, Julian Huxley is probably one of the most preeminent British activists of the new colonial science [50]. In the 1920's, He made a tour sponsored by the Britain's Committee on Native Education in Tropical Africa. The committee asked him how biological science and knowledge of the natural world might be integrated into general educational efforts. Huxley replied the Committee by suggesting that African studies center should adopt an ecological framework: *"At the present moment, it is clear*

103 *that many if not most problems of applied biology can only be satisfactorily solved by reference*  
104 *to a background of ecological ideas, by whose aid the interrelations of different branches of*  
105 *biological science can be studied”* (quoted by Tilley [50]). Huxley also claimed that “*it is often*  
106 *possible for the ecologist to point out to this or that specialist new lines of approach to his*  
107 *particular problem—disease of man or of domestic animals may prove to be correlated with a*  
108 *cycle of abundance and scarcity in some wild animal . . . game migrations or . . . climatic cycles*  
109 *or variations in mineral content of foodplants.”* (quoted by Tilley [50]). On that, Huxley  
110 emphasized the importance on a “*close liaison between the Department of Ecology and any*  
111 *Anthropological work prosecuted in the School of African Studies, and with medical work*  
112 *bearing on Africa.”* A proposal resumed by Tilley as: “*This triumvirate—ecology,*  
113 *anthropology, and medicine— was central to colonial Africa’s economic and social*  
114 *development”*.

115  
116 In the 1930s, The African Research Survey emerged as a network of academics and officials  
117 (i.e, the London and Liverpool Schools of Tropical Medicine, the Imperial Forestry Institute in  
118 Oxford, the Imperial Agricultural Bureaux) under its director Malcolm Hailey and the scientific  
119 adviser Edgar Barton Worthington, authored of “*Science in Africa*”, a book summarizing the  
120 works done [56]. One diagram included is fascinating (Fig. 1), even more is the way it was  
121 presented by Worthington [56]: “*The picture really presented by Africa is one of movement, all*  
122 *branches of physical, biological and human activity reacting on each other, to produce what*  
123 *biologists would refer to as an ecological complex”* (quoted by Tilley [50]). For contemporary  
124 health policy makers such figure is very striking and resembles many of today’s one.

125  
126 Environmental influences on health were analyzed by two French geographers Maximilien  
127 Sorre [48], who was credited with the concept of pathogenic complex, and Jacques May [31],  
128 the founder of modern medical geography. Sorre [48] argued that the emergence of diseases  
129 depends on physical, biological and social factors and more specifically on the climate, the  
130 natural biological environment and the anthro-po-geographical environment (see Oppong &  
131 Harold [36]). For Sorre, the environmental conditions, the living conditions of the pathogen and  
132 the characteristics of individuals influence the appearance of a disease. The approach of May,  
133 who started his career as a medical doctor in French Indochina, focused on the role of the  
134 environment in the formation of human diseases and the importance of geography in mapping  
135 pathological trends. May provided a theoretical framework for studying the environment and

geographical factors (in his words, “geogenetics”) of pathogen emergence. He continued his career in the US where he used to work for the USAID and the WHO.

One has to remind that just at the end of the World War II, and at the starting of the decolonization period, Julien Huxley, after co-founding the WWF and initiating the creation of the IUCN, was appointed as the first director of the newly created UNESCO,. Later on, in 1968, the links between societies, health and biological conservation were addressed at the Unesco Biosphere Conference, in which the scientific basis for the rational use and conservation of biosphere resources were drafted. In terms of health, the loss of biological diversity was directly associated with the deterioration of physical and mental health: *“Whether the challenges come from physical or social forces, the diversity of environments is of crucial importance for the evolution of man and his societies because the ultimate results of a stereotyped and equalized environment can be and often is an impoverishment of life, a progressive loss of the qualities that we identify with humanness and a weakening of physical and mental health. Our policy should be to preserve or to create as many diversified environments as possible”* [52]. Interestingly, in the Recommendation 3 “Research on Human Ecology” of the final report of the conference after considering that *“man is an integrated part of most ecosystems, not only influencing but being influenced; that his physical and mental health, now and in the future, are intimately linked with the dynamic systems of natural objects, forces and processes that interact with the biosphere and including also the man’s culture”*, made the recommendation *“that continuing and intensified research should be undertaken on the ecology of human diseases, with special references to those associated with environmental change and to the zoonotic diseases arising from the interactions between man and the animal”*. What is important to emphasize is that this recommendation called for the implementation of an ecology of zoonotic diseases that should integrate the problematic of environmental changes and consider human culture.

For contemporary researchers engaged in the understanding of various social, ecological, biological factors related to the emergence of diseases, the writings of Logan, Huxley, Worthington to the final report of the Unesco conference of 1968 appear to be so modern. Even so that they could have been written nowadays by any of the current international organizations involved in the One Health initiative [2]. But, one can ask why these writings of the late 19th century or the middle of the 20th century that appear so relevant have disappeared from our contemporary scientific writings (see [9])? Indeed, scientific researchers involved in the “On

Health” have to integrate in their discourses that a large part of the rhetoric they used is not new but deeply rooted in the colonial sciences that aimed at developing local societies, their health and the health of their livestock, and their economies by favoring their integration into the Empire market as that time and to the global market today.

**Figure 1. The colonial scientific network of environmental management in Worthington [56] (see also Tilley [50] , Morand & Lajaunie [33] ).**

Interestingly, the network presented above, which does not exclude any of our ‘modern’ scientific disciplines, puts anthropology at the top of the chart. Something hardly taken into consideration when assessing policy of preparedness or response to zoonotic outbreak that regularly flourish on a global scale nowadays, with the fear of a new pandemic (see box 1). Anthropology, a discipline that found its origin in the colonial period itself, seems to have been banned for long from public health engagement, something that may be explained by its initial racial theories serving colonial wills. Often considered as the ‘daughter of colonialism’, anthropology has been favor the serve colonial administration. To wipe off from this view, in France, the use of the term ‘comparated sociology’ or ‘ethnology’ has replaced the term ‘anthropology” from academia for decades in the 20<sup>th</sup> century . It has then been reiterated by Claude Lévi-Strauss after the second World War II which introduced the term “Social-Anthropology’ in the country.

#### **Box 1. Ongoing global crises**

Since the end of the 20<sup>th</sup> century we assist in an increase in the number of emerging infectious diseases [19,45] mainly related to climate change, land use change, growth of global trade and biodiversity loss. Biodiversity loss through altered landscapes due to urbanization and agricultural intensification appears to be linked to higher disease risks with emergence of novel pathogens resulting from increased interactions between wildlife, domesticated animals, and humans [18, 28, 16]. Such infectious diseases lead to an increasing number of global outbreaks with a slight but constant apparition of new pathogens worldwide. Another trend observed is the homogenization of global parasite distribution, which began around 1960 [46]. Using network analysis, a striking decrease of the modularity of the country-pathogen network is also observed [37], suggesting that outbreaks of infectious diseases are increasingly shared among an increasing number of countries. That is to say that today, an outbreak of a given infectious disease has a greater chance to spread among a larger number of countries due to globalization.



These above patterns strongly suggest that global changes are affecting the global epidemiological environment mostly by favoring the spread of infectious diseases among countries and by increasing the risks of pandemics [49]. An echo today with the emergence of the 2019-nCoV originating from China rapidly spreads out of the country to reach global scale.

**Figure 2 Number of infectious diseases presenting outbreaks globally over the last 60 years from GIDEON (Global Infectious Diseases and Epidemiology Network, [www.gideononline.com](http://www.gideononline.com)).**

#### **c.d Results and discussion**

##### **Biological and cultural diversity: a (still) missing link for a better health**

In the context of repeated global health crises, what does it mean today to encompass into a single approach human, animal, and environmental health as highlighted by colonial administrators and currently promoted by ‘One Health’ initiatives? While acknowledging colonial past view, one should not forget to extricate from their views and relations with local populations and to engage with new forms of exchange based on dialogue and mutual collaboration rather than domination. This way, apprehending health as ‘one’ primarily requires to renew the appreciation of knowledge possessed and implemented by local populations of their immediate environments. The latter have much to say about the current state of knowledge on biodiversity as well as the way to manage it.

Thanks to their local knowledge, their approach and management of territories and resources, local populations are essentials actors in meeting the challenges related to global health and environmental risks. This is all the more true as it meets the current requirements of research ethics. An extension of the 1992 International Convention on Biological Diversity signed in Rio, the Nagoya Protocol, has governed access to genetic resources (animal, human, and microbial genomes) since taking effect in 2014. This protocol emphasizes the need to involve local populations in research so that they have access to scientific knowledge, participate in building such knowledge, and share in its benefits.

Again, back in 2008, a World Bank report insisted on the fact that indigenous territories encompass up to 22 percent of the world’s land surface which hold about 80 percent of the global biodiversity [47] . The role of local knowledge in managing and maintaining a high level of biodiversity was already acknowledged years ago on the occasion of Convention on Biological Diversity (CBD) in 1992 in Rio. In particular, the Article 8J of this convention emphasized the preservation of local knowledge and know-how for the conservation and sustainable

management of biodiversity. It states to respect, preserve and maintain knowledge, innovations and practices of indigenous and local communities embodying traditional lifestyles relevant for the conservation and sustainable use of biological diversity.

Let's add that the rich immediate and surrounding environment local population are living in does not only provide them basics needs for their daily life, immediate resource for their medicine, and inspiration for their cultural and spiritual activities. Biodiversity directly encompasses in their own society, reflecting a particular way of living and representing the world, known as cosmology. Be the Kasua in Papua Guinea [6] who have borrowed some of their attitudes - expressive, sexual, technical, ceremonial, even ritual - from animals co-evolving in their shared forest, or the Aït Ba'amran communities in South Morocco and the Quechua populations of Peruvian Amazonia [44]who employed natural elements to transmit their culture, there is no boundary between nature and culture as projected in western dualistic ontology. For them, biodiversity is intrinsically linked with their own culture and identity. But let's be precise before continuing, our will to highlight to role of local knowledge does not mean to naively idealizing the knowledge and know-how possess by communities but considering the way they are sometimes forgotten or smothered by global measures, they rather could be sentinels for better anticipation and management of health and environmental crises, as notably shown by Ruhlmann [40] with Mongolian herders.

Anthropologists (and social scientists in general) are well positioned to respond this need of in-depth and immersive research. As a people-centered discipline, historically, anthropology accounts for the diversity and complexity of relationships communities share with their environment. Back in 1962, this knowledge refers to what Claude Lévi-Strauss coined as called the "*science of concrete*" in his book *The Savage Mind* [24]. In the first chapter of the volume, he attempted to characterize two modes of thought, or methods toward acquiring knowledge: the "science of the concrete" or mythical thought, and the modern scientific inquiry. His demonstration stressed that both scientific and mythical thought should be understood as valid and that one does not supersede the other. They actually consist in two autonomous ways of thinking, rather than two stages of evolution as thought back in colonial period. Despite a growing demand for social scientists to tackle global problems nowadays [43], what we witness is that are call only *after* an epidemic outbreaks in emergency situations. Since Ebola outbreaks, social scientists are assigned to facilitate the implementation of measures of control and policy, help in describing local context, and make understanding of local risky practices (see box 2).

## Box. 2 Social Scientists and ebola outbreaks

In recent years, anthropologists become valuable interlocutors to address the multiple social economic political and cultural intertwining in epidemic outbreaks. By involving social science researchers who were present or directly engaged in the field, the recent (and many) episodes of ebola crises across West Africa highlighted the nature of their contributions. Although recent, feedbacks have demonstrated the value of involving these researchers who used to work closely with affected-populations. A recent special issue of the journal "*Anthropology in Action*" (2017) draw up a first - but not exhaustive - inventory of interventions, in particular from researchers in the field of medical anthropology and development anthropology who turned their research into applied anthropology [53]. For the involved researchers such situation also challenged methods of conducting fieldwork. One of the main mobilization of social scientists in emergency situations, resides in their presence for the promotion of health measures by NGO or health experts, making such measures understandable and acceptable to local communities. Online network and platforms dedicated to the multiple dimensions of outbreak, notably for helping to implement accurate local interventions were launched (See <http://www.ebola-anthropology.net/> and <https://shsebola.hypotheses.org/>) .

It is undoubtedly that one of the roles of the social scientists is to mediate between the various knowledges to enable a dialogue between scientists, decision-makers, and local populations specially during emergency situations such as epidemics outbreaks where hard measure are decided. Indeed, while health issues have invaded the public space, particularly those related to the origin of animals' diseases, they crystallizing opinions and actors involved. Various situations lead to a misunderstanding of the measures (slaughter) or issues (particularly economic) associated with the management or prevention of health crises. In the livestock sector, for example, a reversed and widespread fear movement in France between local farmers who fear that wildlife affect livestock on the one hand, and scientists or conservationists who fear that livestock affect wildlife on the other [12]. But should the social scientists be restricted to a role of health promoter, *cultural broker*, or risk communicator? Pursuing with the case of Ebola, a group of scholars [41] directly involved in field during outbreaks insist on their role in post crisis period, notably for the following of patients who experienced the social effect of the disease. For Ebola survivors, this includes to understand the physical, social and psychosocial effects of it. Inputs provide precious feedbacks on the way patients experienced measures during epidemic. Such information could indeed be crucial for a better adaptation of measure and coordination between global and local health agencies.

305 Shall we even go further in this step and include *upstream* the inputs of social sciences in the  
306 prevention of risk related to animal, human and environmental health? As for anthropologists,  
307 this question is closely related to the way they conduct their research, the type of data they  
308 collected and more crucially the approach they employed to collect them.

### 310 **How to access local knowledge**

311 Anthropology (or any related discipline) through its approach (field survey over time, bottom-  
312 up approach) and its methodological tools (participating and repeated observation of practices,  
313 attention to details, data collection in vernacular language, interviews or life stories) can tell  
314 much about the various perspectives on phenomena like the transmission of diseases from  
315 humans to animals and from domestic to wild animals. Instead of taking the global guidelines  
316 that guide local actions as a starting point, most social scientists have in common to engaged in  
317 bottom-up approach, using ethnographic as its sole method.

318  
319 Such is the case of the anthropology of Nature promoted by Descola [8] who challenged the  
320 western dualistic view of nature and culture. Changing such perspective can help in  
321 understanding the social and cultural factors that allow pathogens to cross the interspecies  
322 barrier locally [14]. As virus and pathogens are rarely translated into local languages and also  
323 hardly make sense for local communities (cf. *undo*), anthropology of nature primarily invite to  
324 shift the focus from the pathogen itself to the construction of the human-nonhuman frontier.  
325 Investigations could then focus on how the interspecies frontier is thought to probe the extent  
326 to which it does or does not allow the passage and spread of pathogens. Following the  
327 ontological perspective Descola [8], pathogens are then be investigated through the interiority  
328 and exteriority of beings. For example: is the pathogen present (visible) inside or outside the  
329 body of animals? According to those who are affected and exposed to it, through what type of  
330 contact could transmission have taken place?

331  
332 Complementarily to the anthropology of Nature, medical anthropology helps in appreciating  
333 the diversity of points of view on biological phenomena such as the transmission of diseases  
334 between humans and animals, and between domestic and wild animals. It is also well positioned  
335 perspective to engage into pluridisciplinary dialogues. As remind by Panter-Brick and  
336 Eggerman [23] , medical anthropology “*sits at the intersection of the humanities, social*  
337 *sciences, and biological sciences, seeking to transform our understanding of “what matters”*  
338 *for people in terms of health, well-being, and environment. Embracing far ranging interests, it*

generates in depth knowledge about the ways people understand these issues and frame health-related decisions". Research in medical anthropology sheds light on the understanding between the biomedical representation of viruses and/or diseases and their local interpretations. It reveals various conception of diseases, different values and perceptions orienting animals' management.

In addition, medical anthropology invites to keep a close eye on policies and relations shared between all actors involved in field and their links. These links, as we know, are not neutral and implicated issues of knowledge and ultimately power. Something applies to any situation where different conceptions of health and disease are at stake. For example, while studying elephant TB surveillance in Lao PDR, Lainé [26] reveals several levels of incomprehension and a lack of dialogue between the local mahouts and veterinarians. There, instead of facilitating exchanges, it has only exacerbate tensions, probably already present, between the various actors involved (NGO, veterinarian, mahout and elephant owner). Finally such biosecurity device [11] has nothing but offered a new legitimacy to veterinary science over local knowledge.

Considering the importance place of domestic animals on earth [32] , the latent epidemic outbreak related to our growing dependency on livestock for food, offer human-animal studies [7]and ethnozoology [17] to become a flourishing area for medical anthropology [4] . Local ethnography conducted on human-animal relations engaged research to investigate how farmers and people daily engaged with animals vary their relationships with them in terms of distance and proximity depending on their health situation. For example, during fieldwork, researchers ask how do people perceive a risk associated with animal diseases? If so, how do they prevent these risks? Under what conditions are animals considered healthy, in their opinion? Are they under the influence of a good or bad spirit?

Drawing from ethnobiological methods, local ethnography seeks for local interpretations of animal diseases, and perceptions of associated zoonotic risks. At the same time, researchers collect local inventories of animals diseases and their treatment using ethnoveterinary and ethnobiological tools. In that direction, advocating for a better integration of ethnobiological research -including its subfields such as ethnoveterinary and ethnomedicine- into the '*One Health*' agenda, Marsha and Robert Quinian [22] recalls how a "one Health" perspective is actually a central part to Ethnobiology. Reciprocally, they add that "*One Health would benefit from ethnobiology for its natural and social perspective, consideration of deep connections between indigenous people and their landscapes, and its norm of rapport establishment*"

(Quinian [22]).

Recent development of ethnographic method could even push further the understanding of complexes socio-ecological systems. As we will show below, embracing a multispecies approach to One Health enlarges the scope of the research by including non-human as a subject/object.

### **A multispecies approach to One Health**

While we have seen that anthropology could historically be defined as a people-centered discipline, in recent years, an “ontological turn” has offered an enlarged vision for understanding the complex entanglements of human and animals. Within the ontological turn, researches have shown that, far from being automatons or machines animals act and think in their environment, and that they have representational abilities in it. This perspective offers new methodological approaches such as multispecies ethnography [20]. It refers to an approach that aims at considering the agency of nonhuman and their multiples (social, historical, and ecological) connectivity with human while challenging the anthropocentric vision upon which ethnography historically depends. Thus, within such “desanthropocentric” perspective, animals are no more thought of as cut off from the world of human, but as an integral part of this world, and as actors capable of acting and interacting.

As a more-than-human approach, multispecies ethnography is open to perspectives from the natural as well as the social sciences. Applying such perspective to a One Health approach allows to engage into innovative results which could benefit human, animal and their shared environment. Researches conducted in such more-than-human approach no more consider animal as passive objects good to think with [25]. Rather, they are themselves actors in shaping and producing knowledge along with humans. Such paradigm, adapted to a transdisciplinary history of One Health has recently revealed how animals have shaped medical knowledge and make difference for their comprehension [56].

More crucially, what is interesting in adopting such desanthropocentric perspective is the fact that while conducting field study it invites not to choose between human or animal, but to carefully look at the network of relations they built in their shared environment. From an epistemological point of view, this reversal implies that the primacy of knowledge should no

longer be granted only to humans. It then gives a prominent place to interspecific interaction and dynamics, thought reciprocally. Finally, conducting a multispecies ethnography of human-animal relations allows researcher to even go further by discussing the notion of local knowledge and investigating how it could be applied to animals themselves.

Relying on local knowledge, it is possible to explore animal's exploitation of resource following what anthropologist Florence Brunois [5] have called ethno-ethology. Practicing ethno-ethology, she writes, encourages to conduct an "*ethnography of how individuals perceive and conceive, in the course of their interaction with them, the behaviour of living beings and how they react to these behaviours*" (Brunois [5] : 34). In the field, this means accessing animals' knowledge and understanding of their immediate environment through the mediation of the people in charge of these animals, in particular how they perceive the said behaviour. This includes, for example, asking them about their knowledge of the plants consumed by animals, or following them through the forest or grazing areas to directly observe the plants or any other plant resources (root, branch, fruit, leaf, vine, bark) consumed by the animals.

Conducting such study implies a strong pluridisciplinary. In that direction, Krief and Brunois-Pasina [21], primatologist and anthropologist respectively, combined their approach to understand the co-evolution of great apes and humans in the Kibale region of Uganda. Their results show that animals are co-producers of shared medical knowledge with humans.

In the same direction, investigating ethnoveterinary practices on pachyderms in Laos, Lainé [27] showed that according to mahouts, elephants have a rich knowledge of the forest world, which they express by looking for specific plant specimens for food and healing. In the Tailue villages in the northwest of the country, the health and care of these animal is based on local ethnoveterinary practices using local plants, to which must be added an essential element: respect for the knowledge of the elephants themselves, who are capable of self-medication. That is, if people provide them with the plants they need for a healthy diet, they are aware that elephants are able to supplement them if necessary thanks to the abundant diversity of the spaces they cross in their company. Such aspect of elephant's health management in village is considered an integral part of the system of care for these animals. There, mahouts do not pretend to control every aspect of elephant diet and care. According to them, the forest is the equivalent of a pharmacy for the elephants, they find many medicines there. Adding that when they are sick, elephants would prefer to stay alone, without seeing any humans, either their owner or the veterinarian, and that finally the forest is the place where the animal was *sabai* ("healthy"). For example, it happens to see an elephant being tired or thinned, especially after several days of

work in the forest. Their morphology can also vary. And everyone agrees that once the task is accomplished, when they leave their elephants at rest, free to roam in the forest, it only takes a few days for them to regain their healthy weight and shape.

The ethnographic survey on human-elephant daily life highlights the interdependency of elephants with local populations they work with, notably in term of health and wellbeing. The results of this research first show a concordance in the ritual treatment of humans and elephants (protection by the same household spirit, collective ceremony). Secondly, the collection of information on the diet of elephants highlights a possible convergence of plant use between human and animal health.

This last example not only allows a decentralization of viewpoint on the world from human to animal, nor engage research in a more dynamic and inter-relational perspective, it also recalls the necessary holistic approach for research on health and infectious diseases. By giving a primary voice to local knowledge such example illustrates how current anthropological research, by focussing on human-animal relation, reverse the order of relations established by colonial veterinarians or doctors, but keeps it holistic approach of health. Here local populations are no more under the domination of administrators, but appears as crucial mediators between various actors including animals themselves.

As we have seen, today's global economic changes induced higher demand for livestock and meat production worldwide which result in a homogenization and intensification of human-animal interactions. To counter square such trends, and to limit the loss of biological diversity, there is a need to instigate dialogue between ethnosciences, biodiversity and health by promoting cultural biodiversity [29]. At the same time, innovative solutions should be purposed, in particular by seeking to reconstruct local veterinary pharmacopoeias based on veterinary scientific knowledge, local pharmacopoeias, and also by adding a third component: the knowledge possessed by animals on their environment that are capable of self-medication. Operating such epistemological change in how 'making' science induce to rethink the way research are conducted including its ethics (see box 3).

### ***Box 3. Rethinking ethics***

Alongside with the 'One Health' approach, in recent years, several discourses on ethics have been produced. The rise of ethical responses to public health crises have been labeled as "One Bioethics" [51], "One Health ethics", and "Global Health ethics" [13]. Yet, till date, no consensus exist among bioethicists to what such label mean [53]. As emphasized Morand and



Lajaunie [34], ethical reflection in the field of biodiversity and health requires examining the relevant scientific domains (i.e. biology, ecology, evolution, human medicine, animal medicine, anthropology, and juridical science), their epistemology, and the need for scientific pluralism. The latter being essential to establish genuine interdisciplinarity and requires the values, practices, and impact of each constituent field to be evaluated. Thus, a well-established “Global Health ethics” is more essential than to build a “One Bioethics”, as proposed by the “One Health” approach, or a “Planetary health ethics”. As Verweij and Bovenkerk [53] pointed out, such “One Bioethics” or “Planetary health ethics” refer more to the domain of meta-ethics which correspond to a moral belief in “health” and “Planetary health”. The crucial point is the scientific posture adopted in the face of health crises originating from ecological crises, and its implications for studying nature (broadly conceptualized as ranging from a simple mechanism that can be easily fixed to a complex adaptive system that requires care). The recognition that crises are systemic must lead to the development of systemic actions for better earth stewardship and better common health and well-being.

#### **e. conclusion : Towards an ecological health solidarity**

In today’s globalized epidemiological environment [32] characterized by the emergence and re-emergence of diseases circulating between humans and animals and the rapid biodiversity decline, social sciences research show that there is no single “one size fits all” solution to the health and environmental risks that threaten our planet. Case-based contextual studies conducted in close collaboration with local populations are needed to incorporate their understanding of the environment they know so well. Working in direct collaboration with local communities also means to challenge the question of knowledge and the dominant relations behind it. Recently a global movement of decolonization of knowledge affecting both ecological [10] and health-related issues [39] has emerged. For the whole scientific communities that is to say to engage in dialogue and take into account the plurality of points of view and different types of knowledge including their own logics and epistemologies.

More crucially, in the society of risk we are living in, where scientific knowledge is a source of uncertainty [3], humans should no longer be considered as the sole repositories of a knowledge imposed on nature. On the contrary, they must learn to collaborate with non-humans. It means to change our view on wildlife and domesticated animals and not necessary consider them as passive objects, or in the case of health as victims of pathogens or guilty of transmitting them.

Potentially, they are co-producer of knowledge on biodiversity. Recent development in social science methodologies allow to take the agency of animals and highlight the interdependencies of living beings on a shared territories. Such perspective sheds light on how social and ecological processes interact with each other and compose a precious ecological solidarity [30] (including including plants, animals, microbes, insects and other species) that can help and prevent from the next epidemic.

### **Conflict of Interest**

Both the authors declare that there is no conflict of interest.

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### **Figures**

Figure 1. The colonial scientific network of environmental management in Worthington (1938) (see also Tilley 2011, Morand & Lajaunie 2017).

Figure 2 Number of infectious diseases presenting outbreaks globally over the last 60 years from GIDEON (Global Infectious Diseases and Epidemiology Network, [www.gideononline.com](http://www.gideononline.com)).

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