

COVID-19 AND THE EARTH: A MULTI-DISCIPLINARY STUDY REVIEW OF DIS- AND RE-CONNECTION IN THE CONTEXT OF THE PLANETARY HEALTH*

*COVID-19 E PLANETA TERRA: UM ESTUDO MULTIDISCIPLINAR SOBRE DESCONEXÃO E RECONEXÃO NO CONTEXTO DA SAÚDE PLANETÁRIA***

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Abstract: The unprecedented impacts of the Coronavirus disease (COVID-19), whose origin is still unclear, but whose consequences have exposed the fragility of human and planet's health, and of their connection, allow reflections on the pandemic's challenges and opportunities. Inside this setting it is crucial to understand how different disciplines trace the root causes of such fragility, and of the separation forces, and explore reconnection solutions. Conducting a systematic and multidisciplinary study review from veterinary science, socioeconomics, Western environmental ethics, indigenous visions, and political philosophy, the contribution features five testimonies in different research fields on the breaking and reconnecting points between humans and non-humans in the natural world. From the multidisciplinary review emerges a recurring pattern of division and connection in the relationship between humans and non-humans on the Planet, and such awareness in research enables the further exploration of integrated concepts and approaches to human and non-human health. In light of the results, the contribution discusses the possibility of adopting interdisciplinary and transdisciplinary (in one word: holistic) approaches to health, that have the potential to connect methods of analysis and explore integrative solution patterns across disciplines. Multidisciplinary and holistic research approaches to human and non-human help

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to identify breaking and connecting points. Potential implications of further studies in this direction will lead to an increased discernment of solutions that could heal our planetary health.

Keywords: COVID-19; Nature; Humans; Disconnection and Reconnection; Multidisciplinary Research.

Resumo: Os impactos sem precedentes do Coronavírus (COVID-19), cuja origem ainda não é clara, mas cujas consequências expuseram a fragilidade da saúde humana e do planeta, e da ligação entre ambas, permitem refletir sobre os desafios e oportunidades da pandemia. Dentro deste cenário, é crucial entender como diferentes disciplinas rastreiam as causas de tal fragilidade, e das forças de separação, e explorar soluções de reconexão. Com um estudo sistemático e multidisciplinar a partir da ciência veterinária, socioeconômica, ética ambiental ocidental, visões indígenas e filosofia política, o artigo apresenta cinco testemunhos em diferentes campos de pesquisa sobre os pontos de ruptura e reconexão entre humanos e não-humanos no mundo natural. A partir do estudo multidisciplinar surge um padrão recorrente de divisão e conexão na relação entre humanos e não-humanos no planeta, e tal conscientização na pesquisa possibilita a exploração de conceitos e abordagens integradas à saúde humana e não-humana. À luz dos resultados, a contribuição discute a possibilidade de adoção de abordagens interdisciplinares e transdisciplinares (em uma palavra: holísticas) à saúde, que tenham o potencial de conectar métodos de análise e explorar padrões de solução integrada entre disciplinas. Abordagens de pesquisa multidisciplinares e holísticas para humanos e não humanos ajudam a identificar pontos de ruptura e conexão. Potenciais implicações de novos estudos nessa direção levarão a um maior discernimento de soluções que poderiam curar nossa saúde planetária.

Palavras-chave: COVID-19; Natureza; Humanos; Desconexão e Re-conexão; Estudo multidisciplinar.

Introduction

The world has met another fatal pandemic affecting the existence of millions of individuals over the globe: the coronavirus disease (COVID-19). Since early November 2019, many nations over the globe have cases rising each day. Numerous nations have shut down, to help control the number of cases, and have executed their regulatory safety measures to stop the ascent. Even though nations are currently endeavoring to lessen the number of cases, numerous lives are being positively and negatively influenced. The nations' decisions in relation to Covid-19 pose dilemmas on individuals, create division and heighten inequalities. Developing problem-solving skills is critical in the current moment. Such skills require awareness of the balance between forces of separation and union, of disconnection and reconnection (Arcari, 2020).

The hypothesis of this contribution is that researchers' knowledge is one of the foundations upon which to build a base for raising awareness because of the objective and trustworthy characteristics of such knowledge.

Therefore, this article aims to fill in the knowledge-gaps by adopting a *multidisciplinary* perspective-study review to build a comprehensive knowledge-base cases, on the breaking and reconnecting points between humans and non-humans in the natural world.⁶ Developing from this introduction, the study lays the foundations for a reflection of the zoonotic character of COVID-19, and continues on the relation between intensive human activities and zoonotic diseases.

From the veterinary research review, emerges how COVID-19, as a new zoonotic pathogen, is providing not only challenges but also opportunities for discussing how the reconnection can function as part of the treatment for the global health crisis that affects the Earth and humanity in different ways. The study continues with a socio-economic review of the concept of circularity – a circular system breaks down if disrupted or heavily stressed (Commoner, 1973) – and explores examples of breaking points applied to the food system, and in the Western evolution of environmental ethics. Hence, the study extends along the line of an imaginary tree, where ancient roots of wisdom (indigenous views and political philosophy) are connected with the new branches of Western ethics.

The discussion focuses on the application of *trans-disciplinary* and *interdisciplinary* approaches to health and focuses on their potential to highlight, expedite, and favour the increasingly visible focus in different research fields on the connections between humans and non-humans, their wellbeing and health.

By reflecting on the connectivity between the pandemic, food system, and environmental protection, the study concludes on the need to continue raising awareness on the tension between forces of division and union, and constantly reconsidering our relation with the ecosystem.

⁶ Here we refer to the meaning of multidisciplinary research connected to the work of scholars from different disciplines conducted independently on a common problem or research question, while interdisciplinary research relies on shared knowledge and trans-disciplinarity integrates the soft and hard sciences in a humanities context. In our paper, we follow a *multi-disciplinary* research method, and we introduce some reflections on trans- and interdisciplinary approaches (gathering them in the same category of “holistic approaches”) in the discussion. In the conclusion, we prospect the possibility that our research is meaningful for any of these approaches individually adopted or differently combined. See for example: <https://research.ncsu.edu/rdo/2020/08/the-difference-between-multidisciplinary-interdisciplinary-and-convergence-research/>. Accessed November 18, 2020.

Methods

The aim of this study is to explore and raise the understanding and awareness of the disconnection-reconnection forces in different research fields, in order to trace the diverse perspectives that different disciplines bring to illustrate the root causes of the ecosystem fragility, of separation forces, and of reconnection solutions. Conducting a systematic and multidisciplinary study review from veterinary science, socioeconomics, Western environmental ethics, indigenous visions, planetary care and feminist political ecology, the contribution features five testimonies on the breaking and reconnecting points between humans and non-humans relationships in the ecosystem. Local knowledge integration in marine governance: a three-disciplinary literature review.

a. Veterinary sciences

Coronaviruses are a family of the ribonucleic acid (RNA) viruses. The term ‘corona’ refers to the crown-like characteristic appearance of the viral particles. Infections occur in both humans and animals and may or may not be zoonoses. In recent years, coronaviruses have become known to the public due to the emergence of two zoonotic diseases: the severe acute respiratory syndrome (SARS) caused by SARS-CoV, and the Middle Eastern respiratory syndrome (MERS), caused by MERS-CoV. These viruses were transmitted via animals (civets for SARS and dromedaries for MERS). In December 2019, several human cases of pneumonia of unknown origin emerged in Wuhan, the capital of the Hubei Province, China. This pneumonia was soon associated with a new Coronavirus, and, in a few months, the whole world faced a pandemic of unprecedented proportions (OIE 2020). The virus is known as SARS-CoV-2 and its associated disease as COVID-19 (OIE 2020). The evolution of SARS-CoV-2 has not been fully comprehended yet. The transmission route is from person to person, but available evidence indicates that SARS-CoV-2 is derived from an animal source. A close-related Coronavirus, similar to SARS-CoV-2, has been found circulating in horseshoe bat populations. However, it should be clarified that, at present, there is insufficient scientific evidence to identify either the animal source of SARS-CoV-2 or the original route of transmission to humans. It is also likely that one or more intermediate hosts are involved. Studies need to be conducted to understand how the virus reached the spillover, i.e., the

process by which a pathogen "jumps" from one species to another, and it becomes capable of infecting, reproducing, and transmitting itself within the new species, and to clarify the role of animals in this pandemic (OIE 2020). The World Health Organization reports how an infodemic has developed in parallel with the pandemic, i.e., the circulation of an excessive amount of information, sometimes not carefully screened, which calls for the development of information studies and information management (known as infodemiology: WHO, 2020).

In this unclear context, one of the major preoccupations highlighted in veterinary sciences has concerned the focus on the relationship between COVID-19 and food. According to several international public health and food safety bodies, there is currently no evidence that SARS-CoV-2 has spread through food or food packaging. Experiences from previous outbreaks of related coronaviruses (SARS-CoV, MERS-CoV) show that transmission through food consumption is extremely unlikely (EFSA 2020). Thus, there is no data to suggest that SARS-CoV-2 is any different in this regard (EFSA 2020).

Suppose a direct correlation between food and the virus is excluded, and the conditions surrounding the emergence of COVID-19 are still unclear, veterinary studies interrogate whether there are further aspects of the current food consumption patterns that can be taken into account to better understand the pandemic. Intensive production of food in the past three decades has had broad implications on the stability of ecosystems. For example, one of the main drivers for deforestation is to create room for agricultural activities (Busch and Ferretti-Gallon, 2017; Jones *et al.*, 2013) and hunting to satisfy the bushmeat demand (Karesh and Noble, 2009). During 2015-2020, the rate of deforestation was estimated at 10 million hectares per year (FAO 2020) and, apart from the more known impacts (i.e., on CO₂ production and biodiversity loss), deforestation, alongside human expansion, lead to the migration of wild species and increased contact between wild species and humans and domestic animals. These elements have been recognized as risk factors in the emergence of new zoonotic diseases (Wolfe *et al.*, 2005).

The relationship between human activities and zoonoses is not a novelty. The report presented at the meeting on emerging zoonoses organized jointly by WHO, FAO, and OIE in 2004 contains a careful analysis of the factors contributing to the emergence of zoonotic diseases. Veterinary research divides the main identified determinants into three categories (Matassa, 2007): 1) pathogens and hosts related factors, 2) environmental factors, and 3) socioeconomic factors (see Tables 1-3 in Appendix). The first category includes the intrinsic

features of the host and microorganisms. The second category concerns ecosystem conditions and extreme atmospheric phenomena. The last one is about the sociological, economic, and technological aspects involved in the emergence or re-emergence of zoonosis.

The fundamental basis for the emergence of new pathogens among microorganisms is the biological one, consisting of mutations, genetic exchange mechanisms, and selection (this process is particularly rapid in some RNA viruses, such as coronavirus). However, it is notable that most of the factors can be traced back to human activity. Specifically, the first seven socioeconomic factors listed among the socioeconomic factors (see Table 3) are directly or indirectly linked to food/food-chain/food consumption. Moreover, other socioeconomic aspects contribute to changing food habits. Of particular interest is the increase in income, especially in countries where it has risen from a lower-middle to a higher level. The resulting growing purchasing power leads to rising demand for food of animal origin, which favors the increase of farmed livestock without parallel adaptation of control and prevention provided by veterinary public health (Matassa, 2007). Hence, human-related activities, particularly food-related ones, can contribute directly or indirectly to the emergence of new pathogens.

Further epidemiological and virological studies are needed to clarify the relationship between COVID-19 emergence and human-related factors. As further developed in the discussion, the most advanced veterinary research is heading towards the adoption of interdisciplinary approaches to clarify such relationship, and promoting the concept of “one health” to acknowledge the mutual interdependence of human, animal and environmental health (Jørgensens; Das Neves, 2020).

b. Socio-economics

Breaking points in systems thinking and socioeconomic factors can ignite paradigm shifts (from linear to circular thinking), as explained in the 'doughnut economics' model of Raworth 2017. The linear paradigm has a spatial dimension in the relationship of increasing human domination over the non-human world. Such a relationship has been based on the false premise of natural resources' inexhaustibility, and has triggered the vicious linear thinking: 'I produce, I consume; therefore, I waste.' However, research on systems thinking prompts us to rethink individual events in their complex interconnection, following a circular rather than linear process. As Barry Commoner illustrates:

within each ecosystem, each living member must act in a way that is compatible with that system's continued existence and, therefore, the organism itself. Such closed, circular systems will break down and place their living members at mortal risk if they are disrupted or too heavily stressed (Commoner, 1973).

Along these lines, in socio-economics research, the adoption of circular models has been greatly encouraged (Raworth, 2017), suggesting the possibilities of creative approaches that forget mathematical formulas draw the world we aspire to, using only a pencil. More precisely, the socio-economics dynamics in the world take the shape of a doughnut, formed by two concentric circles (Raworth, 2017). Thus, the human species' survival and wellbeing are dependent on these two concentric thresholds: the environmental and social circle (Raworth, 2017). The environmental threshold is the external planetary border above which the relationship with Nature becomes dangerous and unsustainable. The social threshold is the limit below which human life is unacceptable. These two circular bands create the doughnut. Nothing more than a lifesaver, a clean and secure area, ensures a decent life for people while respecting Nature and fundamental Earth and human rights. Among these, Raworth lists the enjoyment of internationally recognized rights, such as water, food, education, health, freedom of expression, political participation, and personal security (Raworth, 2017). Circularity is inclusive of human and environmental diversities, and applies also to the food system. The food systems that best reflect the Raworth 'doughnut economics' model belong to the small-scale agriculture. The small-scale systems develop under two thresholds: from a socio-economics viewpoint, their focus is on community and proximity governance of land practices. From an environmental perspective, small-scale systems are in harmony with the surrounding ecosystem, safeguarding land- and waterscape. Furthermore, small-scale food systems have a fundamental role in biodiversity protection and conservation, as well as in culture preservation. According to the HLPE, small-scale and family producers are responsible for most of the food consumed globally (70%) of the investments in agriculture. Family and small-scale food systems gather in the form of a community of people. Community is a circular social entity based on knowledge, relationships, openness, inclusion, security, and democracy, all mandatory values for cultivating and accessing food (HLPE, 2013).

There is nothing surprisingly new in a circular approach that focuses on small-scale systems. Whether intentionally or not, each of us belongs to a community: may this be a

family, or rather a city, a country. However, the COVID-19 pandemic highlighted the need for communities to become protagonists again to re-shape our economic model and our values system. As collective projects, where associates participate by choosing and respecting everybody's rules and rights, communities contribute to developing fundamental patterns for understanding challenges and proposing alternatives. They introduce comprehensive ways of thinking, where human and non-human necessities are enhanced and prioritized. In this perspective, in the current and coming years, human beings have the opportunity to translate the community-based model into structured and long-term programs of reconnection with the Planet, whose role as nourishing system would be restored.

c. Western environmental ethics⁷

Research on environmental ethics shows how Nature has exerted a particular fascination over humans since ancient times (Parola, 2013). Thus, early civilizations developed their foundational values from the relationship between humans and the natural world. Despite these roots, research shows how a part of humanity (approximately the Western World) quickly began to modify this view and move towards the idea of being at the center of the creation (Passmore, 1975). The alienation from Nature continued (Radcliffe, 2000), and nature's violations and degradation escalated over the course of the 20th and 21st centuries (Parola 2013, at 31). In the Western-philosophical and legal tradition, such an approach is known as anthropocentrism (Merriam-Wester Dictionary, 2020). Its foundation is laid on the religious concept that positions human beings at the center of the universe (Pace, 2001, at 15). In particular, this idea was carried out by early Christianity (Zamagni, 1994) and then by the modern scientific vision of Nature. One of the reasons for the turn of early Christianity towards anthropocentrism is retrieved in the early translation and interpretation of the book of Genesis (NIV)⁸, stating that the Lord God created *men* to have dominion over the natural world (Genesis I: 26; Parola, 2013 at 32). This passage has been read not only by early Christianity but also by other religious traditions (Judaism and Islam) as the man's charter, granting him the right to subdue the Earth and its inhabitants. Thus, one can speak of "Christian arrogance," and this approach was long predominant and did also not find an

⁷ This sub-section is an expansion of previous work: Parola G (2013). Environmental Democracy at Global Level. Rights and Duties for a New Citizenship. Versita, London, 20-90.

⁸ This passage from Genesis, the illustration of the Garden of Eden, and all the other quoted passages come from a version of the Bible published in 1660, publisher J Field, by permission of the British Library Board.

obstacle in the modern scientific vision of Nature (Parola, 2013, at 33). In particular, in the 17th century, Bacon and Descartes re-affirmed the man's dominion over Nature (respectively in the *New Atlantis*, ed. 1989, and in the *Discourse of Method*, ed. 1931). Descartes, inspired by Bacon's visions, took from the Christian tradition the attitude of man as Nature's governor. This approach was later maintained and also reinforced in the following centuries, and Bacon and Descartes' interpretations were absorbed into the ideology of modern Western societies, communist and capitalist, and exported to the East. Nowadays, this viewpoint is no longer sustained, and the rise of a new vision of the relationship between humans and Nature has recently appeared in a new Christian interpretation of the Bible. In 2015, Pope Francis wrote the Encyclical Letter "Laudato si' On Care for Our Common Home." The Encyclical suggests to move from an anthropocentric to an eco-centric approach. It calls the Church and the world to acknowledge the moral and social dimensions of the ecological crisis. It emphasizes the beauty of Nature, industrialization's effects on the environment, and the importance of integral ecology, reminding us that "our common home [the Earth] is like a sister with whom we share our life and a beautiful mother who opens her arms to embrace us". The document continues by suggesting to rethink the interpretation of the human being as Lord and master of the Earth:

"We have come to see ourselves as her lords and masters, entitled to plunder her at will. The violence present in our hearts, wounded by sin, is also reflected in sickness symptoms evident in the soil, in the air, and all forms of life. It is why the earth herself, burdened and laid waste, is among the most abandoned and maltreated of our poor; she "groans in travail" (Rom 8:22)."

Although Christians have indeed at times incorrectly interpreted the Scripture, the new interpretation offered by Pope Francis rejects the notion that the creation in God's image justifies absolute domination over other creatures. The Encyclical calls for a mutual responsibility between human beings and the Earth: "Each community can take from the bounty of the earth whatever it needs for subsistence, but it also has the duty to protect the Earth and ensure its fruitfulness for coming generations. The Encyclical also criticizes the scientific reductionist approach of Nature: "Nature is usually seen as a system which can be studied, understood and controlled, whereas creation can only be understood as a gift from the outstretched hand of the Father of all [...]. When Nature is viewed solely as a source of profit and gain, society has serious consequences. This vision of "might is right" has engendered

immense inequality, injustice, and acts of violence against the majority of humanity since resources end up in the hands of the first comer or the most powerful: the winner takes all." Thus, this new interpretation denies that humans, concerning Nature, are necessarily despots, but it sees them as stewards actively responsible as God's deputy for the world's care. Thus, the Aramaic word "kabash" (previously translated as "subdue") has to be re-translated with the more accurate expression: "bring into bondage", where humans are bonded to the Earth as stewards and trustees for God.

d. Political philosophy

Integral studies in political philosophy convene that the great challenge of our epoch, referred to as the Anthropocene, Capitalocene, or Chthulucene⁹, is to reintegrate the human boundaries within the limits of the rest of the natural world (Gallagher, 2012). Two combined research approaches tackle such challenge: 1) Planetary Care (PC), a planetary form of health and care, that focuses on the "humanitarian rescue of nonhumans" (Tickin, 2019); 2) Feminist Political Ecology (FPE), that helps nurture the possibilities of alternative visions focussing on women's ability to generate circularity. The approaches combine two objectives: the improvement of human conditions (and more specifically: rural women's conditions, according to FPE), and the care for a healthy environment. Moreover, the integrated approach of PC and FPE challenges and deconstructs hegemonies in the environmental governance realm, and evaluates women's experiences and constraints from the structural inequalities that women endure in their communities or households, and not because they are women per se (Harcourt and Nelson, 2015). It dismantles normalised assumptions concerning modes of allocation of critical resources, while questioning naturalised discourses over meaning, knowledge and authority (Boelens *et al.*, 2016). FPE and PC allow to portray women's reality, struggles and capabilities as complex and multi-faceted, enabling an intersectional perspective to gender relations at the interface with class, sexuality, dis-ability, caste, religion, and age on a local to a global scale. In other words, the combination of PC and FPE allows questioning the analytical and policy-framing separation between the formal and informal sectors of the economy, a separation that, according to Pearson (in Cornwell *et al.*, 2007), has allowed the

⁹ The expression is coined by Haraway and derives from chthon, meaning "earth" in Greek, associated with things that dwell in or under the earth (Haraway 2016).

majority of women's paid and unpaid (but vital) work and relevant knowledge to remain outside the remit of public policy.

The proposed approach leads to three levels of knowledge results. First, it decolonizes mindsets and challenges knowledge-assumptions situated on the monoculture of capital-centric thinking, which have rendered a whole rich set of relationships in rural settings non-existent, 'non credible alternatives to what exists' (Gibson-Graham, 2005). In this perspective, labor is not restricted to commodity production, nor reproduced solely by wage (Bauhardt, 2019). It is rather extended to the place of the household and the family, where care practices of immaterial value – including obtaining, breeding and saving seeds, growing plants, collecting firewood, planning meals, acquiring and processing food, cooking and serving food, cleaning kitchens, and washing dishes as well as bringing up children– take place. Recognizing the significance of rural women's contributions provides a starting point for discerning and valuing the *invisible*. It allows the imagination of a world based on the culture of *enough*, where people's wellbeing does not have detrimental effects on other humans, nor depends on the exploitation or commodification of the natural world (Wichterich in Nelson and Harcourt, 2015).

Second, it suggests to engage and research in cooperation with communities to understand how rural women define themselves, live, feel, understand and interact with the environment and all the living beings (Clement *et al.*, 2019). This approach provides a positive and emancipatory basis for framing Nature, in ways that do not reproduce her assumed inferiority and dependence.

Third, building on Donna Haraway's neologism of *nature-culture* (Haraway, 2016), it helps redress the balance between humans and Nature in constructing worldviews (Di Chiro in Nelson and Harcourt, 2015). In this light, the environment is perceived as an entanglement of Nature and culture, a space of coexistence and co-creation (Bauhardt in Ead. and Harcourt, 2019).

e. Indigenous views

Lessons on the symbiotic relationship between humans and non-humans in the natural world, and therefore on the need to maintain and restore the nourishing connection between the Earth and the living beings, are drawn from Indigenous legal orders worldwide

(Nursey-Bray, 2014). Indigenous stories, value-sets, and beliefs substantially converge towards recognizing the oneness of all things, allowing the need to acknowledge the Earth's role as the nourishing mother of all living beings. Indigenous cosmo-visions keep a relationship of respect and symbiosis with human, natural, and supernatural universes: Nature patterns correspond to social and human patterns (cycle of tides, seasons, migrations, sunrise, and sunset, kinship and life-cycles). Such cosmologies help forge systems of socially embedded rules that place the natural world at the center of protection (Nursey-Bray, 2014). The interconnectedness of Nature and human beings is a core belief shared by communities that live in close connection with the ecosystem and are enormously dependant on it: typically, it is the elders who are the experts and transmit such knowledge through storytelling, examples, and languages (Cajete, 1999).

One of the most iconic examples of indigenous visions rooted in the symbiotic relationship between humans and non-humans comes from Oceania, the Central and South Pacific Ocean islands. Among the human communities of Oceania, the Australian indigenous peoples¹⁰ and the Māori of New Zealand (Aotearoa in the Māori language) stand out to recognize the centrality of land- and seascape, and the role of human and nonhuman communities in protecting, guarding and stewarding Nature. For example, among the Australian indigenous peoples, the Aboriginal people calls Australia the 'sea country,' indicating the sense of an entire material, cultural, kin, and spiritual relationship. Their perspectives focus on holistic approaches to human and non-human stewardship of Nature, challenging the Western concepts of land and sea as stocks of resources, rights, and commodities (Smyth, 2011). Research on Aboriginal views asserts that two axioms underpin Aboriginal relations with land and sea: the land-sea is the law, and we are not alone (Graham, 1999). Thus, the land-sea is sacred and the basis of any relationship. The relationship between Nature and peoples determines all human relationships and is the pattern for social and, therefore, institutional relations. Similar value-sets are shared by the Māori peoples, who developed a working definition of stewardship, *kaitiakitanga*, translated as guardianship, preservation, conservation, fostering, protecting, sheltering (Rev. Māori Marsden, 2003). *Kaitiaki* are agents who perform

¹⁰ According to the definition of the Australian Government “Indigenous Australians” include peoples who: “are of Aboriginal or Torres Strait Islander descent; identify as being of Aboriginal or Torres Strait Islander origin; and are accepted as such in the communities in which they live or have lived. In most data collections, a person is considered to be Indigenous if they identified themselves, or were identified by another household member, as being of Aboriginal or Torres Strait Islander origin. For a few data collections, information on acceptance of a person as being Indigenous by an Indigenous community may also be required.” See <https://www.aihw.gov.au/reports/australipoas-welfare/profile-of-indigenous-australians>. Accessed November 17, 2020.

active guardianship and are charged with the responsibility for safeguarding and protecting Nature for past, present, and future generations (Burke and Rameka, 2010). There is no room for human sovereignty over non-humans, nor for a separation between human and non-human communities and Nature: everything is are connected and committed to protecting the planetary health.

In conclusion, research on indigenous views highlights the normative acknowledgement (present in the indigenous cosmo-visions) of the Earth as the biological mother that nourishes and ensures all living beings' health and vitality.

Results

This contribution has reflected on how COVID-19 is acting as a catalyst to the disconnection of humans and non-humans, but also as a triggering re-connecting factor. Starting from this reflection and with the aim to develop a knowledge base that increases awareness on the dichotomy disconnection-connection, this contribution developed as a multidisciplinary study review. The research from veterinary sciences, socioeconomics, environmental ethics, indigenous view, and political philosophy, focused on three main aspects: 1. specific research foci and insights, including major research gaps within the exiting research field, 2. an overview over methods used within the different strands of literature, and 3. potential best practice approaches highlighted by the different research traditions. The red thread uniting the studies from different disciplines conceptually *connects* health of the humans and of the Planet as a whole. Such thread is made of three components: protection (of nature's health, of the vulnerable, of the unheard), circularity, and oneness in approaches. The result of tackling health of humans and non-humans, from multiple perspectives, is twofold. On the one side, it shows the importance of research designs that are multidisciplinary, and therefore enhances the visions of researchers from different disciplines on a recurring theme, such as the disconnection-connection patterns. On the other side, it restores and heals the wounds (to humans and non-humans) caused by the disconnections, by opening new venues of research in the field, such as the designs of integrated concepts and approaches to human and non-human health.

Discussion

From the different disciplinary angles, emerge the deep cycling forces of disconnection and connection among animal, vegetal and human health in the ecosystem. A growing number of scholars involved in inter- and trans-disciplinary on health research, advocate for the adoption of holistic approaches to health (Charron, 2012; Falzon *et al.*, 2018; Davis *et al.*, 2017). Calvin Schwabe, veterinary parasitologist and epidemiologist, introduced the term 'One Medicine' in 1984, encouraging the adoption of an integrated approach to the management of zoonoses (Schwabe, 1984). Along these lines, and following significant growth in the circulation of infectious agents, policy-makers and researcher have increased their focus on the study of synergies across human, animal and ecosystem health sectors would achieve more sustainable health benefits. On this basis, the 'One Health, One World' concept was introduced during the Wildlife Conservation Society symposium in 2004, in New York, followed by the institution of the 'One Health initiative' in 2007, the 'One Health Commission' in 2009, and the 'One Health platform' in 2015. Despite the widespread recognition of the One Health (OH) approach, the translation and implementation of this concept into practical policies and strategies have been difficult to achieve (Falzon *et al.*, 2018; Davis *et al.*, 2017). As of today, the OH approach is officially recognized by many countries, by the European Union, and by international organizations such as WHO, OIE, FAO, as a key strategy in many sectors that benefit from the collaboration between different disciplines (Falzon *et al.*, 2018; Davis *et al.*, 2017). Another interdisciplinary approach, the Eco-Health (EH) approach, has developed in parallel (Charron, 2012). It is often used as a synonym of OH because of its conceptual overlap, to the point that some authors propose to unify the two concepts, despite the differences (Zinsstag, 2012). Both approaches advocate inter-disciplinarity and promote the health of people, animals, and ecosystems (Lerner and Berg, 2017).

Despite these developments, only a few practical OH policies currently implemented effectively integrate data across human and animal health, and even fewer attempted to integrate data from the vegetal world. Multiple reasons could underlie this ineffective transition. First, inconsistent government commitments to sustainability and a scarcity of educational and academic opportunities have not encouraged research and practical

policies. Second, difficulties in obtaining resources and funds have prevented harmonization in implementation (Falzon *et al.*, 2018; Davis *et al.*, 2017).

Conclusions

This contribution proposes a multidisciplinary approach as a response to the process of awareness-raising on the forces of separation and union, disconnection and reconnection between humans and non-humans, in a context of planetary health. Approaches from veterinary science, socio-economics, Western environmental ethics, indigenous cosmologies, and political philosophy offer a number of possible remedies to the undisputed anthropocentric origin of the disconnection between humans and non-humans, and on the consequent escalating effects on the planetary health: by counterbalancing anthropocentrism with the implementation of nature-centered visions, by hearing and reporting unreported or underrepresented voices (small scale food systems, indigenous and rural women's voices).

The multi-disciplinary analysis of these scenarios leads to and enriches the discussion of inter- and transdisciplinary approaches to health. A further exploration of the implications of such holistic approaches in research, their use as unifying lenses to identify patterns and commonalities in different research fields, has the potential to address further gaps in the search of solutions to the dichotomy disconnection-reconnection, broadening the vision of one planetary health, which unifies humans and non-humans.

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Tables:

Table 1

Factors relating to pathogens and hosts
1. Adaptability (plasticity) and variability of microorganisms (new strains, spillovers)
2. Increased resistance to antibiotics and anthelmintics in numerous pathogens
3. Increased susceptibility to infections by humans (aging, the spread of immunodeficiencies)

Table 2

Environmental factors
1. Change in climatic conditions, leading to the creation of new habitats for zoonotic vectors
2. Alterations and transformations of natural ecosystems
3. Natural disasters, such as hurricanes and floods

Table 3

Socioeconomic factors
1. Globalization, no barriers, and liberalization of trade in animals and animal products
2. Demographic changes (population growth and Urbanization) and habits
3. Economic development and changes in land-use patterns (increasing use of intensive crops and monocultures)
4. Technological progress and changes in industrial technologies (especially in the food supply chains)
5. Increased proximity to animals (particularly large farms)
6. Increased volume and speed of travel and trade (particularly long-distance trade), involving people, animals, foodstuffs, and other goods
7. Migratory flows of people: possible introduction of new pathogens and new eating habits (i.e., raw fish and exotic food consumption)
8. Wars and internal conflicts which reduce investment in public health and veterinary prophylactic plans for livestock
9. Poverty and social inequalities
10. Inadequacy of public health systems at the local, national and global level
11. Increase in international tourism (also associated with exotic species trade)