PAPACO

Newsletter from African protected areas

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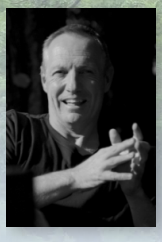


Editorial

Geoffroy Mauvais,
Papaco Coordinator

THE WORLD "AFTER"

Last July, the NAPA op-ed presented some ideas aiming to improve management and governance in African protected areas. None of them were revolutionising: we merely discussed ideas about ethics, good governance, efficiency, capacity-building... Many NAPA readers however reached out to thank us for these few lines, a welcome sign indicating that these changes find widespread echoes in our readership.

Then, a tiny thing brought our species to its knees. A tiny thing that we will never see, and whose status as a live being is even debated among scientists. And yet, we are surrounded by billions of viruses. They are actually the most abundant biological entity on Earth. We are told that they surround us in concentrations exceeding 800 million per square meters (on the ground), and that the ocean contains a mass of viruses worth around 75 million blue whales. These figures, although not particularly useful for our understanding of the current situation, do describe efficiently our reality: we have had to live with viruses, since the beginning of times.

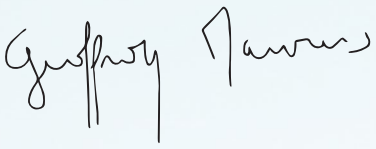
In its hubris, man obviously tends to consider himself as greater than the contingencies of nature. Virtual has become our norm, even able to replace the material things that surround us by things which do not exist. We feel as though we live in a virtual reality, or even in an "augmented reality". This is an illusion: we are nothing more than a biological construction, no different to many others, and we are deeply connected to this world – very concrete, both welcoming and dangerous.

One aspect of this connection are the diseases that we share in common with other living beings. This NAPA, in particular, focuses on zoonosis, and on the role of wild species in their transmission, as well as the impacts of human activities on their expansion, their evolution in the context of climate change, and so on. This is a major topic not just today, with the COVID situation, but also for the future – for all other diseases!

What will our world look like "after", no one can predict. There are encouraging signs that show change is possible: this year, Earth Overshoot Day (the day marking the point where humans have consumed all of the resources produced by our planet in a year) was set back three weeks (August 22), while it had been falling earlier and earlier into the year since 1970 (where it was set on December 29). This is an important symbol, seeing as no human decision – even if agreed on collectively (conventions, conferences, summits…) – could achieve this ever before. This shows that when we really try, it works.

At a smaller scale, the Ebo forest in Cameroon (threatened by an industrial project) is now saved, after the industrial exploitation permit was cancelled under international but especially local pressure. We must acknowledge this victory, showing the importance of civil society engagement for nature.

At the same time, there are other indicators (too many), that seem to say that our world "after" will look a lot like our world "before"; and that it could even get worse. Signs such as the American government authorizing petrol exploitation in the Artic (in a reserve created in 1960). Or the rising price of gold, useless metal whose industry deeply scars so many natural sites, amassed by the wealthy precisely in these times of crises when wealth should go towards healing, fixing, and feeding. •



Our courses

MOOCS

- New session -

On 14 September a new MOOC session will start. The previous session was quite successful, but more on that in next month's NAPA. In the meantime, you can enrol in the coming session either to finish the MOOC you didn't manage to complete last time, or to look into new themes to develop your protected area management skills.

Remember to request your certificate of completion by sending an email at moocs@papaco.org.

MORE DETAILS: mooc-conservation.org

ONLINE CERTIFICATION

- Next exam coming up -

A second exam sitting will be organised during the coming MOOC session for the online Certificate on Protected area conservation. Dates coming soon.

What is it about? Students who completed all PAPACO MOOCs and one IFDD's three MOOCs (Sustainable development, Environmental law or Economy and environmental management) may sit a single exam, gathering all topics. If they succeed, they receive a Certificate on Protected area conservation from Senghor University. Because the IFDD's MOOCs are only available in French, for the time being, the exam is strictly available for French-speaking students.

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Ambassadors

MOOC INFORMATION MEETINGS

For more details, contact the relevant ambassador.

GABON
@LIBREVILLE
- When? 5 September 2020 at 10:00
- Where? Omar Bongo University
- Which ambassador? Brice

DRC
@KINSHASA
- When? 14 September 2020 at 10:00
- Where? Bomengo Cultural Center
- Which ambassador? Emmanuel

CAMEROON
@YAOUNDÉ
- When? 09 September 2020 at 13:00
- Where? Cameroon Women Leadership Initiative headquarters (WLIC).
- Which ambassador? Pascale

@SOA FOR A MUSUEM VISIT
- When? 12 September 2020 at 8:00
- Where? Millennium Ecologicl Museum
- Which ambassador? Pascale

AMBASSADOR ? An ambassador is a designated Papaco MOOC student who volunteered to help students in his city or region.

Contact us to get in touch with your ambassador, or click on the relevant name in the column to your right.

List of ambassadors (click on the name to send them an email):

- Benin, Kévin
- Bouaké, Bernadette
- Burkina Faso, Valéry
- Burundi, Léonidas
- Comoros, Humblot
- Côte d'Ivoire, Mamadou
- Douala (Cameroon), Mathias
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- Kisangani (DRC), Richard
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- Tunisia, Moadh
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- Zambia, Chewe

This month: Covid-19 & biodiversity

The French Foundation for Biodiversity Research has published a compilation of sheets on zoonotic diseases, more specifically on the links between Covid-19 and biodiversity. In this NAPA, we are publishing a couple of extracts, the full document can be consulted here.

SHEET 1

Is the frequency of zoonotic diseases increasing, and if so, since when?

CONSENSUS

Over the past 50 years, the number of epidemics worldwide has risen significantly with on average two to three new infectious agents emerging each year (Jones et al. 2008, Nature). An acceleration in the frequency of disease outbreaks, particularly of zoonotic origin, has been observed since the early 1980s (Smith et al. 2014, J R Soc Interface; and Morand et al. 2014, Plos One for a closer look at South East Asia).

These trends are significant, even when taking into account the fact that the monitoring effort has been increased, which could confound these observations (Morand and Lajaunie 2017, ISTE Press Ltd.). After controlling reporting bias, we do observe an increase over this period of time in the number of epidemics, particularly of animal origin, with mortality varying greatly from one epidemic to another (a few dozen to 12,000 for SARS-CoV-1 and 20,000 deaths for Ebola virus diseases).

The emergence and spread of antimicrobial resistance is also becoming a problem worldwide. This has a major impact on public health as it helps the spread of infectious diseases. The effects of antimicrobial resistance on animal health and biodiversity are still poorly known, but its transmission pathways involve wildlife and the environment. An integrated (One Health) approach to antibiotic resistance is essential (Goutard et al., 2017, BMJ).

DISSENSUS

There may be some disagreement, not on the increase in the frequency of epidemics, but on the number of cases of illness that are caused by an emerging zoonotic disease (often only a few), on the use of different diagnostic tools at different points in time and on changing human demographics (the effects of population size on pathogen diversity and the spread of epidemic waves). There may also be a sampling bias, with previously known or major types of diseases or epidemic events receiving particular attention, and conversely, other diseases, whose exact etiological origin has not been established, being classified under generic terms such as "influenza syndrome" or "infectious pneumonia". There is also a tendency to underestimate co-infections, which has consequences for the recording of infectious agents in circulation, including those of animal origin (Razzauti et al. 2015 Plos NTD, Moutailler et al. 2016, Plos NTD).

LACK OF KNOWLEDGE OR ANALYTICAL BIAS

There may be a bias in how these events are counted, especially if the etiological origin or mode of transmission of a pathogen is not known, as is the case at present for the SARS-CoV-2 virus responsible for Covid-19. In addition, although the discovery of new viral entities has increased since the second half of the 20th century, it is unclear whether these are indeed new species and whether they can be considered pathogenic to humans (Woolhouse et al. 2008, Proc Biol Sci). There is still confusion between the notion of microbe and pathogen, one not necessarily being the other. Furthermore, new microbes are nowadays mainly characterized by molecular sequencing, which does not inform on whether these particles or cells are viable and at what density they infect organs (the notion of inoculum) (Hosseini et al. 2017, Phil. Trans. R. Soc. B). Many endemic diseases, of which many are of zoonotic origin, do not sufficiently mobilise decision-makers and the public and private sector. These diseases affect nearly one billion people, especially in tropical countries (for Africa, see Hotez and Kamath 2009, Plos NTD). To reverse this trend, several of these diseases have been put on the WHO's "neglected tropical disease" list. Lack of data for these diseases also

introduces a bias in the case count (under-reporting, confusion with other diseases).

NEED FOR RESEARCH

It would be interesting to refine this trend by determining the proportion of zoonotic diseases that are transmitted by wildlife and by domestic animals, and assess the relative importance of these groups in disease emergence. In addition, improvement in diagnosis without a priori knowledge (exploratory infectiology) would make it possible to uncover new or underestimated infectious agents that may be responsible for specific outbreaks (the subject of attribution), whereas at present they are linked to outbreaks of syndromic origin.

SPECIAL CASE OF COVID-19

Covid-19 is due to the emergence of a coronavirus-type infectious agent that belongs to a known viral family with previously identified risk factors (Cheng et al. 2007, Clin Microbiol Rev). However, the host species of origin and the modes of transmission of the virus causing this pandemic are not precisely known to date.

SHEET 2

Are there more contacts between humans and wildlife, and if so, why?

CONSENSUS

Changes in land use, particularly the exploitation of forests in intertropical regions, bring humans in contact with microorganisms (Karesh et al. 2012, The Lancet, Jones et al. , 2013 PNAS, Combe et al. 2019, Emerg. Microbes Infect.). Recent assessments have shown an increase in deforestation in different parts of the world, with 100 million hectares of forest lost between 1980 and 2000 (IPBES 2019, IPBES Secretariat). Wildlife trade is also expanding, but the situation regarding poaching is harder to quantify because of the clandestine nature of this activity, which affects the poorest populations (Can et al. 2019, GECCO). In developed countries, urban greening, certain forms of rewilding , outdoor activities (Millins et al. 2017, Phil Trans, Kilpatrick et al. 2017, Phil Trans, Sandifer et al. 2015, Ecosyst Serv), as well as the demand for new species of

Illegal wildlife trade in Myanmar. Photo: Dan Bennett.

pets (e.g. cases of Monkeypox in the United States, Bernard and Anderson 2006, EID) could promote contacts between humans, wildlife and infectious agents. These elements point to an increase in contacts between humans and wildlife (Symes et al. 2018, Nat Comm).

DISSENSUS

Globally, biodiversity loss could ultimately reduce human/wildlife contacts, simply due to a lack of wildlife, although the situation may differ greatly from one region of the world to another. However, it is important to clarify what is meant by “biodiversity loss”, as this loss may benefit a small number of species (for example, certain human commensal species) that are potentially involved in zoonotic diseases. Nevertheless, the proportion of wild species without any contact with humans is undoubtedly decreasing, and exposure is on the rise.

LACK OF KNOWLEDGE OR ANALYTICAL BIAS

Studies quantifying these contacts are lacking, particularly on a local scale. Studies of socio-ecosystems with limited contacts or few outbreak occurrences are also lacking (Duvall 2008, Landscape Ecol., Leblan 2017 EHESS Coll. “En temps & Lieux", Guégan et al. 2020, Env. Res. let.). Moreover, the notion of "contact" is relatively imprecise: in the literature, a distinction is made between "direct" contact (physical exposure to body fluids from an infected animal, but also exposure to aerosols) and "indirect" or "secondary" contact (via fomites, excreta or vectors sharing the same habitat as humans). In addition, the notion of "close contact" may refer to bodily proximity both with and without physical contact (Narat et al. 2017, EcoHealth). Knowledge is also lacking regarding the effects of spatial planning (of protected areas) on exposure risk (i.e. area size and shape influence the quantity of borders (fractal dimension of the fringes) and thus the amount of interaction with the wild) (Hosseini et al. 2017, Phil. Trans. R. Soc B).

NEED FOR RESEARCH

Clearly, approaches that are similar to those proposed by Rulli et al. (2017, Sci Rep) and Olivero et al. (2017, Sci Rep), which consider the spatial topology of different environments (urban and peri-urban environments, agricultural and livestock areas, natural ecosystems), their interaction and their evolution, should be developed. Planning scenarios should also be analysed and interpreted in the light of the microbiological hazards present, and the level of exposure and vulnerability of individuals and populations. Studies that model land fragmentation and human/wildlife contacts (Faust et al. 2018, Ecol Lett, Bloomfield et al. , 2020, Landscape Ecology) could be followed up with an analysis of their impact on infectious risk.

SPECIAL CASE OF COVID-19

Studies on the bats (flying foxes) responsible for transmitting the Hendra virus have been carried out (Plowright et al. 2011, Procs B). However, data is lacking for horseshoe bats, several species of which could be involved in the emergence in China of the coronavirus causing Covid-19. It has already been shown that human presence constitutes a stress factor for bat colonies and induces changes in their social behaviour (Ancillotto, et al. 2019, LUP). Conversely, certain human socio-cultural practices may promote contact with bats (Ohemeng et al. 2017, Anthrozoös). Viruses that are phylogenetically close to the one that caused the Covid-19 crisis have been identified in horseshoe bats (Lau et al. 2005, PNAS, Li et al. 2005, Science, Hu et al. 2018, Emerg Microbes Infect, Zhou et al. 2020, Nature) and pangolins (Lam et al. 2020, Nature). The latter are sold in large numbers on Asian markets for food and pharmacopoeia (Challender et al. 2020 in "Pangolins", Elsevier), and are also "kept" on wild animal farms (‘t Sas-Rolfes and Challender 2020 in "Pangolins", Elsevier), providing much opportunity for contact with humans and interaction with other species. These conditions facilitate the emergence of new viruses.

SHEET 14

What are the evidence-based links between zoonotic diseases and the development of bushmeat consumption and wildlife trafficking associated with traditional pharmacopoeia?

CONSENSUS

The link between bushmeat consumption and trade and emerging infectious diseases has been established in several cases (such as the shift from SIV to HIV, Ebola and SARS) (Karesh et al., 2005, Emerg Infect Dis, Swift et al. 2007,

EcoHealth). The number of zoonoses related to bushmeat consumption is believed to be currently underestimated (Gomez and Aguirre 2008, Ann N Y Acad Sci, Kurpiers et al. 2016, Problematic Wildlife). The bushmeat chain poses a greater risk than the local meat chain (in the way carcasses are processed, meat is stored and consumed, etc.). However, bushmeat trade participants and consumers remain poorly informed about the health risks or do not comply with health management measures, thus extending the risk of infection to the entire meat chain (from hunter to consumer) (Greatorex et al. 2016, Plos One, LeBreton et al. 2006, An Cons, Kamins et al. 2015, EcoHealth). The bushmeat trade tends to be organized regionally in large urban markets (Edderai and Dame 2006, Oryx), and is now expanding internationally via air and sea trade routes (Brown 2004, Rev Sci Tech, Temmam et al. 2017, Transbound Emerg Dis). To meet this demand, wild game from a wide range of species is sold in very large volumes (Chaber et al. 2010, Cons Lett, Cronin et al. 2015, Plos One). These factors (high volume and diversity of species involved, high human density) provide favourable conditions for the emergence and transmission of pathogens (Karesh and Noble 2009, Mount Sinaï J Of Medecine).

However, the most important factor seems to be direct contact with wild animals when hunting, holding animals captive (sometimes) and preparing carcasses for the bushmeat trade. Stress conditions associated with the capture and holding of animals could also increase the risk of pathogen transmission.

The risks associated with traditional pharmacopoeia are reduced once living organisms have been caught and handled, because products are often highly processed (packaged, cooked or dried, reduced to powder, or only specific parts are processed).

Additional literature: Narat et al. 2017, EcoHealth; Nahar et al. 2020, EcoHealth, Kolodziej-Sobocinska and Miniuk 2018, Medycyna weterynaryjna, Mwangi et al. 2016, African J. of Wildlife Research, Greatorex et al. 2016, PLOS One, Nauman et al. 2017, in Trends in game meat hygiene.

Bushmeat cooking in Cameroon (Ngog-Mapubi). Photo: Eric Freyssinge

DISSENSUS:

The traditional dimension of these activities has been questioned. The development and/or globalisation of these practices potentially scale up their impact; in particular, an increase in volume and rate of resource exchange may increase the number of pathogens. These commercial bushmeat chains can also weaken local populations by competing with them for their food.

LACK OF KNOWLEDGE OR ANALYTICAL BIAS

Practices that may cause zoonoses, other than the consumption of bushmeat, are harder to investigate: taming wild species, consuming the same fruits (cultivated or wild), sharing habitats and having contact with body fluids and excreta (Narat et al. 2017, EcoHealth, Muehlenbein 2017, Am Journal of Phys Anthr).

The trade in exotic pets, in particular the trade in new “pet” species to supply an increasingly frantic market, poses a real threat of introducing new microbial agents, including human pathogens, as was the case with the Monkeypox virus in Atlanta in the early 2000s (Smith et al. 2017, EcoHealth).

NEED FOR RESEARCH

Research using economic and ethno-ecological approaches (in particular, the study of communities that practice hunting and wild game "preparation") could provide valuable insights. Systematic (i.e. nontargeted) virological and serological screening of animals sold on markets could provide a better estimate of the risk. Increased surveillance of the main platforms for wildlife trade in cities could be an effective strategy to prevent the risk of disease emergence.

SPECIAL CASE OF COVID-19

As the precise circumstances of the emergence of the coronavirus causing the Covid-19 outbreak have not yet been established, bushmeat consumption cannot be implicated with any certainty at this stage, although the latest data suggest that pangolin, which is intensively consumed in China and South East Asia, could be a potential intermediate host for SARS-CoV-2 (Xiao et al. 2020, Nature; (Hassanin et al., 2020, Mammalia).

SHEET 20

Could the management or eradication of wild species or populations that are likely to cause zoonoses be an alternative? How can we avoid the negative reactions in certain sections of the population to species seen as potential sources of zoonotic diseases and epidemics?

CONSENSUS

The first question refers in part to previous sections (SHEET 6 and SHEET 8) on the taxonomic groups (excluding invertebrates) that are likely to be sources of zoonotic diseases or act as potential intermediate hosts. This question only makes sense from a scientific point of view if we can accurately identify which higher taxonomic groups, possibly even species, are most likely to be involved in new outbreaks of zoonoses. This is not always possible, although there is consensus as to the potential role of certain higher groups (e.g. Rodentia, Chiroptera, primates, Artiodactyla, Carnivora, in descending order of importance) for the transmission viruses, and in certain specific cases where the species responsible for the outbreak has been clearly identified. However, scientists are not the only ones with a say on this issue, especially when the press, the public or political figures start blaming particular taxa, such as bats, which then become the object of rejection by affected populations who will demand the removal or elimination of these animals.

The pure and simple elimination of a particular taxon, entire populations or sub-populations in a given area, beyond the ethical problems it raises, is problematic and raises the question of the impact the loss of this population would have on the ecosystem. This solution can only be envisaged in the case of invasive species. Nonetheless, drastic reductions in host populations are regularly proposed. Yet, beyond the fact that this practice is increasingly seen as unacceptable by society, it may be counterproductive in terms of health objectives. In certain specific cases, reducing host population density has significantly helped resolve a health crisis: for example, the culling of wild boars has contributed to the management of African swine fever outbreaks in

Europe. The elimination of individuals can also contribute, alongside other methods, to controlling local outbreaks of, for instance, tuberculosis in badgers or brucellosis in ibexes. In other cases, the large scale indiscriminate elimination of individuals often has a disruptive effect which increases disease risk. This has been shown for instance for rabies and echinococcosis. The relative failure of badger culls in England in reducing the prevalence of bovine tuberculosis is very illustrative at this level and has just led the British government to abandon this practice, which was not well accepted by the public. In Uganda in 2008, a local population of flying foxes (bats) was almost completely exterminated, and the caves that sheltered them were sealed off, following cases of haemorrhagic fever linked to the Marburg virus. This resulted four years later in a serious epidemic, caused by the Marburg virus, associated with the return of a bat population that was much more infected than the one that was present in 2007-2008.

The use of genetic control methods (genome editing, gene drive, CRISPR-Cas-9) in mammalian populations to locally eradicate host populations of pathogens will also have to be limited, considering the risk of spreading these genetic modifications in the wild or transferring them into other species, and the ethical issues raised by these prospects. When it is possible, the vaccination of humans, domestic or farm animals but also of wild hosts is an effective solution (e.g. rabies in Europe and the New World, foot and mouth disease in South Africa, Kyasanur forest virus, Nipah virus, etc.). Vaccination is considered an option for Ebola in great apes, particularly in "habituated" populations (scientific and tourism activities) and for reducing the transmission of bovine tuberculosis (bTB) by badgers in Great Britain. Vaccination of wild boars in Spain and brushtail possums in New Zealand is also being considered to control bTB. The best example of successful wildlife vaccination remains the eradication of terrestrial rabies in Western Europe through the vaccination of foxes. Rather than considering culling wild animals, human populations should keep away from potential hosts of zoonotic diseases and ensure the same, as far as possible, for farmed animals and pets. This includes hunting, handling and consuming wild species that are potential hosts for pathogens. The knowledge acquired on the behaviour of these hosts can be used to limit their access to resources or habitats and protect against the

Pangolin by Nach Barnebenan.

risk of contamination (e.g. bats of the genus Pteropus, which are sources of the Nipah virus in Asia). Better waste and food resource management can help avoid attracting wildlife close to human habitations and thus reduce the risk of transmission. Education, especially of children, can help reduce the risk of direct interaction with wildlife by teaching them to not handle these animals.

In order to avoid negative reactions in certain populations to species perceived as potentially dangerous (or conversely species seen as totemic, sacred, untouchable), investment in raising awareness and education is essential. This investment has to be adapted to the cultural particularities of different human societies. In particular, it should be stressed that although an animal can, under particular circumstances, spread a pathogenic agent, this does not alter its role in the functioning of an ecosystem and thus in the maintenance of the major life cycles that are indispensable to humans. Scientists have a role to play here to avoid contributing to the stigmatization of certain taxonomic groups.

Bibliography: Kikuti et al, 2011, Zoon. Pub. Health, Harrison et al, 2011, Biol. Conserv., Amman et al. 2014, Em. Infec. Dis., Thanapongtharm et al. 2015, BMC Vet. Res., Ajesh et al. 2016, Zoon. Pub. Health, Leendertz et al, 2017, Mam. Rev., De Vos et al. 2016, Ecol. and Soc., Velasco-Villa et al. 2017, Antiviral Res., Sutherland et al, 2018, TREE, Carter et al, 2018, Plos One, Singh et al, 2019, Vet. Quarter., Parsons et al, 2019, Microb. Biotech., Ham et al, 2019, J. Appl. Ecol., ANSES, 2019, Prentice et al, 2019, J.R.S.Interface, Miguel et al, 2020, Nature Comm Biology).

DISSENSUS

No dissensus apart from the fact that it is difficult to attempt to specifically regulate species or populations without (i) being certain that they are involved in a zoonosis and (ii) without placing this strategy within a wider approach that considers the functioning of biological communities and the interactions that take place within them.

LACK OF KNOWLEDGE OR ANALYTICAL BIAS

It is difficult to have a clear idea of the consequences of management/regulation strategies, given the complexity of ecosystem interaction networks. There are a few studies on the eco-epidemiological consequences of management/regulation strategies (although this topic could be better documented); there is, in particular, a significant lack of studies on the evolutionary consequences (e.g. evolution of virulence; impact on genetic and immunogenetic diversity, impact on the immune response...) of these strategies. (Sarrazin & Lecomte 2016, Science, Jorgensen et al. 2019, Annu. Rev. Ecol. Evol. Syst).

NEED FOR RESEARCH

There is a need to develop studies on the evolutionary consequences of wildlife management strategies. Investment in the dissemination of scientific knowledge is also needed so that human practices can evolve to take into account the ecology of animals that are likely to spread pathogens.

SPECIAL CASE OF COVID-19

Reduce illegal wildlife trade, end bushmeat consumption including the consumption of species that are potentially involved in zoonoses, implement reasoned and science-based population management of these species.

SHEET 21

Can the development of protected areas help reduce the risk of zoonotic diseases? What are the processes involved and what would be the required level of protection?

CONSENSUS

If we consider that there is a link between biodiversity degradation and the occurrence of zoonoses (see fact sheets 9-12), and that it can be explained, to a large extent, by increased contact between humans and wildlife, either from increased human presence in natural habitats or the destruction of these habitats through land use changes (e.g. deforestation), then the option of reducing these contacts by establishing protected areas, where both land use and human incursions into natural habitats, and associated activities including wildlife harvesting, are strictly limited, makes sense.

In addition, from an ecological point of view, and even if there is some disagreement within the scientific community, the hypothesis that maintaining biological communities with high species-level diversity within protected areas would

prevent the emergence of major disease-causing pathogens reinforces the importance of having protected areas (SHEET 22).

Such as policy promoting the development of protected areas can be achieved by creating new areas, expanding existing areas and, above all, increasing their protection level (i.e. by further reducing human activity), even though the current trend worldwide is to reduce actual protection levels.

Still, we face multiple and complex challenges. Protecting biodiversity implies that we are effectively also protecting potential sources of zoonoses. It also means managing the interface between protected areas and peripheral areas of human activity, where contacts occur, in particular between domestic animals and wildlife, and paying particular attention to urban expansion near protected areas. At this level, a fractal dimension of boundaries should be minimized.

Protecting biodiversity also means limiting resource extraction and exploitation, while taking into account and managing the need of certain populations for bushmeat. It also means better regulation of tourism and recreational activities that are a source of contact between humans and wildlife, and of reciprocal pathogen transmission, even though these activities provide an income for local populations and contribute to different aspects of human well-being.

We are therefore faced with issues of social acceptability, political and economic constraints and the need to educate the public given the growing concerns surrounding the risk of zoonoses and epidemics; there may be concerns over the establishment of new protected areas and the future of existing ones may be called into question. Clearly, this type of strategy, beyond the conceptual evidence in support of it, must be implemented at the appropriate territorial scale. This means encouraging dialogue with local populations, who may play a role in protection and access regulation (sacred or community forests), all the while acknowledging the dual imperative of protecting biodiversity and limiting the transmission of pathogens to humans, farm animals or wildlife.

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DISSENSUS

There is a recurring debate within the scientific community as to whether the development of protected areas should be prioritised over other approaches of biodiversity conservation that may also lead to an improved management of the relationship between humans and wildlife. These dissenting views are related in part to the ongoing debate between land sharing (Leblan 2017, EHESS Coll. "In Time & Place") and land sparing (Oates 1999, Univ Cali Press) and do not directly address the issue of zoonoses. As indicated above, the hypothesis that maintaining biological communities with high species diversity would prevent the emergence of major disease-causing pathogens remains controversial (see the dilution effect hypothesis - i.e.the negative correlation between host richness and host infection levels, see fact sheet 22- versus the amplification hypothesis). These two hypotheses are certainly not mutually exclusive and may depend on the spatial scale of analysis. Overall, it is likely that the relationship between biodiversity and disease risk is not linear.

LACK OF KNOWLEDGE OR ANALYTICAL BIAS

Current knowledge of the mechanisms underlying the emergence patterns of zoonotic diseases is still too patchy to accurately estimate the benefits that can be derived from different strategies of large-scale biodiversity conservation.

NEED FOR RESEARCH

Research is needed at different levels, from understanding the mechanisms linking biodiversity, pathogen diversity, the prevalence of pathogens in their respective hosts and zoonosis risk, to a better assessment of the health benefits that can be expected from having protected areas (and the impact of different protection levels, up to the highest), without neglecting the cost-benefit aspect of these measures compared to other modes of public health interventions. The

EcoHealth paradigm could be associated with the concept of resilience and landscape-level epidemiological data. A major investment in research is needed, both nationally and internationally.

SPECIAL CASE OF COVID-19

There is no specificity associated with the Covid-19 phenomenon at this level. Choosing a strategy with the dual objective of preserving biodiversity and reducing the risk of zoonoses, and informed by scientific evidence and work that is needed to fill the gaps in our knowledge, should make it possible to partly reduce the risk of new occurrence of such pandemics. • Read the full report here.

A SURVEY WAS RELEASED IN PARTNERSHIP WITH THE ICCA CONSORTIUM ON COMMUNITY IMPACTS OF AND RESPONSES TO COVID-19. IT IS DESTINED FOR COMMUNITIES AND ORGANISATIONS THAT WORK WITH THEM. CLICK HERE TO PARTICIPATE.

Announcements

PANORAMA
SOLUTIONS FOR A HEALTHY PLANET

Zooterra

Zooterra is reimagining how we support nature through a patent-pending product that gives users a direct, transparent and fun way to help protect wildlife and natural habitats. On the platform, users can buy a digital token called terra associated with natural areas and wildlife from around the world. Proceeds from terra sales directly support projects linked to the areas and wildlife selected. Zooterra transforms the existing user experience for people who want to support nature conservation by providing:

- Ownership and gamification through digital collectibles called terras linked to specific natural areas and wildlife
- Transparency by funding specific projects
- Understanding impact through stories and project updates
- Personalization through a unique experience for each user

By associating defined areas of natural land into unique collectibles, Zooterra gives people a window into nature and a stake into its survival.

Kasigau Wildlife Corridor, Kenya
© Wildlife Works & Zooterra

Full article: here.
More info on Panorama: here.

Conservation Pilot with WCS

Where? Bamingui-Bangoran National Park and Manovo-Gounda-St. Floris Park Landscape region in northern CAR

Applications deadline: 18 September 2020

>> Click here to access full job description <<

Conservation Pilot with WCS

Where? Okapi Wildlife Reserve in Northeastern, DRC

Applications deadline: 23 September 2020

>> Click here to access full job description <<

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