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How to Live Safely with Bats? Ignorance(s) in post-Ebola Risk Communication (Guinea, Sierra Leone)

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Abstract

The 2013–6 Ebola disease epidemic in West Africa drove a surge of environmental communication campaigns in regions considered at-risk for Ebola, despite uncertainty about the disease's transmission pathways from animals to humans. This article examines fractures in knowledge produced through the communication of an unstable truth about the risk of contracting Ebola from an animal source. It presents sources arising from efforts of risk communication in Guinea: excerpts from community outreach materials and documented scenes of verbal jousting between communication agents and their audience, in which the status of animals, and in particular bats, as the reservoir of the Ebola virus is an object of controversies between US infectious disease experts, Sierra Leonean and Guinean project employees and residents of Forest Guinea. Several types of ignorance structure community outreach activities: reductionism inherent to "risk behaviour" research, strategic ignorance in risk communication, ignorance as an epistemic marker of social status, and the socio-political uncertainty in which post-Ebola interventions take place. Using insights from the anthropology of ignorance and development studies, I argue that asymmetries in ignorances, plural and contingent, structure risk communication and its impotence in reforming local lifeways defined as "risk behaviours."

Keywords: zoonotic disease, risk, Ebola, environmental knowledge, ignorance.

Résumé

Comment vivre en sécurité avec les chauves-souris ?

Ignorance(s) et communication sur les risques post-Ebola (Guinée, Sierra Leone)

En décembre 2013, l'épidémie d'Ebola la plus meurtrière à ce jour démarrait dans une région du sud-est de la Guinée, nommée Guinée forestière. Cette épidémie a depuis donné lieu à une vague de campagnes de communication environnementale dans les régions considérées à risque d'Ebola, et en particulier en Afrique de l'Ouest, en dépit d'incertitudes sur les voies de transmission de la maladie des animaux aux humains. Cet article examine les fractures générées par la communication d'une vérité instable sur le risque de contracter Ebola d'une source animale.

Il est fondé sur seize mois d'observation participante, d'entretiens et d'interactions informelles avec les agents d'échantillonnage et sensibilisateurs du projet PREDICT, un consortium créé en 2009 et financé par l'agence américaine USAID pour la détection de pathogènes émergents – une constellation d'intérêts et de technologies en faveur d'« Une seule santé », le paradigme institutionnel aujourd'hui dominant qui promeut une approche holistique de la santé humaine, animale et environnementale. PREDICT a employé dans ce cadre, durant plus de deux années, des professionnels guinéens – essentiellement vétérinaires, beaucoup d'entre eux originaires de Guinée forestière. Ils ont échantillonné des milliers de chauves-souris et de rongeurs, conduit une enquête qualitative, et enfin, mené une campagne de communication sur les risques de maladie zoonotique. L'article présente des sources mises en jeu par cette dernière phase de communication sur les risques en Guinée : extraits de matériel de sensibilisation et scènes de joute verbale, dans lesquels le statut d'animaux comme réservoir d'Ebola, en particulier celui des chauves-souris, est l'objet de controverses entre experts états-uniens sur les maladies infectieuses, sierra-léonais et guinéens employés par PREDICT, et résidents de Guinée forestière. Au lieu de critiquer l'imposition unilatérale des savoirs et ignorances environnementaux, et leur pouvoir sur le gouvernement des conduites, l'analyse est centrée sur leur appropriation, leur performativité et leur subversion par les professionnels de PREDICT et les membres du public sensibilisé. Plusieurs types d'ignorances structurent en effet la « boîte à images » (le fascicule support de la plupart des activités de sensibilisation dans le monde du développement), ainsi que sa réalisation et son usage.

Avant même que les résultats de son échantillonnage ne soient connus, le consortium PREDICT développait le livret « Comment vivre en toute sécurité avec les chauves-souris ». Une première partie de l'article décrit le livret et met en lumière les contrastes discursifs et visuels entre un diagramme d'infection axé sur la chasse aux chauves-souris, une liste hétéroclite de pratiques domestiques et d'élevage à éviter, et des explications sommaires quant à la dangerosité des chauves-souris. La notion de « contact avec les chauves-souris », centrale et pourtant vague, fait montre d'une forme d'« ignorance stratégique », par laquelle les zones de flou dans la compréhension de l'écologie des maladies zoonotiques sont activement mobilisées en vue de limiter toute interaction entre humains et chauves-souris. La deuxième partie de l'article s'intéresse à la réalisation du livret et aux processus de traduction qui l'ont sédimenté à partir d'une enquête diligentée par PREDICT sur les « comportements à risque », dont les données relatives à la Sierra Leone ont été publiées du fait de la détection d'une nouvelle espèce de virus Ebola dans le pays. Les discussions lors de l'atelier de travail sur le livret, en Sierra Leone, révèlent la part prise par la production de données sur les « comportements » dans la fabrique de normes, et la manière dont elles omettent les processus spatio-temporels et les rencontres quotidiennes inter-espèces qui rendent possible l'émergence de maladies – une traduction

sélective activement influencée par les enquêteurs de PREDICT, à la manière de « courtiers en développement ». Une troisième partie porte enfin sur les mécanismes qui sous-tendent la campagne de communication sur les risques menée en Guinée forestière. La discussion est fondée sur leurs interactions avec des écoliers et lors d'assemblées publiques, et leurs réflexions sur l'opportunité d'exprimer des doutes quant aux preuves scientifiques sur le réservoir et la transmission d'Ebola. Admettre son ignorance des risques et accepter de prendre des précautions sont des attitudes qu'ils encouragent en vue d'une réforme de la société guinéenne, et qui marquent une hiérarchie sociale donnant l'ascendant aux « scientifiques », c'est-à-dire à la classe moyenne éduquée dont les agents du projet sont issus. Ils se risquent donc à aménager leur discours, du moins dans des contextes où l'incertitude sociopolitique est levée et la menace de violences à l'encontre du personnel de projets médico-scientifiques faisant suite à l'épidémie d'Ebola semble écartée.

Agir sur les risques environnementaux, dans une situation postcoloniale, revient à entremêler recherche et intervention plutôt qu'à suivre un script temporel où les preuves scientifiques établies nourrissent les politiques d'intervention. On soulève néanmoins ici la question de la valeur d'usage du savoir – et de l'ignorance – générées par une telle recherche-intervention. En dernière instance, les incompréhensions, l'agressivité, et les questions pleines d'humour provoquées par les réunions de sensibilisation dégagent un certain scepticisme à l'égard des appels à vivre à côté des chauves-souris, plutôt qu'« avec » elles peut-être. À la lumière de l'anthropologie de l'ignorance et des études de développement, l'article démontre que des asymétries d'ignorances, plurielles et contingentes, modèlent la communication sur les risques et expliquent en partie son impotence à réformer les modes de vie vus comme « comportements à risque ».

Mots-clés : maladie zoonotique, risque, Ebola, savoir environnemental, ignorance.

Resumo

Como viver em completa segurança com morcegos e o que se ignora sobre eles:

Ignorância e comunicação sobre os riscos pós Ébola (Guiné, Serra Leoa)

Em Dezembro de 2013, a epidemia de Ébola mais mortífera até então tinha início numa região do sueste da Guiné, denominada Guiné florestal. Posteriormente esta epidemia deu lugar a uma vaga de campanhas de comunicação ambiental nas regiões consideradas de risco de Ébola, em particular na África ocidental, a despeito as incertezas quanto às vias de transmissão da doença dos animais aos humanos. Este artigo examina as fracturas geradas pela comunicação de uma verdade instável sobre os riscos de contrair o Ébola a partir de uma origem animal.

Tem por base dezasseis meses de observação participante, entrevistas e interações informais com os agentes de recolha de amostras e os sensibilizadores/activistas do projecto PREDICT, um consórcio criado em 2009 e financiado pela agência americana USAID para a detecção de patogénicos emergentes – uma constelação de interesses e de tecnologias a favor de «Uma única saúde», o paradigma institucional hoje dominante que promove uma abordagem holística da saúde humana, animal e ambiental. PREDICT empregou, neste quadro, durante mais de dois anos, profissionais guineenses – essencialmente veterinários, muitos dos quais originários da Guiné florestal. Recolheram amostras de milhares de morcegos e de roedores, conduziram uma pesquisa qualitativa e finalmente levaram a cabo uma campanha de comunicação sobre os riscos de doenças zoonóticas. O artigo apresenta as fontes utilizadas nesta última fase de comunicação sobre os riscos na Guiné. Excertos de material de sensibilização e cenas de competições verbais, em que o estatuto dos animais como reservatório do Ébola, em particular o dos morcegos, é objecto de controvérsia entre

especialistas norte-americanos sobre as doenças infecciosas, funcionários do PREDICT da Serra Leoa e da Guiné, e residentes da Guiné florestal. Em vez de criticar a imposição unilateral dos saberes e das ignorâncias ambientais, e do seu poder sobre a gestão dos comportamentos? A análise centra-se na sua apropriação, performatividade e subversão pelos profissionais do PREDICT e pelos participantes sensibilizados do público. Vários tipos de ignorância estruturam com efeito a «caixa de imagens» (o fascículo suporte da maior parte das actividades de sensibilização no mundo do desenvolvimento), assim como a sua realização e uso.

Antes mesmo de os resultados da sua recolha serem conhecidos, o consórcio PREDICT produzia o livrete «Como viver em segurança com os morcegos». Uma primeira parte do texto descreve o livrete e destaca os contrastes discursivos e visuais entre um diagrama de infecção centrado na caça aos morcegos, numa lista heteróclita de práticas domésticas e de produção animal a evitar, e explicações sumárias quanto ao carácter perigoso dos morcegos. A noção de «contacto com os morcegos», central e no entanto vaga, demonstra uma forma de «ignorância estratégica», através da qual as zonas cinzentas na compreensão da ecologia das doenças zoonóticas são activamente mobilizadas com vista a limitar qualquer interacção entre seres humanos e morcegos. A segunda parte do artigo debruça-se sobre a realização do livrete e sobre os processos de tradução que o concretizaram a partir de uma pesquisa diligenciada por PREDICT sobre os «comportamentos de risco», cujos dados relativos à Serra Leoa foram publicados devido à detecção de uma nova espécie do vírus do Ébola no país. As discussões durante a sessão de trabalho sobre o livrete, na Serra Leoa, revelam a parte ocupada pela produção de dados sobre os «comportamentos» na produção de normas, e a forma como omitem os processos espaço-temporais os contactos quotidianos inter-espécies que tornam possível a emergência de doenças – uma tradução selectiva activamente influenciada pelos pesquisadores de PREDICT, ao estilo de «corretores do desenvolvimento». Finalmente uma terceira parte foca os mecanismos subjacentes à campanha de comunicação sobre os riscos, realizada na Guiné florestal. A discussão baseia-se na sua interacção com estudantes e nas assembleias públicas, e sobre as reflexões sobre a oportunidade de exprimir dúvidas quanto às provas científicas sobre o reservatório e a transmissão do Ébola. Admitir a ignorância dos riscos e aceitar tomar precauções são atitudes encorajadas tendo em vista uma reforma da sociedade guineense, que marcam uma hierarquia social dando ascendência aos «científicos», isto é, à classe média instruída de que provêm os agentes do projecto. Arriscam-se portanto a adaptar o seu discurso, pelo menos nos contextos em que a incerteza sócio-política está eliminada e a ameaça de violência contra o pessoal dos projectos médico-científicos, que se seguiu à epidemia de Ébola, parece afastada.

Actuar sobre os riscos ambientais, numa situação pós-colonial, leva a que se misturem investigação e intervenção de preferência a seguir um plano temporal em que as provas científicas estabelecidas alimentem as políticas de intervenção. Levanta-se, no entanto, aqui a questão do valor de uso do saber - e da ignorância - gerados por tal investigação-intervenção. Em última instância, as incompreensões, a agressividade e as perguntas cheias de humor provocadas pelas reuniões de sensibilização deixam talvez escapar um certo cepticismo em relação aos apelos para viver ao lado dos morcegos, em vez de «com». À luz da antropologia da ignorância e dos estudos de desenvolvimento, o artigo demonstra que assimetrias de ignorância, plurais e contingentes, modelam a comunicação sobre os riscos e explicam em parte a sua impotência em reformar os modos de vida considerados «comportamentos de risco».

Palavras-chave: doença zoonótica, risco, Ébola, saber ambiental, ignorância.

How to Live Safely with Bats?

Ignorance(s) in post-Ebola Risk Communication (Guinea, Sierra Leone)

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This document, a 24-page booklet, is one of the 13 adapted versions produced by the PREDICT Consortium, see: <https://p2.predict.global/living-safely-with-bats-book> [archive].

It is provided as a United States Government Work and is free of copyright. It has been uploaded to Nakala, which guarantees long-term access to the resource.

Introduction

In December 2013, an outbreak of Ebola disease started in a region of rural south-eastern Guinea known as Forest Guinea, from where it went on to strike major cities of Liberia, Sierra Leone, and Guinea. The outbreak resulted in a total of 28,616 reported cases and 11,310 deaths according to the WHO. In the aftermath, fear that the disease may be maintained by a natural disease reservoir in the region drove a surge of prevention campaigns to raise community awareness about the zoonotic risk of Ebola. Since the first 1976 Ebola outbreak in then Zaire, disease experts have hypothesized an animal reservoir for the Ebola virus. This hypothesis has shaped prevention campaigns to promote practices—such as the avoidance of bushmeat hunting—to mitigate the risk of infection. Yet lacunas remain regarding the ecological dynamics of the Ebola virus disease, including the animal reservoirs in which the virus is maintained in given environments and the mechanisms by which it is transmitted to human and nonhuman hosts (Leendertz *et al.* 2016). Drawing on the anthropology of ignorance and development, this article examines fractures in knowledge produced by the communication of an unstable truth about the risk of contracting Ebola from an animal source. It presents sources arising from efforts of risk communication in Guinea: excerpts from community outreach materials and documented scenes of verbal jousting between communication agents and their audience, in which the status of bats as the reservoir of the Ebola virus is an object of controversies between US infectious disease experts, Sierra Leonean and Guinean project employees, and residents of Forest Guinea.

In 2017–9, I participated in most of the fifty-five communication sessions organised by the infectious disease research programme PREDICT in Forest Guinea,

which were based on the flipchart discussed in this article. The meetings activated a flurry of questions and provocations, as suggested by the following excerpt from my field notes:

The residents of Nyen, the neighbourhood of N'Zerekore hardest hit by the Ebola outbreak, were informed of our coming by town criers in the morning. Those announced "Ebola communication" although the neighbourhood chief was told yesterday that we'd talk about disease prevention. Communication agent Michel wears a T-shirt he was given by a NGO, with the words "Infection Prevention and Control in an Ebola Outbreak Context" printed on it.¹ He obtained it while working as a lab agent for the Ebola response, back in 2014–5. It is now 8 am and twenty or thirty people slowly gather near the marketplace as they watch our delegation take place (six communication agents and the project manager employed by PREDICT, and myself). We are offered chairs and benches, a lot of people remain standing. After a brief personal introduction, Miche^l, the only one among us who speaks the Kpelle language, locally dominant, prompts people to describe the images that he displays on the flipchart, but no one answers him. "We are just listening to you for now," a man says. [...]

As soon as Michel finishes his presentation, a young man with a cap enquires: "*What diseases do bats have? Where do they take them from?*" Michel translates every question for our attention in French before answering in Kpelle and translating his answer for us. Norbert, another communication agent, whispers in my ear as a way of further translating the question just asked: "*Where do they take diseases... He means, who gives them diseases?*"

Michel lectures on the three diseases that their superiors told them were harboured by bats: rabies, tetanus, and Ebola. In addition, he mumbles something about bats and the "reservoir notion." Someone retorts: "*Does this mean that rabid dogs are infected by bats?*" Leaving no time for an answer, they continue unabated. "*In my classroom, there were many bats in the ceiling. We hunted and ate them, but none of us got sick. Our ancestors have been eating bats for a long time. Does every person who eats bats get Ebola?*" Michel grows visibly unnerved and takes a few steps back towards the veranda where the rest of us sits on the edge of our chairs, and I start screening the space for emergency exits as the project agents taught me. Questions are thrown at him now: "*You told us not to eat fruits left by bats and not to touch their waste. You also said that bat waste can make fruit trees grow. Can we eat these fruits?*" Someone comments that this is a "pertinent" question. Michel starts answering by mentioning "growth cycles" but Dr Bilis, the field manager, neatly responds that "*fruits do not keep the virus in them, only animals do.*" I notice that this answer is ambiguous enough to be understood as contradicting the flipchart message about not touching bitten fruits.

Seeing their colleague struggling, the other agents volunteer to reply directly in French, as they assume that most residents of Nyen, an urban neighbourhood, understand it. They are requested to speak louder so everyone can hear them. One asks what to do "*for prevention, how to eliminate these animals.*" The agents explain that this is difficult and that the consequences of killing bats are grave. Omar, who hails from north-eastern Guinea, breaks his usual silence in exasperation: "*Did we tell you to avoid ducks? Guinea fowls, turkeys? If we talk about bats, that's because we did very advanced research on the animal.*"

Norbert distributes a few miniature bat books and leaflets: "*Since they have questions, here are answers.*" The meeting is brought to an end as we shake hands with the

1. The identities of the research participants have been anonymised. The names used are pseudonyms.

neighbourhood chief and squeeze ourselves in the Land Cruiser parked right nearby in case a prompt exit is needed to escape strife. Breaking the tense silence, Michel sighs angrily and translates what he heard someone say in Kpelle: *“We said no to this Ebola stuff, so why do these outsiders come again and tell us that bats have Ebola?” These villagers of Nyen came to confound us, that’s it.*”

I recorded this scene during a phase of participation observation as I was collecting data for my doctoral research in the N’Zerekore region of Forest Guinea on the making of narratives about Ebola’s origins in the context of large-scale animal sampling operations for research on the disease. Through contacts at the Pasteur Institute and the Food and Agriculture Organization, I had met the Guinean managers of PREDICT, an international research consortium involving US universities, conservation organisations, and a for-profit data analysis venture, launched in 2009 and funded by the United States Agency for International Development to detect emerging pathogens in areas designed as “viral hotspots,” in Africa and Southeast Asia (Jones 2008). In Guinea, PREDICT partnered with ministries, the National Institute of Public Health, the Haemorrhagic Fever lab, and the Superior Institute for Veterinary Science and Medicine—all institutions which benefited from novel investment in epidemic preparedness and disease surveillance in the years after the epidemic. The project employed a dozen young and middle-aged professionals: all university graduates, essentially veterinary doctors with private practices or precarious positions in the livestock administration (there were also some biologists, doctors, and sociology graduates among them). Like Michel, some of them hailed from Forest Guinea, and many of them had found jobs assisting with epidemic containment during the outbreak, a time which they mostly remembered as marked by acts of violence against response workers (Fairhead 2016). Guinea and Sierra Leone, two of the poorest countries in the world with understaffed health systems strained by structural adjustment policies in the 1980s, are places where distrust of elites and outsiders is rooted in a long history of slavery and resource extraction (Wilkinson and Fairhead 2017). Social and political cleavages, however, played out differently in Sierra Leone and Guinea during the Ebola epidemic, whereby Guinea saw continuing episodes of “resistance” to the outbreak response, many of which began in tense discussions such as in Nyen.

In 2017, PREDICT employees had been given temporary contracts as “sampling agents” (*agents d’échantillonnage*) to capture animals by way of nets and traps. They collected samples of saliva, faeces, and blood. The samples were then sent out and analysed for traces of emergent pathogens in the country’s capital, Conakry, and the United States. A couple more agents were recruited for administering questionnaires to people residing in the sampling catchment area and to collect data on the “risk behaviours” thought to expose people to zoonotic diseases. Once the sampling phase was terminated, a few PREDICT staff—who spoke the dominant languages of Forest Guinea—had their contract renewed and were trained to communicate about the results of their labour.

During the outbreak, many anthropologists were enlisted as cultural mediators to troubleshoot community resistance experienced at times by outside healthcare workers (Abramowitz 2017). PREDICT managers enthusiastically endorsed my wish to conduct ethnographic research with them. They saw anthropological interest in their interactions with the communities they visited as self-evident, given past histories of violent encounters. I joined them at the end of the sampling phase, as several thousand animals (mainly rodents and bats) had already been sampled and individual questionnaires administered to hundreds of people.

The project now aimed to reduce the risk of zoonotic diseases through a communication campaign on “living safely with bats.” In 2017–9, I conducted sixteen months of ethnographic fieldwork with the team, actively participating in their activities, repeatedly interviewing them on and off the record, and developing interpersonal bonds during and beyond fieldwork. The nature of this highly mobile fieldwork meant that I had an opportunity to discern the opinions and concerns of Forestier communities through their encounters with the PREDICT project. I grounded my impressions by discussing them in meetings and semi-structured interviews with about thirty medical and veterinarian doctors, authorities from the local Departments of Health, Animal Farming, and Environment, journalists, the employees of other animal sampling projects, and anyone interested in talking about bats and where diseases come from in Forest Guinea.

The *Living Safely with Bats* picture book

The *Living Safely with Bats* picture book, a 24-page long flipchart, was produced in 2018 by the PREDICT consortium “to use scientific results to inform the development of intervention strategies that could reduce the spillover, amplification, and spread of novel viruses” following the discovery of a new species of Ebola virus in Sierra Leone (PREDICT Consortium 2020). Drafted by project managers and qualitative research scientists from consortium member EcoHealth Alliance, the content was determined by simultaneous research on “risk behaviours” in PREDICT’s countries of implementation. It was tested and refined in Sierra Leone and Tanzania, and “benefited from cultural vetting by 17 country teams” before being translated in twelve languages, including Khmer, Amharic and Nepalese. It was primarily delivered by PREDICT employees in the West African countries affected by the Ebola outbreak (Guinea, Sierra Leone, Liberia), but also deployed in different ways in Cameroon, Côte d’Ivoire, the Democratic Republic of the Congo, Ethiopia, Ghana, Kenya, the Republic of the Congo, Rwanda, Uganda, Bangladesh, Cambodia, China, Lao, Indonesia, Malaysia, Myanmar, Nepal, Thailand—where it was used to communicate to street vendors of bats, students, hunters, etc. Miniature copies of the booklet were also distributed to political leaders and teachers. In 2022, the resource—which, being funded by USAID, is provided as a US government work and is free of copyright—was still available on a commercial data storage tool of the University of California Davis.^a My emails to PREDICT, UC Davis, and its One Health institute to ask for permission to archive the resource on a public data repository were unanswered. In keeping with USAID’s policy, we uploaded the document to Nakala (<https://doi.org/10.34847/nkl.b060ar22>), which guarantees long-term access to the resource.

a. Here: <https://ucdavis.app.box.com/v/livingsafelywithbats>.
The service used is Box: <https://www.box.com/>.

Studies of risk governance have detailed how scientific uncertainty is produced through different regimes of knowledge (Shackley and Wynne 1996). A body of work investigates the ways in which decisions are made under conditions of limited knowledge, and in which knowledge about uncertainty stabilises as risk (Stirling 2007; Stirling and Scoones 2009). With respect to the governance of toxic pollution, sociologists Soraya Boudia and Nathalie Jas (2013) have, for example, highlighted successive shifts in the discourse legitimating regulatory policies since the 1960s, away from the goal of limiting pollution and towards assessments based on quantitative thresholds and risk probabilities. Historical catastrophes and failure of regulatory policies, they argue, created a new neoliberal paradigm of “adaptability,” in which individuals are faced to live in an inescapable toxic world and to accept responsibility for informing themselves of “risks” to avoid their own poisoning. Environmental education about zoonotic risks, though not founded in a state-regulated “government of technosciences” (Pestre 2014) *per se*, draws on a similarly “powerless science” (Boudia and Jas 2013) as we will see, whereby the entanglements of scientific research and institutions fail to translate into effective protection.

Initiatives such as PREDICT not only grapple with the effects of human activity on the environment, but also with the uncertainty inherent to “mutant swarms of viruses” (Caduff 2014, 300). Such uncertainties, anthropologists argue, inherently defeat efforts at prediction. They instead dictate a politics of preparedness. As anthropologist Carlo Caduff shows, “not knowing” is not merely a precursor to more knowledge about risk. “Not knowing” is itself a productive force when, for example, pandemic prophecies are converted into possibilities for action by an ethics of precaution. This article follows his lead in looking ethnographically at the work that scientific uncertainty regarding Ebola’s animal reservoir does in the post-Ebola landscape of Forest Guinea. Nonknowledge about the environmental risk of disease is deployed, concealed, or valued differently by situated communities—Sierra Leonean data collectors, US specialists in “behaviour change,” Guinean vets, the rural and urban populations of Forest Guinea attending communication sessions—all of whom are entangled in competing claims about how to live safely with bats. In keeping with the expanding literature on “agnotology” (Proctor 2008)—the exploration of ignorance making, use, and valuation—I use the terms nonknowledge and ignorance interchangeably, and do not make a moral judgement about the myriad processes of unknowing, their strategic character, and their costs.

Rather than highlight the top-down imposition of environmental ignorance as a power engine for the self-government of population, I focus on its appropriation, performance, and critique by professionals and inhabitants of Forest Guinea, who are the target audience of PREDICT’s educational campaign. As “development brokers” (Lewis and Mosse 2006), the people tasked with environmental communication assimilate scientific discourse, and also scientific ignorance, in a particular truth formation dependent upon biographical trajectories, economic livelihoods, and desires for personal progress. I argue that asymmetries in ignorances, plural

and contingent, structure community outreach activities and their impotence in reforming local lifeways. The argument echoes historian Guillaume Lachenal's critique of viral surveillance and related environmental health education in Cameroon as a "nihilistic regime of scientific knowledge" (2015), whereby animals are sampled, viruses detected, and public health bows to neoliberal interventions because "nothing can be done" to prevent diseases from emerging. While Lachenal observed in Cameroon a reluctance to launch education campaigns precisely for fear of scepticism and misunderstandings, I turn my attention to what happens when the professionals involved in a sampling enterprise do not shy away from communicating. The PREDICT flipchart, also known to project agents as the "bat book," is first introduced as a visual artefact that strategically combines knowledge and ignorance about zoonotic risk. I move on to describe the making of the bat book as an encounter between the epistemic reductionism inherent to risk science and the socio-politics of the people involved in translating it. Debates during communication sessions finally show PREDICT agents negotiate multiple forms of ignorance—of animal reservoirs, zoonotic risk, but also crucially of their legitimacy and social position within diverse contexts. I close the paper by reflecting on how people's engagement with zoonotic risk communication subverts its potency.

How to live safely with bats?

The PREDICT project did not release findings from their animal sampling operations in Guinea until 2018. But as early as 2017, a community outreach plan was devised for the populations targeted by its research on Ebola's hosts in West Africa. The "Living Safely with Bats" campaign was based on a visual resource, presented as an "evidence-based" instrument addressing the "behavioural factors" increasing the risk of disease emergence (PREDICT Consortium 2020). The campaign echoes a prevalent "culture of development" in health interventions, which regard the everyday activities, or "behaviours," of targeted populations as needing reform through education (Packard 1997). By analytically describing the images and excerpts from the bat book, I point out how zoonotic risk is visually and discursively problematised in relation to people's lifestyles, integrating several kinds of knowledge and strategically using ignorance about the disease reservoir status of bats. Although the bat book was designed to address all bat-borne diseases, its creation and primary reception in a post-Ebola context mandate its discussion in relation to what is known about animal-human transmission of the Ebola virus.

The flipchart contains six sections associating drawings with texts on the reverse side. The texts are for the presenter to read while the audience observes pictures, a common performance in communication for development. The first section of the bat book gives an overview of why "bats are essential to our ecosystem" by virtue of their contribution to pollination, seed dispersal, and insect population control. The second section opens on page 10 with the statement: "Bats are incriminated as reservoirs for viruses such as rabies and others" and cautions that "killing them or

Living Safely with Bats



PREDICT-2 is part of USAID's Emerging Pandemic Threats (EPT) program and aims to strengthen global capacity for the detection, discovery, and prevention of viruses with pandemic potential, specifically those that can move between animals and people (zoonotic viruses). Implementing partners for PREDICT-2 are the University of California, Davis; EcoHealth Alliance; Metabiota; Smithsonian Institution; Wildlife Conservation Society; and, the partner institutions and governments of the 35 countries in which we have worked.

A goal of the behavioral risk component of PREDICT-2 is to use scientific results to inform the development of intervention strategies that could reduce the spillover, amplification, and spread of novel viruses. Preliminary analyses identified an expressed need to provide behavior change strategies as they relate to living safely with bats. The current resource was developed to address this need.

A moderated picture book format was recommended by local leaders. Subject matter experts from the PREDICT-2 consortium developed an initial draft which was updated based on feedback from country teams and local community members. When the picture book is used in new settings, it is recommended that additional local level feedback be incorporated to tailor the content to the specific context.

Moderation of the picture book is intended to be provided by a trusted community leader, and talking points are provided for each image that the storyteller can use to moderate the discussion. To facilitate this, the document should be printed out such that there is an image on one side with the talking points on the other side. The moderator can then hold up the images to show to the audience, and use the talking points on the back to guide the discussion.

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PREDICT Consortium. 2018. *Living Safely with Bats: Africa Version*

Front cover, credits, table of contents.

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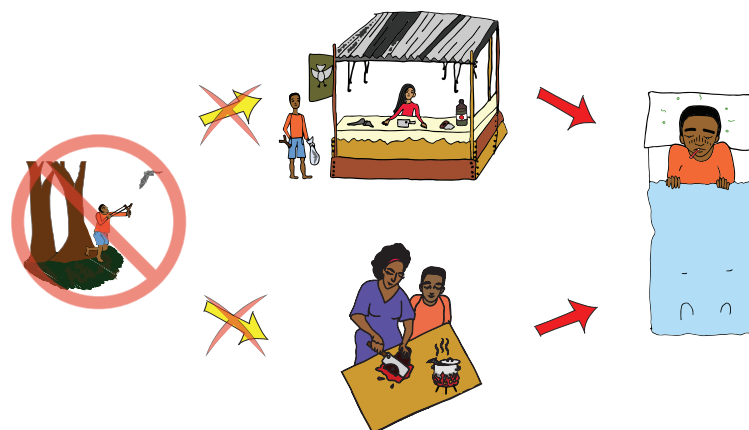
disturbing their natural habitat can worsen disease propagation.” It is thus “preferable not to kill, hunt, cook or eat bats.” This economic calculation of benefits and dangers in sharing a landscape with bats is characteristic of the One Health agenda, a twenty-first-century concept endorsed by multiple international organisations (including those partaking in the PREDICT consortium) for addressing challenges to human, animal, and environmental health holistically (Bardosh 2016). The bat book’s injunctions specifically follow from the One Health call to strengthen forest and bat conservation measures during the Ebola outbreak (Fairhead 2018). Animal culling, a disease management measure whereby animals are killed to limit the spread of an infection, is not only prohibited because bats are environmental benefactors, but because, ecologists have recently found culling may have the counterproductive effect of enabling spillover to humans by disturbing bat population dynamics. Such knowledge has transformed the figure of bats (Fairhead 2018): far from being “rogue” animals to be eliminated because they transmit diseases, they are turned into the unfortunate victims of “rogue” hunters and tree fellers.

The consequences of disrupting environmental balance are illustrated by a diagram on page 4 (Figure 1), which shows the process of infection.² It begins with a boy, who kills a bat with a slingshot and faces two possibilities: he may sell his prey to a saleswoman or bring it to someone we assume to be his mother, who both butcher the bat and spill its blood. Either way, the two “risk pathways” converge. The boy is sent to bed with a fever (and on to a very uncertain fate if he is sick with Ebola disease, as anyone of those brought in the making and reception of the bat book would remember). Hunters have been blamed as potential index patients in many epidemiological narratives of diseases emerging in Africa, including Ebola, even though some of their assumptions were shown to be unfounded by historical epidemiology (Rupp et al. 2016). Here, however, in contrast to many spillover narratives, the hunter represented is not a grown-up male but a boy, perhaps in keeping with recent research on the involvement of children in hunting activities in Sierra Leone (Bonwitt et al. 2017). The diagram is structured by arrows and prohibition signs, telling a clear tale of infection, whereby the causality is straightforward and teleological (Lynteris 2017): Ebola, when zoonotic, is definitively transmitted by contact with butchered bats. This visual skirts around alternative depictions of the ecology of Ebola, prevalent in some strands of the scientific literature (Groseth et al. 2007; Caron et al. 2018), which present cybernetic cycles of pathogen transmission within populations of bats, apes, antelopes, and other vectors, including human beings who may pass it on to other animals—an unstable depiction where many hypotheses are punctuated by question marks. Notwithstanding its simplified understanding of the ecological transmission of bat-borne diseases, a clear series of prescriptions on human-bat contact follows the diagram, illustrated again by prohibition signs. They show a motley list of domestic, farming, and culinary practices to avoid: touching dead or live bats (Figure 2a), leaving food or water uncovered (Figure 2b), eating or

2. I refer to the pages as numbered in the booklet, which differ from the pages in the PDF file: for example, page numbered 4 corresponds to pages 10–11 in the PDF file.

Section 2. Ways to Live Safely with Bats: The Basics

While bats have been connected to rabies and other diseases, killing or disturbing the natural homes of bats can actually make rabies spread to more people. Because of this, it's best not to kill, hunt, sell, cook, or eat bats.



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Figure 1: PREDICT Consortium. 2018. *Living Safely with Bats: Africa Version* Page 4.

Permanent identifier: <https://doi.org/10.34847/nkl.b060ar22>.

feeding fruits eaten by bats to domestic animals (Figure 2c), and leaving cattle to graze under bat roosting trees. These activities encompass more than hunting, but, by contrast with cyclical diagrams, they position humans as an epidemiological dead-end for the virus, environmentally exposed through a variety of “risk behaviours.”

Granted, the following flipchart section (Section 4, p. 10–12) acknowledges that contact with live bats may be inevitable (p. 10). But lengthy advice is provided on the “management” of said contact. Details are given on how to dispose of dead bats by wearing a face mask, gloves, and glasses; picking up the bat with a plastic bag and burning it; or burying it in a one to two-metre-deep hole before disinfecting the shovel. After contact with bat fluids, e.g., strolling under a tree while a bat happens to urinate, affected individuals are advised to rinse the body zone under running water for a full five minutes. Techniques are also suggested to rid infested homes of bats such as stuffing roofline crevices with fibreglass or newspapers. The bat book gives precise recommendations involving many technologies. But it simultaneously anticipates expensive technology scarcities by suggesting low-cost substitutes: surgical masks can be replaced by scarves, hand sanitiser by soap, gloves by plastic bags, plywood by empty rice bags, running water can be replaced by a person’s pouring water from a bucket, and even mental counting can stand in for a watch. These technologies of containment functioning as pairs embed a definition of the

Section 2. Ways to Live Safely with Bats: The Basics

One easy way to stay safe is to avoid eating food or drinking water that has come into contact with bat urine or feces. For example, you can cover your food and water. When you do, it is important to regularly clean these covers with soap and running water.



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Section 2. Ways to Live Safely with Bats: The Basics

The best way to live safely with bats is to avoid all contact with both living and dead bats. It is especially important to avoid bodily fluids such as spit, blood, urine, or feces, and to prevent bats from living inside homes and buildings (also called "roosting").



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Section 2. Ways to Live Safely with Bats: The Basics

To reduce the risk of getting sick, avoid eating fruit that has been partially eaten by wild animals or livestock. You should never eat or drink something that you think bats have come in contact with.

Do not try to save food that has been partially eaten by bats by removing the sections with obvious bite marks, and do not feed these partially eaten fruits to livestock. The entire item may be spoiled and could make you sick.



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Figure 2a, b, c: Ibid., page 5, 6, 7
 Permanent identifier: <https://doi.org/10.34847/nkl.b060ar22>.

audience's environment as characterised by infrastructural lack (Redfield 2012), even though they aim to make the recommendations realistic and affordable. Most importantly, despite a lengthy text, the hazard itself is barely explicated, an impasse revealed by some of the interactions in Nyen. Out of twenty-four pages, only the diagram reproduced above (Figure 1) and the accompanying text summarily justify why one should take precautions with bats. The Ebola disease, though omnipresent in communication sessions as will be seen, is not mentioned, only the rabies virus is.³ "Living safely" next to bats—rather than "with" them—is a question of "how" rather than "why," in keeping with the title of the bat book.

Epidemiological understandings of risk—and their translation into prevention policies—have assumed greater complexity in recent years, in part thanks to the involvement of social scientists in disease control, notably in HIV prevention (Brown 2019). In the case of zoonotic diseases, the One Health framework has catalysed further research on the processes by which Ebola—a disease whose uncertain cycle and zoonotic transmission challenge prevention efforts—may spillover into human populations. Research has highlighted the role played by women and children in hunting activities. It has also broadened the range of situations considered at risk, which now extends to drinking water left uncovered, or walking under bat roosts. Yet for the goal of disease prevention, intricate forms of complexity—related to humans, pathogens, and everything that may connect them—must be simplified (Brown 2019). Minutiae about disease cycles and scientific controversies about the reservoir status of different bat species are left undisclosed. The contingent meetings of institutions, livelihoods and individuals that account for pathogenicity, according to an anthropological reading (Brown and Kelly 2014), are reduced in practice to a question of "behaviour," and in that case, of contact. What "contact with bats" means is left undefined by scientific works (Narat et al 2017) and prevention communication alike, which levels out the variable risk entailed by categories as incommensurable as one's professional identity as a hunter, one's livestock feeding practices, and one's bad luck while strolling under a mango tree.

These voids can be assimilated to forms of strategic ignorance, conceptualised by sociologist Linsey McGoey as the active mobilisation of unknowns to advance a given agenda (2012). Seen in this light, ignorance is socially useful: that institutions forget or omit things is, to a certain extent, inevitable for sense-making. According to sociologist Steve Rayner (2012, 111), "knowledge out of place can be viewed as a form of information pollution, lying on the boundaries of what is organisationally knowable and not knowable [...]". In this case, providing excessive information about Ebola's ecology would obfuscate storytelling and its operability. The objective of the bat book is not so much to communicate explicit information about uncertainties associated with risks: it is to pre-empt all danger by restricting contact between humans and bats.

3. This is so even though 99% of rabies cases in humans are caused by contact with a dog, and scarcely any case of bat-human transmission has been reported in Africa (Warrell 2010).

The sociopolitics of translating ignorance

Although I did not participate in the making of the bat book with the US-based managers of the PREDICT consortium, I had the opportunity of observing steps of its local sedimentation during a training workshop in 2017 in Makeni, Sierra Leone, one of the countries targeted by PREDICT post-Ebola research. The bat book was indeed not simply constructed somewhere and disseminated all around the world, as a “palimpsest” of environmental knowledge production (West 2020). Its design purported to integrate the environmental knowledge and practices of the locations targeted by PREDICT, and it was said to be specifically translated for African contexts (PREDICT Consortium 2020). The following section highlights the social interests and power asymmetries that went into finetuning the bat book, in the process of translating PREDICT qualitative research on human-bat interactions in Sierra Leone. The bat book does not only translate localised knowledge into normative prescriptions; it also capitalises on nonknowledge inherent to qualitative research, which I suggest is endorsed for different reasons by West African development agents and US communication experts.

The project mandated research on “contact with wild and domesticated animals and the factors motivating those behaviours” (PREDICT 2016, 3). Over 18,000 people participated in the study worldwide. Beside one methodological article presenting an “innovative strategy to investigate social and behavioural risks of emerging viral threats,” which the authors alleged “socialized One Health” (Saylor et al. 2020), the research seems to have led, so far, to a handful of publications only on given localities, after the collected data was analysed by project managers and epidemiologists mostly based in US offices. I was told by one PREDICT US leader, a veterinary epidemiologist in charge of surveillance activities, that financial constraints forestalled a comprehensive analysis, and that their data analysts narrowed down their analysis on key “risk factors,” such as contact with bats. The wealth of data collected was, besides, compiled in-country and allegedly communicated to the national disease surveillance administration and research participants themselves (in Guinea, the 340 interviews were summarily analysed and summed up in three pages of PREDICT’s final activity report). Thus exclusively concerned with “human interactions with bat populations,” the Sierra Leone study sums up findings about two sites in the Bombali district, selected from the (undefined) number of surveyed locations because the project detected there a new species of Ebola virus, subsequently named Bombali virus, and “human populations have had close contact with microchiropteran bats” (Euren et al. 2020, 292).

One of the contact sites described is “a semi-urban landscape” where the young male members of “a local ‘secret society’ [...] have access to a grove where they hunt fruit bats and sell them ‘as a source of supplemental income’” (2020, 295–98). “Secret societies,” or sodalities, are sociopolitical institutions for managing intergenerational relationships and property in this region of West Africa. Authorisation to penetrate the sacred grove destined for initiation rituals seems to have granted some men

exclusive access to a forested area where fruit bats roost. Fruits bats in Sierra Leone, however, are mostly hunted opportunistically since their hunting is a challenging and hardly lucrative activity (Bonwitt et al. 2017).⁴ These few young hunters are nevertheless said to incur risk contact with bats through “bites and scratches,” “direct contact with blood and viscera,” and also through “inhalation and exposure to bat feces and urine,” the latter a newly considered indirect transmission pathway. The authors imply that contact could be limited by the use of protective personal equipment (such as “football goalkeeper’s gloves”). A second contact site is found in “households with ceiling bat colonies” (Euren et al. 2020, 295), lesser explored by similar studies. The article unequivocally attributes the “infestation” of these houses to defaults in the architecture of dwellings built by an international NGO for survivors of the Sierra Leone civil war. Their permeable roofline lent itself to bat colonies roosting in public meeting places, households, and the pits of outdoor toilets. The notion of contact is in this case more diffuse than in the case of hunters: it ranges from killing bats to rid of their nuisance, being hit by a bat while going to the toilet, to faeces dropping on the inhabitants in their sleep, and falling in drinking water. Even the persistent smell of urine seems to count as contact, evoking both historical ideas about miasmas as a source of infection and the threat of aerosolised contamination. Such human-animal proximities may seem inextricable, the article’s results section nevertheless clarifies that “contaminated water was reportedly used for bathing by at least one respondent and is indicative that contaminated water may be used by the community for other purposes as well” (ibid.).

A “risky zoography” is thus pictured, in the words of Natalie Porter (2012): a spatial representation of interspecies entanglements, with implications about where responsibilities lie in zoonotic disease control. The description is certainly more complex than those of earlier publications centred on hunters and their practices. If hunters still appear at risk by virtue of their gender, age, and belonging to a secret society, the inhabitants of infested houses are functionally described as “people living with household bat infestations.” The results section of the article further acknowledges the role of assemblages of plywood ceilings, toilet pits, and the sticks used to kill bats in the making of pathogenic proximities. But in spite of being “told that all exclusion attempts to date had been futile” (2020, 295), the study authors intently point out that carelessness and lack of hygiene (and possibly social institutions) are accountable for failing to erect strict boundaries between humans and animals. Furthermore, the article fails to expound on the socio-economic context of the people surveyed: it does not mention for example that many of the household owners in the second site had their hands cut off by rebels of the Revolutionary United Front as the civil war reached the Bombali district in 1998–2000, evident while I attended a PREDICT training session with other West African employees in the location. The

4. In Sierra Leone and Guinea, bat consumption in rural areas is a rather marginal phenomenon, and those hunted are usually kept for private consumption; smoked bat meat is imported to urban markets from northern Guinea at the end of the dry season, around February-March.

inhabitants of this site closely depended on assistance programme for their housing and livelihoods (a situation which may even explicate their availability for all sorts of bat sampling and behavioural studies).

The article concludes by introducing the PREDICT community engagement strategy, devised for the populations of the West African countries affected by the Ebola outbreak. In 2017, I attended a workshop in Makeni, Sierra Leone, where three “communication experts”—one of them had lived in the capital of Freetown years before and all had worked in the AIDS project industry—were flown in to discuss an early draft of the booklet. The responsibility for drafting the flipchart was granted to communication professionals, and so the meeting did not include infectious disease specialists.

The “country team” involved in “culturally vetting” the bat book in Sierra Leone consisted of two Sierra Leonean graduates in sociology employed by Metabiota, a for-profit risk analysis start-up and a member of the PREDICT consortium. They both sampled bats for PREDICT before carrying out behavioural data collection in the same sites. They asked people about their contacts with bats, people who had previously seen PREDICT staff capture animals wearing personal protective equipment. US experts, who found their draft too long, turned to the two Sierra Leonean sociologists, who would figure as authors on Euren et al.’s publication. What were, in their experience, the priority behaviours to be addressed in order to reduce the disease transmission risk, US experts asked the Sierra Leonean professionals? Promptly, the local PREDICT employees listed a series of practices involving humans and bats: “bat hunting,” “children hunting bats,” “picking up dead bats,” “touching fruits eaten by bats,” “feeding them to domestic animals.” Their listing was confined to elements of the interview grid they used for data collection and thus omitted practices such as, for example, the collection of bat excrements to make plant fertiliser, relatively common in the region. Their faces expressed revulsion as they talked about how some people conceded to consuming animals found dead, a reaction which resonates with enshrined prejudice against the food habits of people living in the forested areas of the region (McGovern 2014). A spokesperson from USAID chimed in to question the feasibility of cautioning against bat hunting given the economic vulnerability of most hunters: could it not antagonise the “communities”? But this recommendation was non-negotiable to the Sierra Leoneans, given the high risk of—and their feeling towards—bat hunting. The conversation did not address probabilistic questions of whether consuming a mango bitten by a bat represented a risk as high as that of consuming bats found dead⁸. It also left unaddressed the multiple material, historical, and social forms of connection that account for “material proximities” between humans and bats (Brown and Kelly 2014). Instead, a consensual selection was made based on the Sierra Leonean agents’ disgust and the communication experts’ concern about the acceptability of the campaign. The process of producing behavioural facts itself—through the questionnaire—was harnessed to produce norms, a translation facilitated by a vague notion of contact.

Complex socio-environmental pressures are inherently reduced by the epistemic form of qualitative research. PREDICT research uncovered diverse instances of “contact with bats” and raised the problem of certain housing infrastructures. A scalar sleight of hand is nonetheless performed by this work of extending and reducing risk factors: their epistemic form deflects responsibilities for complex ecological ills onto people’s lifeways, as critical literature on health risk shows (Kleinman and Suryanarayanan 2012; Sanabria 2016). It obfuscates the global power structures and circuits of capital that impact people’s environment and health. In practice, this process is enacted by the interplay of communication experts and development brokers. Through their involvement in translating ecological science, virology findings, and qualitative research into communication material, the Sierra Leonean agents incorporated a thoroughly social affect—the disgust they felt at the consumption of food they considered abject—into the final object. The bat book thus does not (only) diffuse a regime of truth manufactured elsewhere, but is the outcome of a cultural formation, which incorporates the identities and occupations of its makers. The bat book materialises a set of postcolonial relationships, strategies of differentiation, and cultural politics, which obscures the socio-infrastructural environment in which diseases emerge.

Founding a “risk culture”

More people were involved in handing out and interpreting the flipchart, in 2018–9. The *Living Safely with Bats* book, initially developed for Africa, primarily targeted Sierra Leone, Liberia, and Guinea. In these latter countries, it became the support of meetings with more than 6,000 people. In Guinea, PREDICT downsized sampling teams and five remaining employees were tasked with communicating, in five languages of Forest Guinea (Kissi, Loma, Maninka, Kpelle, and French) in the sites where they previously sampled bats. The booklet became an irreplaceable communication aid, which accompanied the team in every group discussion, classroom interventions, and radio broadcasts (“accessible to >1.9 million individuals,” the final report touted) across the region. I accompanied them while they were driven at dawn to verandas, central squares, and community meeting halls. A crowd of twenty to forty people—women with babies, elderly people, men in their labouring clothes, etc.—usually offered us chairs. After a brief introduction to PREDICT’s work, the community outreach session was performed by an agent who spoke the dominant language in the locality. They improvised a dialogue with the attendees, using the bat book as an aid for about fifteen minutes; meanwhile, the other agents sank into their smartphones to pass the time. It was afterwards, in the time left for questions, that all agents became vigilant again. Interventions from the attendees were being translated into French for all, including myself, to contribute to a collective debate about the notion of “disease reservoir” and methods to pre-empt human infection. The following excerpts from observations and fieldnotes taken during meetings suggest that PREDICT agents and individuals from their audience

selectively assumed, bypassed, and transformed their ignorance about matters of zoonotic disease. Ignorance thus becomes a central feature of the brokers' project of social engineering through changing epistemic attitudes. Ultimately, not only ignorance of the zoonotic disease hazard is at play, nor that of zoonotic disease risk. So, too, is uncertainty about the socio-political context in which this community outreach programme takes place.

As exemplified by the vignette opening the introduction, many communication sessions ended in confusion, as the agents hurriedly departed while leaving many questions hanging in the air. Persistent questioning, especially from young men, met defensive reactions, recalling the tension and incidents that marred the Ebola outbreak response in 2014–5 in Guinea. Diverse sorts of interactions between the populations of affected communities and response agents then were qualified as “resistance.” Such “resistance” ranged from mere indifference to Ebola awareness meetings, to disrespect of contact quarantine rules, to nonreferral of the sick, to violent acts such as stoning vehicles and burning treatment centres (ACAPS 2015). Those incidents caused many casualties and cost the lives of eight response workers in September 2014 in the Forest Guinea town of Womey, fifty kilometres north of N’Zerekore. In 2014–5, conflicts were particularly numerous in the region, where established norms of cooperation between populations and distant state authorities, long complicit with foreign extractive industries, were disrupted by the response apparatus (Fairhead 2016). The legitimacy of state representatives and the young urban graduates employed by the response, like those who formed the PREDICT labour force, was contested by the unemployed educated youth, who resented the collaboration of municipal authorities (Le Marcis et al. 2019). A couple of years later, PREDICT agents were still terrified of exposing themselves to the rejection and violence attached to the outbreak response. Communication on zoonotic risk, especially associated with animals seen as wild, recalled the Ebola outbreak, and generally seemed to attract popular disapproval or indifference.

The notion of “zoonosis” itself was perceived as a dangerous hypothesis to voice in public. Although national disease surveillance systems have started monitoring “zoonoses” in West Africa since the Ebola outbreak, and the term is now an epidemiological category in reports and the object of countless meetings, it was largely avoided in the communication campaign. Agents simply explained in local languages that certain diseases carried by animals can “catch” humans (the bat book vaguely referred to a “connect[ion]” between bats and diseases). The notion of a disease reservoir, *un réservoir de maladies* in French, was sometimes referred to, but more commonly conveyed by the explanation that bats have diseases, “dangers” or “evil things,” that do not harm them, but if provoked, they can “give” them to humans. The zoonotic causality of the Ebola outbreak had been and still was indeed the object of much scepticism and speculations among locals (Bonwitt et al. 2018; Thys 2019). As hinted by Norbert who translated for my attention the question “*where do bats take diseases?*” into “*who gives them diseases?*” and the many interviews and

informal discussions I had, many people saw evil human intentionality at the source of the outbreak, even if they did consider that animals could be implicated. During the outbreak, many stories circulated that referenced the interests of the national elite and foreign industry, implying collusions between figures such as businessman Benny Steinmetz, who had just lost an iron ore mining licence in Forest Guinea on account of alleged bribery, former humanitarian and French Minister of Health Bernard Kouchner, the pharmaceutical industry, and President Alpha Condé. In 2017–9, PREDICT workers interpreted doubts publicly raised during meetings as a challenge to their morality as employees of a post-Ebola project. They feared insinuations that they may have themselves played a role in “Ebola business” by injecting pathogens to bats while pretending to sample them.

This sociopolitical context elucidates why PREDICT agents were ready to interpret many interventions as “fake questions,” intent on “confounding” them. Uncertainty about political allegiances and social tensions in their context of intervention made it difficult for them to assume their epistemic lacunas about Ebola: giving to understand that there may be gaps in the hypothesis that bats can transmit the Ebola virus would have been sheer imprudence on the part of the very individuals supposed to represent and disseminate this view. Conversely, admitting to not knowing the answer was valued in other settings. That there were limits to knowledge may not have been granted during tense encounters with the threatening mass that PREDICT agents referred to as the “community,” but it was welcomed as a contribution to the debate in schoolrooms, as the following excerpt from fieldnotes exemplifies:

[Michel presents the bat book in a high school in Gueckedou. He speaks in French and students are encouraged to ask and answer questions.]

A student asks how old bats can get. Michel pauses for a second and says: “I don’t know, I am not a bat specialist.”

At these words, Dr Bilis stands up and claps: “I love this! In science, if you don’t know, you don’t know. I don’t know myself, despite my grey beard. But the question is interesting, and I will now show you how you can proceed to find the answer.”

He extracts a shiny smartphone from his pocket. “As a man of science, I know where to find the answer: it is in the air, on the internet, free as a gift!” Five minutes later, he solemnly announces that bats can live up to forty-one years, as he just found out on Wikipedia.

[...]

[A few hours later,] Dr Bilis debriefs the bat life expectancy episode for the team to reflect on: “What is an intellectual? In Guinea, everywhere, every person who defends a thesis [for their degree] has sources, references. But if we take a look at ourselves, Guineans, do we like to refer?”

Dr Bilis articulated his ignorance as what we could see as a “void where knowledge has not yet spread” (Proctor 2008, 2): nonknowledge is not dangerous when it can be substituted by knowledge. An elderly vet doctor trained in Cuba when Guinea exploited ties to its socialist partners for training its elite, Dr Bilis, an energetic man with unusually outspoken manners and a trimmed grey beard, had long acted as the Regional Director of Animal Farming. As for Michel, a thirty-year-old biologist

originally from the N'Zerekore district, he gained his first professional experience as a lab worker in the Ebola response, and actively prepared himself for a career in international health project management. Although both Forest Guinean men, they distinguished themselves through their mastery of French and the prestige of NGO employment, and never failed to urge the students they met during communication to work assiduously so “they may become like them and drive a four-wheel drive” one day. In this context, where students from the region the furthest away from the capital aspired to success through education, social status was entwined with an epistemological attitude. Dr Bilis tried to make room for ignorance as a space that could be populated by references that were as “free as a gift”—unlike many commodities and positions in Guinea, a notoriously corrupt country. The growth of knowledge over ignorance—enabled by a recent boom in smartphone use and improvement of the internet coverage—was connected to expanding opportunities for rural schoolchildren. In the agents’ vision, this combination would be central to the ascendancy of progress and science over Guinean lives.

In this spirit, interventions from the audience were differently appraised depending on the context where communication efforts took place: a “community” meeting or a school. Many came across as more constructive—less “fake”—than the ones witnessed in Nyen. Following is a non-exhaustive list of questions asked by participants from any context after listening to the community outreach speech.

- What if we eat the fruit of a tree that grew out of a seed dispersed by a bat?
- What if we inhale the smell of bat excrements, or the smoke of burnt bat?
- What if we bury bats next to a well, will it infect the water?
- What if we eat an animal that ate an infected bat?
- What if a bat falls on the ground, gets rained on, and women use that water for cleaning, or a child walks in it?
- What if we accidentally walk on a bat?
- What if a wild animal eats a fruit bitten by a contaminated bat? What if we eat it later?
- What if we eat an animal shot with a bullet traditionally made of guano?
- What if a chick drinks from a puddle in which a bat urinated?
- What if we throw a dead bat in the toilet: what about the smell, or what if it spills out?

Dr Bilis named such questions “if-questions” (*questions de si*) and often praised their merit during meetings, and when, together with the agents, he later debriefed the proceedings and pondered over the best answers. These questions certainly brought forward the built environment, agricultural strategies, food habits, and climatic patterns that may create the conditions for disease communicability in complex ways. But again only their epistemic content and ethical purport was addressed by communicators: according to Dr Bilis, “if-questions” were concerned with situations whose probability of occurring was minuscule and displayed imaginative abilities on the part of the speaker. In answering, particularly in classrooms where his authority was salient, he felt it was his duty to congratulate the speaker on asking a “scientific question.” They signalled an *intellectuel*. In the recent political history of Guinea, *intellectuels*—people with secondary education who understand French—have played a critical role in mediating political events and been often accused of kindling

opposition to the regime, as during its response to the Ebola outbreak (Somparé 2020). Yet Dr Bilis saw in such questions the willingness of *intellectuels* to query issues in an abstract way by conceptualising them as a matter of probabilities (in contrast to “fake” questions)—an ethical bridge between these individuals, whether students or not, and PREDICT workers. To answer them, he liked to invoke the “concept of the hundred-first,” and he encouraged the rest of the team to do likewise. The epistemic tenet could be summed up in a sentence: “Not every bat is infected.” Even if the Ebola virus had never been found in one hundred bats, it could be harboured by the hundred-first bat. To convey this idea, agents qualified their statements using the modal verb “can,” translated in local languages. Bats *can* give diseases, but they do not have to. “Our ancestors may have eaten one hundred bats without a problem, the hundred-first *can* trigger an outbreak!”

Reducing risk to a matter of probabilities bypassed thorny minutiae in the ecology of diseases. This discussion circumvented a core issue in research on animal reservoirs of disease, that of maintenance versus transmissibility (Haydon et al. 2002). A very small proportion of bats, of certain species, might host the virus, actually well below one percent overall (moreover, live virus has never been found in fruit bats, only DNA sequences). But because an animal hosts a disease does not mean that it works as an effective disease transmitter. Some animals cannot replicate and excrete the virus, i.e., be infectious, or only at certain moments of their life cycle. Surely, PREDICT Guinean agents did not distinguish the dynamics of reservoir maintenance from those of disease transmissibility because, having not received disciplinary training in disease ecology, they mostly derived their understanding of “the reservoir notion” from prior involvement in animal sampling. But in replacing that caveat by the “concept of the hundred-first,” they transformed the nature of ignorance: they moved away from ontological uncertainty (are infected bats also viral transmitters?), towards a matter of risk probabilities (will you meet the infected hundred-first bat?). This transformation echoes a shift in hazard regulation, at the end of the twentieth century, when the “assessment” of hazards became separated from their “management” as risks (Jasanoff 1990). In this case though, it is not the effect of a government of technoscience, but a situated instance of communication efforts accommodating asymmetries of knowledge.

The tenet of the “hundred-first” crystallises the effort of PREDICT staff to shift the risk culture of their Guinean audience. Assuming them to be generally unaware of zoonotic disease hazards, the agents wished to inculcate people with aversion to risk, which they took to inhere in nature and not in modern technologies (a vision which differs in that from the “risk society” of Ulrich Beck [1992]). This objective was clearly laid out by Prof Baldé, PREDICT country coordinator and Dr Bilis’s superior, who had decided to elucidate the notion of risk to his team members when he trained them in risk communication. Baldé, a privileged Guinean repatriate with a doctoral degree in epidemiology from a US university, held that his country people failed to take risks seriously. To contextualise his teachings, he borrowed a central point from

popular US risk communicator Peter Sandman, that risk was “hazard + outrage” (1993). “Appropriate fear” is, in this model, a commendable response to risk situations. In Baldé’s opinion, Guineans lacked outrage, and he made it PREDICT’s mission to “give outrage” to the public. Not unsurprisingly, he looked to the United States as a model for his project of founding a new risk culture. “Uncertainty is Americans’ greatest strength,” Baldé repeated ad infinitum: Americans would, in his opinion, not minimise any risk because they were certain to be that “hundred-first” befallen by misfortune. The agents were told not to insist on “scientific uncertainty” about risks when addressing a “community-based audience” (i.e., one without *intellectuels*, such as in Nyen), so that a sense of hazard would nurture outrage and motivate them to stop eating bats. “Outrage” is fear-led compliance with advice for risk prevention.

In their attempt to replace one uncertainty with another, PREDICT agents circumvented ignorance about complex ecological dynamics. This came out strongly in their responses to questions which emphasised the material proximities of humans and animals:

What if a child picked up mangoes bitten by infected bats?
Mangoes should not be left to ripen on the tree; collect them before they fall.
What if a chick drinks from a puddle in which a bat urinated?
Chickens should not be left to wander but gathered in a pen.
What if a child walks in that puddle?
Children should wear shoes as soon as they can.

In their responses, PREDICT agents made hygienic prescriptions. They redirected responsibilities away from the government and infrastructure development: the possible role of road building, derelict public health structures, or poor waste management in the emergence of infectious diseases was not touched upon. Instead, heterogenous and dispersed environmental convergences were made to symbolise the threat, whereby water, toilets, and mangos—if ill-managed—could potentially transmit Ebola. Their answers turned the unruliness of elements, animals, and children into an object for human responsibility. The agents may have fallen back on reflexes hardened in the space of public health, contoured in colonial and postcolonial Africa by hygienic norms (Burke 1996; Curtin 1998). Calls to discipline behaviours and observe sanitary rules have historically policed the border between civilisation and savagery, and produced differentiation and hierarchy. However, a broader assembly, and a heterogenous array of relations of submission, control, and dependence is convoked by contemporary zoonotic risk communication (Brown and Nading 2019). People’s questions may infer that separating species was ontologically impossible. Nevertheless, the flipchart and PREDICT agents’ answers produced humans and animals as units to be separated, or more precisely animals as units amenable to human control.

PREDICT agents translated knowledge and nonknowledge about the environmental danger constituted by multispecies entanglements, and orientated their translation based on the social makeup and ethics they imputed to different audiences. They therein configured diseases that defeat scientific pretensions to knowledge, and

that many of their interlocutors associate to irresponsible beings, as a problem of risk, preventable through self-reform. In that process of accommodating and circumventing ignorance, the audience was not only incited to “living-with” an inescapably hazardous world (Boudia and Jas 2019). It was also asked to embrace an epistemic attitude towards risk and develop a modern “risk culture.”

Conclusion

I was able to talk about the communication strategy and the bat book’s drafting in Makeni with one of PREDICT leaders, a forty-something US vet doctor turned project manager who studied viral haemorrhagic fevers in wildlife. After a lunch of fried rice, he gave me a brief explanation for why “communication was uncoupled from the results of the scientific study,” by which he did not mean the qualitative research, but the microbiological evidence. As a disease ecologist, he himself judged the bat reservoir hypothesis rather “fairly likely” than “very likely” at this stage. But it was “common knowledge,” he said, that all species of bats are carriers of diseases, which they can transmit to humans. Bats are known to act as reservoirs for several viruses (rabies, influenza, measles, and pneumonia viruses, amongst others) (Wang and Cowled 2015). They have also been recently associated with emerging infectious diseases, such as Hendra and Nipah virus diseases, the Middle Eastern Respiratory Syndrome, and famously COVID-19, although the transmission dynamics of these viruses are complex and partially known. On a global scale, bats have become “epidemic villains” incubating existential risk for humanity despite lack of certainty about their reservoir status for many diseases (Lynteris 2019). The vet doctor did not judge it necessary to wait for the specific results of PREDICT research on West African bats to communicate. “What would it serve to single out one bat species as the Ebola reservoir, would you tell people that they can touch and eat any bat but the Egyptian fruit bat?”

Policies and projects concerned with environmental risk in postcolonial locales intertwine research and intervention, rather than follow a temporal script of scientific evidence informing implementation. The boundaries between scientific investigations and governmentality, which loosened in development and global health interventions (Nguyen 2009; Rottenburg 2009), are also bypassed in environmental risk interventions. Critiques have excoriated the biopolitics of “experimentality,” which subjugate populations as a result. But I centre my account on the use value of the evidence—or the ignorance—generated through the research-cum-intervention that programmes such as PREDICT represent. Uncertain truths about the causes and ecology of Ebola are stabilised in the process of drafting a visual resource and communicating about zoonotic disease risk. They incidentally enshrine a collection of figures—bats, hunters, cooks, housewives, etc.—as “epidemic villains,” in the words of Christos Lynteris (2019). Those we could call “science brokers” (Mosse 2013) play an influential role in shaping the form of risks to be acted upon, drawing on their social trajectory, professional practices, and affects. Ultimately, what is negotiated in

communication encounters is not (only) the certainty of evidence, but an epistemic foundation for reforming lifeways and modernising the country.

The Forest Guinea audience did not necessarily contest zoonotic risk communication based on its epistemic content, but on account of its limited potency. In final reports, the PREDICT Consortium could but highlight anecdotal evidence that some “communities” had acted on their advice to block bats’ entry into some buildings, for example. After community outreach activities however, I heard many more requests for construction material, and sighs that the few who ate bats would continue to do so. The questioning highlighted above raised a flurry of uncontrollable misunderstandings, tongue-in-cheek stories, and aggressive posturing, pointing out that exchanges of biological material between humans, fauna, and flora are the uncontrollable stuff of everyday life in vulnerable conditions, and that precautions, however extensive they may be, are powerless to prevent viral crossover. Taking onboard Lachenal’s critique of research on the origins of HIV in Cameroon (2015), we can understand these controversies as probing the limits of environmental knowledge in defining risks and qualifying human pretensions to prevent unfortunate yet unpredictable events. Such interventions manifest scepticism towards calls to “live next to bats,” rather than with them. An alternative critique emerges in this parody of One Health logics, where a chicken which drank from a puddle where a bat peed cannot be eaten: a critique not so much bent on contesting knowledge as a collective performance showing PREDICT’s impotence. The Ebola outbreak of 2013–16 was not the first nor the last disease outbreak to mobilise fears and programs targeted at zoonotic disease risks, as the COVID-19 pandemic has made abundantly clear. Understanding the sociopolitics and environmental subjectivities at work in such configurations of risk is critical to make sense and act in the face of complex disease emergences.

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