# AN ANTHROPOLOGY OF 'AVIAN FLU': BEYOND THE NATURE-CULTURE DIVIDE

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April 2013

A thesis submitted to McGill University in partial fulfillment of the requirements of the degree of Master of Arts in Anthropology

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#### **ACKNOWLEDGMENTS**

I would like to make many thanks to the following people who have helped me complete my research:

First, to my informants without whom this project would not be possible. You have all been so patient, open, and generous with your time and efforts. I'm humbled by the amount of knowledge and willingness with which all of you engaged my questions, no matter how mundane, naïve, or awkward.

To my supervisor Tobias Rees, who does not always know just how formative his ideas have been in shaping my thinking (sometimes to a degree that surprises even myself!) in the realm of academics and beyond. Thank you for offering me the challenge (and pleasure) of exploring the limits of what I know and, echoing others, to trace these boundaries in order to move beyond them. This is a challenge that renews itself beyond this project and academia itself; I hope that I am adequate to meet this task.

To Eduardo Kohn who has provided much food for thought. I appreciate the way in which you have provoked me to think differently and hope to continue engaging with the intellectual challenges that you offer in future work.

To my writing group: Raad Fadaak, Kristin Flemons, Josh Friesen, and Valerie Webber. You have all been incomparable intellectual companions along this journey. I don't know what I would have done without your spontaneity, wit, enthusiasm, and curiosity to sustain me during the writing process, and which has motivated me to embark upon new journeys – hopefully be in your company again.

To my officemates who helped with so many of the daily tribulations of being a graduate student – your encouragement, practical advice, and company throughout the journey has been crucial. Among these office mates, thanks to Jonah Campbell for orienting me within the literature on sociological analyses of modeling; Fiona Gideon Achi for helping me translate my abstract on short notice; and Hadi Karsoho for fielding all manner of questions.

Lastly, to my parents and sister, as well as my partner, who have provided unconditional support in all my endeavours so far. Thank you for all your patience and encouragement on this long journey (whose end only seems to recede into the horizon as I draw closer to it).

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#### **Introduction: Diagnoses**

In the antechamber to the post-mortem room, the avian pathologist who I'll call Dr. Campbell,<sup>1</sup> and myself don lab coats. Dr. Campbell pulls on a pair of neoprene boots and instructs me to slip a pair of plastic bags over my shoes. She looks over her shoulder as she enters the post-mortem room.

"There will be a smell," Dr. Campbell says, "I hope that you'll be Okay with it."<sup>2</sup>

On a metal table before me is a row of dissected chicks. Dr. Campbell examines the post-mortem reports for a moment before turning to the birds themselves. She scrutinizes the livers of the chicks and points out relevant details: their livers are swollen and not a "liver" colour; some livers display "cobblestoning"; the dark spots indicate that the chicks probably experienced hemorrhaging. The signs are all there; Dr. Campbell needs no other confirmations. This, she says with a quick wave of her hand, is most likely occlusion body hepatitis. Moreover, there can be only one cause: an adenovirus. That said, Dr. Campbell must confirm these suspicions with a histology test followed by molecular diagnostic tests. I'm impressed with the swiftness of her assessment and her certainty about the diagnosis. Even Dr. Campbell makes a remark about the ease of the diagnosis:

"This is like a slam dunk."

I'm not sure whether Dr. Campbell is trying to emphasize that this is an exceptionally easy disease to identify, or if this particular case of the disease is an

<sup>&</sup>lt;sup>1</sup> In the rest of this thesis, I use pseudonyms for all my informants. I recognize that there are difficulties ensuring that the identities of my informants remain confidential, especially when they work closely with each other. Consequently, informants may recognize themselves or others who participated in my study. In case of possible identification, I have taken care to ensure that the content of what I disclose does not put informants at risk. <sup>2</sup> Except where indicated, words within quotations do *not* come from recorded interviews but are rendered from my field notes and memories. As Lawrence Cohen (n.d.) has noted, discoveries in the field often come out of unplanned and more importantly, unrecorded, conversations. I have chosen to re-create my encounters with informants in a certain way (as will become apparent) because my aim is not produce the 'truth' based on accepted forms of scientific evidence – if this can be achieved at all. Whether or not my account is plausible remains up to the reader.

exception to routine diagnostic assessments of the same disease. She turns on a tap to wash her hands above which is posted a sign listing relevant federally notifiable diseases. Avian influenza (AI) is listed near the top.<sup>3</sup>

"How did you know you were looking at avian flu?" I ask, thinking about her involvement in the 2004 outbreak of avian influenza in the Fraser Valley.

"It was like nothing I'd ever seen," Dr. Campbell replies. Up until that point, what she saw come into the animal health center that day was something she had only seen in textbooks. Pulling out her books for comparison, she knew that the signs could be nothing but avian influenza. Dr. Campbell had to wait a few weeks, however, as the sample underwent further testing at Canada's national reference laboratory in Winnipeg. Shortly afterwards, the results came back positive: the bird had been infected by H7N3,<sup>4</sup> a highly pathogenic strain of avian influenza. Dr. Campbell had witnessed Canada's first confirmed case of avian influenza.

In this moment of diagnosis, a biological form was singled out from a multitude of others. Despite the certainty of this moment, management of the 2004 outbreak was far from smooth. There were provincial-federal disputes about how best to contain the spread of AI and to handle affected farms. Existing regulations had not anticipated the potential for conflict between veterinarians' ethical responsibilities to protect the confidentiality of their clients and the government's demand for information about infected farms. There were no regulations to govern the distribution of roles and responsibilities amongst provincial and federal actors, or public and private sectors. Systems of management were thrown together ad hoc. Within this void, the poultry industry developed its own communications strategy and devised provisional protocols of action for its members to prevent the spread of AI.

<sup>&</sup>lt;sup>3</sup> In my thesis, the term 'AI' does not refer to any specific viral strain but to the species influenza A virus, which is known to infect birds but has also demonstrated the ability to infect other mammals, including humans.

<sup>&</sup>lt;sup>4</sup> There are several viral strains of avian influenza that vary according to the H and N protein markers attached to the virus' surface. These markers help scientists identify different strains. H5 and H7 variants are considered highly pathogenic and are federally notifiable diseases in Canada. The H5N1 variant has gathered the most attention in health interventions, scientific research, and the media after its deadly appearance in 2003.

Indeterminacy equally persisted in efforts to understand the origins of AI in the Fraser Valley, which are multiple. Accusing fingers pointed at wild birds, industrial poultry production practices, non-compliance with biosecurity measures, backyard flocks, government mismanagement of the outbreak, and farm service routes. As the assignment of blame continues even today to envelope a throng of things, it becomes clear that the origins of AI are not easily pinpointed to a single source, or assembled into a linear narrative.

In the cloud of uncertainty<sup>5</sup> that constituted AI, the moment of clarity in which Dr. Campbell recognized and diagnosed AI is a striking exception. Drawing attention to this moment may seem to privilege scientific knowledge as having the final authority to determine what something *is*. However, this moment of diagnosis was an inciting point, a moment of biological certainty around which thinking and action subsequently arranged themselves. And yet, *in spite* of this moment of diagnostic confirmation, AI cannot be reduced to the science of pathology or the molecular identification of viral strains. AI was and continues to be ambiguous – from the accounts given about its origins, to the actual unfolding of the outbreak, to the emergency preparedness efforts that followed in its wake.

Particularly in the efforts that followed the outbreak, technicians of emergency preparedness plans find themselves confronting a dilemma: they are trying to predict the unknown from the known, or a set of historically likely variables arising from previous incidents that in turn enable the calculation of probabilities. But the unknown remains unknown precisely because it is unprecedented and therefore a singularity (Lakoff and Collier 2008). Technicians of emergency preparedness are not trying to predict another instance of AI-of-the-2004-outbreak but to predict the instance of something that is *not* AI-of-the-2004outbreak. All of which leaves unresolved the problem: how can the unknown be predicted?

<sup>&</sup>lt;sup>5</sup> As Celia Lowe (2010) suggested in her ethnography of H5N1 in Indonesia, the viral 'cloud' that comprises H5N1 – as a heterogeneous and contingent assortment of elements that interact in mutually transformative ways – is both a material feature and useful analytic to understand the kinds of world-making that emerge out of an H5N1 event.

Efforts to predict 'AI' or other infectious diseases like it confuse temporality. A predicted 'AI' event is a moment not wholly determined by its past nor one that is fully realized, despite calculations where its predicted future approaches its actual future. 'AI,' or its predicted occurrence, creates a decisive break between past and future, an ambiguous space that is underdetermined. How 'AI' will unfold, what living and non-living things it will implicate in its happening, or the effects it will have on thinking and practice cannot be fully known in advance. Even what 'AI' is biologically speaking is difficult to determine in advance, given that the emergent strain of virus arises from a constellation of spatial and temporal relations that are contingent in themselves. 'AI' produces further ambiguity. As Celia Lowe (2010) underscores in her ethnography of H5N1 in Indonesia, "the thing that is H5N1 does not gather together adherents in a single context, but rather proliferates contexts" (Lowe 2012:644).

Thus, when I took up the 2004 outbreak of AI in the Fraser Valley as an anthropological curiosity it was only a starting point. On one hand, I could ask: what disparate things does 'AI' bring together and in what manner are they arranged? Curiosity about the ambiguity of 'AI' at this level presumed a reassortment of already given entities. On the other hand, and at an altogether different level, how does 'AI' radically reconstitute what these constituent entities *are* in relation to 'AI' and to one another? With its appearance, 'AI' introduced an overflow that could not be contained by the conventional categories for ordering the world: a potentially new reality (or realities) was coming into being. Could I track this modal change in the way the world was ordered? It could be argued that, in the abstract, AI goes beyond nature-culture divides – but at the concrete level, what do this look like?

Such an anthropological exploration would be what Tobias Rees (2012) has called "research into the open" (Rees 2012:5), or the exploration of something that does not actually exist before research and hence, could not be known beforehand. The kind of study suggested by the overflow that arose from 'AI' entailed exposing the conventional tools of socio-cultural anthropology to the singularity of an event that potentially exceeds them. How could such a study proceed? As described by Rees (2012), the challenge (and beauty) of one form of anthropological fieldwork

today is "a process that ultimately is about the–equally intellectual as aesthetic– emergence of form" (Rees 2012:4).

My thesis follows the emergence of form. It is organized according to the three field sites that I entered over the course of four months in 2012: the Fraser Valley of Canada where the 2004 outbreak of AI first occurred, to the Department of Ecosystems and Public Health at the University of Calgary, and a field school on ecohealth in New Brunswick. In each site, fieldwork offered up different objects of research, suggested new angles of approach, and presented new ways to think about my research problem, which mutated into something that was not quite avian flu.

FIELD SITE I:

Fraser Valley, British Columbia

A thorough account of the 2004 outbreak of AI in the Fraser Valley is waiting to be written. There are certainly some aspects about the experiences of AI that remain underreported and deserve attention. My time in the field in Summer 2012 demonstrated that AI had left indelible marks across a whole community, despite the fact that eight years had already passed since the first outbreak. Studies on these effects would have the potential to help bring attention to the effects that AI had on the Fraser Valley community, inform actions in case of further outbreaks, as well as bring closure to many of the informants I met. A handful of my informants in the Fraser Valley continue to work hard in these directions and I wish I could include myself as part of those endeavours. The account that follows, however, does not set out to advance those goals. Instead, I show how my movements through this field site generated insights about AI and gave form to ways of thinking about AI that I could not have asked prior to doing fieldwork.

#### Jurisdictions

Room 103 doesn't have any windows. The only source of light is fluorescent, flatly illuminating a large table surrounded by chairs. I have a meeting here with two senior virologists from the BC provincial laboratory in the hopes of learning more about AI and its virological workings. Based on what I know so far, AI is caused by viruses adapted to birds and does not usually cause observable illness in wild birds. Protein markers on the surface of the virus restrict it from infecting humans or other mammals, such as pigs. Under certain environmental pressures, however, the AI virus can mutate in ways that change external protein markers and, potentially, mechanisms for interspecies transmissibility. From this basic information, I assumed that an understanding of AI at the virological level offered a way to cross boundaries and move through the various non-human animals, humans, and political institutions that AI linked together during the 2004 outbreak.

In the meeting room, Drs. Scott and Walker are seated opposite me at either end of the table. They slip me their informed consent forms, which Dr. Scott had

initially withheld. "I want to talk to Dr. Mills first," Dr. Scott told me, referring to his superior at the animal health center. He also suggested that I interview him and Dr. Walker at the same time. The proposition seems reasonable enough so I agree to do a joint interview.

I carefully tuck the forms under my notebook. From across the table Dr. Scott asks me to explain my project, which I immediately address with a wellrehearsed explanation. I hope that I've adequately answered their question. A void of silence opens up amongst us. "Will these results be published?" Dr. Scott asks, finally.

Without hesitating, I state that my research will be written up as a Master's Thesis. Drs. Scott and Walker do not betray any signs about what they're thinking. With less certainty, I babble on about the possibility of producing something publishable in a journal but that it is not likely given only one summer's worth of fieldwork. I look at them for any clues as to what to say next. After a short pause Dr. Scott elaborates: both him and Dr. Walker, he begins, are employed by the Ministry of Agriculture. Before the outbreak they could say whatever they wanted but now that's not the case. He sits back and lets me absorb this information with all its implications. Anxious to reassure them, I explain that my thesis will have limited circulation – most likely only my supervisor, my other committee member, and an external examiner will read it in detail. I don't know if Drs. Scott and Boyle are convinced but they signal for the interview to start.

"Did you sequence the low path as well as high path AI strains?" I ask.

Immediately, Drs. Scott and Walker tell me that they have no mandate to sequence them, not until they've received approval from the Canadian Food Inspection Agency (CFIA). Any sequencing that they do afterwards is just for follow-up. While they sequenced a small section of the viral genome, the Genome Center of BC was primarily responsible for whole genome analysis. Rather, their main function as virologists at the animal health center is diagnosis. Already, they're challenged keeping up with the high volumes of samples that arrive at the center.

I look at Drs. Scott and Walker and nod. My line of questioning becomes as technically oriented as possible: how can a virus that infects poultry become adapted

to human beings? In what reservoirs can the AI virus be found? What kinds of conditions allow for the emergence of AI? Both speak freely about AI within this carefully delimited arena of virology. As the interview takes shape, so does the terrain of inquiry map itself out before me. What first appeared as the outer limits of a virological understanding newly emerge as the frontiers of an unknown territory, a boundary to be tested and escaped. Perhaps in this space on the margins I can find 'AI' as it leaks out from virological domains – and spills into the unknown. As I discovered in the inquiries that I conducted after interviewing the virologists, there were others conducting their own explorations of these limits, which is how I was led to Dr. Campbell.

### "A political animal"

Dr. Campbell seats herself behind a desk strewn with papers and folders. Although her work as the avian pathologist at the laboratory mainly entails making postmortem observations and descriptions of birds brought into the laboratory, Dr. Campbell has expressed keen interest in my investigation of AI. Since the outbreak, she has actively given presentations and published articles on the overall impacts of the 2004 AI outbreak. In these endeavours she does not restrict her commentary to the virology or pathology of AI. Dr. Campbell begins our conversation by introducing me to the problem of AI in the Fraser Valley.

"The CFIA wants to stop foreign animal disease," she says, "such as highly pathogenic avian influenza." *Foreign animal disease*. The term bears special attention. According to the CFIA, foreign animal diseases (FAD) are determined by their absence in Canada. Examples include highly pathogenic avian influenza (HPAI), bovine spongiform encephalopathy (BSE), and foot-and-mouth disease. The CFIA's mandate is to keep Canada clear of these diseases and eradicate them as soon as they are detected. Put in other terms by a different veterinarian, FADs are federally notifiable because of their trade importance. Naming FADs is a way of controlling international trade and protecting domestic industries from outside competition. Dr. Campbell elaborates some more. During the 2004 outbreak, the CFIA and government was under pressure from the World Organization for Animal Health (OIE) to appease trade partners. The CFIA knew that if trading borders shut, products would rot, production would decline, and people's businesses could suffer in the long term. Between Canada and the EU alone, there is significant trade of not only meat and eggs, but poultry genetics as well. When HPAI "hit" the Fraser Valley in 2004 the EU threatened to stop importing Canadian birds unless the government conducted HPAI testing. Poultry producers, however, were reluctant and sometimes actively resistant to test their flocks for HPAI. As government policy dictated, testpositive flocks would be immediately eradicated – as well as the millions of dollars in production and sales that these poultry were worth. To compensate for the loss, the federal Health of Animals Act paid CAD 63.7 million to poultry producers (Teichroeb 2004).

But in Dr. Campbell's opinion, the most impacted group of people were *not* the producers.

"What I think would be really interesting for your project," Dr. Campbell says, "is an exploration of the peripheral effects of avian flu." She goes on: There was a sociologist from Lancaster University who studied how the 2001 outbreak of foot-and-mouth disease in the UK had affected rural communities<sup>6</sup>. She interviewed farmers, their families, slaughter teams, truckers and auctioneers, local retail tourism business operators, and other members of the community including teachers, clergy, veterinarians and health professionals. From the information she collected, it became apparent to the sociologist that the community was experiencing post-traumatic stress. In conducting the study, she was able to identify and draw attention to a significant gap that could then be addressed.

Dr. Campbell indicates that there are similarities in the experiences people had of the 2004 outbreak in the Fraser Valley. Egg collectors, feed deliverers,

<sup>&</sup>lt;sup>6</sup> See Maggie Mort, Ian Convey, Josephine Baxter and Cathy Bailey, "Animal Disease and Human Trauma: The Psychosocial Implications of the 2001 UK Foot and Mouth Disease Disaster," *Journal of Applied Animal Welfare Science* 11, no. 2 (2008): 133-148. For a more thorough development of the ideas developed in Mort et al.'s (2001) article, see Ian Convey, Maggie Mort, Josephine Baxter and Cathy Bailey, *Animal Disease and Human Trauma: Emotional Geographies of Disaster* (London: Palgrave MacMillan, 2008).

truckers, veterinarians, and others were seriously affected psychologically, socially, and economically by the outbreak. She even knows of some truckers who had to pull their kids out of daycare. For backyard flock owners, the experience of the 2004 outbreak was especially profound, especially because it was overlooked.

"You should talk to backyard flock people; they have a different relationship to, and reasons for keeping, animals. AI had a profound emotional impact on them." These people, she goes on to say, have suffered. But the experiences of these other groups of people were not officially recognized, nor did they receive any compensation. A study on avian flu in the Fraser Valley, would help redress an imbalance in reporting on avian flu that mostly featured Southeast Asia and commercial producers when it came to the 2004 Canadian outbreak.

"I deal with avian flu everyday," Dr. Campbell continues, "people are still scared." The AI outbreak was not well managed, data collection was corrupted, nobody wrote anything down. The CFIA didn't know what they were dealing with, they wouldn't listen to what they were told they were dealing with, and they didn't want the rest of the world to know they didn't know how to deal with this. "This was a political animal," Dr. Campbell states.

Her office has a climate of its own. Zoonotic paraphernalia closes us in: stuffed bird dolls crowd the shelves, a strip of dried snakeskin is pinned above the door, feathers sprout out of cups alongside pens and pencils, a slim volume, "How to Survive Bird Flu," is propped up on the window sill. Things threaten to overflow out of the office and yet there is a discernible theme and order to the display of these things. At the same time, here is Dr. Campbell – the same individual who recognized a diagnosis of HPAI on that fateful day in 2004 – trying to capture the social, political, and economic excess of the AI outbreak. There are ways to contain these elements of AI that fall outside the delicately bounded realm of virology. Social anthropology itself, Dr. Campbell seems to suggest, can fulfill precisely this purpose.

Amidst the drifts of paper and binders and tucked into the far corner of her office on her desk, I spy a microscope. Here is the central instrument of Dr. Campbell's practice, through which she can ascertain pathological agents. Yet the

microscope does not bring the AI virus into view so much as magnify its absence; as Dr. Campbell describes AI to me in its social-political-economic form, I wonder: where has the AI virus gotten to?

#### **Human-Animal Interfaces**

I'm flipping through TV channels when a bolded headline arrests my attention: "Breaking News: Virus Transmissible Between Humans." The news update is followed by images of looted grocery stores, their shelves left in disarray. I watch in horror as a pandemic unfolds virtually before my eyes.

Several minutes pass before I realize that this is a docudrama produced by the Canadian Broadcasting Company (CBC), titled "Black Dawn: The Next Pandemic." The program, which originally aired in January 2006, enacts the implications of a hypothetical pandemic of AI (H5N1) as it spread from a local outbreak to global pandemic. The docudrama depicts the emergence of a strain of H5N1 in Thailand that has not only managed to 'jump' the species barrier but is capable of human-to-human transmission. With alarming realism, viewers experience through 'live' coverage the effects of a global pandemic: distant political debates about the involvement of Canada in helping Thailand, the mobilization of local, national, and international health agencies to mobilize emergency preparedness and response plans, travel bans, false alarms, quarantines, public health announcements, confirmed cases, work and school closures, the migration of people to outside the city, self-imposed isolation, stockpiling of supplies, looting and riots. Fear, panic, and social disorder. Sickness, and death. As the producers note: "Although fictional, the scenario is very much grounded in scientific fact... The key elements of our timeline are based on the research, modeling predictions and planning assumptions used to prepare the pandemic plans by the World Health Organization (WHO), the Public Health Agency of Canada, the US Department of Health and Human Services and the UK's Health Protection Agency" (CBC 2007).

The docudrama depicts an extreme scenario. But this possible future keeps human attention fixed precisely on those zones of human-animal contact targeted by scientists and governments as likely sources for zoonoses that could wreak global

devastation. Major AI outbreaks since 2003 have given reason to governments and non-governmental organizations alike to establish disease surveillance networks, emergency preparedness and response plans, and programs to improve capacity for monitoring the human-animal interface.<sup>7</sup> As various anthropologists have pointed out (Kirksey and Helmreich 2010; Kohn 2007, 2012; Paxson 2008), the human practices that have sprung up in these zones of human-animal contact raise important questions: how do multispecies interactions put at stake conventional ways of thinking in terms of 'nature' and 'culture'? In what ways, and with what effects, does challenging these frameworks of thinking put at stake our own conceptions of what it is to be human? What are the ethical implications of challenging 'nature' and 'culture' categories, especially with regard to human-animal relations? As Donna Haraway (2008:244) said: "If we appreciate the foolishness of human exceptionalism, then we know that becoming is always becoming with-in a contact zone where the outcome, where who is in the world, is at stake." For anthropologists, zoonoses such as AI are productive sites for exploring how the lives and deaths of a multitude of organisms are entangled with the lives of humans, and the ideas of anthropos implicated therein.

In the context of global AI outbreaks, both Indonesia and Vietnam are regions that have experienced alarmingly high death rates among both poultry and humans.<sup>8</sup> As a result, various governmental and non-governmental agencies have targeted these two countries (as well as other Southeast Asian locations) for

<sup>&</sup>lt;sup>7</sup> The earliest major outbreak of highly pathogenic H5N1 was reported in 1997 on poultry farms and in live animal markets in Hong Kong. During this outbreak, the first known instances of human infection with this virus were reported. Compared to the 1997 outbreak, the re-emergence of H5N1 in 2003 and 2004 was more wide reaching in terms of geography, number of human and animal cases, as well as fatalities. Since then, H5N1 has been detected in Europe and Africa and in some Asian countries it has become an endemic disease. Since these outbreaks, the WHO, FAO, OIE, and 88 foreign governments have been collaborating to address HPAI through coordinated planning, monitoring, and transparency in reporting and investigating AI incidents. One of the most significant outcomes of these collaborations has been the implementation of disease surveillance networks at the human-animal interface and among wild birds believed to be a major carrier of the AI virus (WHO 2011).

<sup>&</sup>lt;sup>8</sup> In Indonesia from 2003 to 2013, there have been a cumulative number of 192 confirmed human cases for H5N1 and 160 human deaths reported to the WHO. In Vietnam for this time period, the number stood at 125 confirmed human cases and 62 deaths (WHO 2013).

intensified disease prevention and control strategies at the animal-human interface. As well, the AI incidents in Southeast Asian have also attracted considerable anthropological attention. In her study of bird flu in Vietnam, Natalie Porter (2013) argues that "zoonoses raise new questions about human obligations to animal health, which spur conflicts about how humans should conduct themselves in the name of an existence they share with other species" (2013:133). As Porter observes, discourse around bird flu in Vietnam is underpinned by the imperative to protect collective human and animal health. Approaching AI in Indonesia from another angle, Celia Lowe (2010) explores AI as a form producer. In her study, Lowe takes up the virus as a "multispecies cloud," which allows for the collecting together of viruses, animal hosts, human institutions, and nations that, in coming together, coalesce in ordinary and unexpected ways. Consisting of a cloud of uncertainty, the forms that AI gives rise to that, in turn, define AI remain dynamic, unpredictable, and open-ended.

In addition to making visible the entanglements of humans with non-human others, events like the 2004 AI outbreak in BC are intriguing because they constitute moments of profound destabilization. During these moments, conventional modes of political analysis, scientific knowledge, or moral conduct are no longer self-evident. The analytic framework provided by Stephen Collier et al. (2004) suggests that the AI outbreak in BC introduced a new *problematization*, understood as the bringing into existence of something through discursive and non-discursive practices such that it is constituted as an object of thought, whether in the form of moral reflection, scientific knowledge, or political analysis. Furthermore, the uncertainty introduced by destabilizing events requires the development of new modes of thinking and practice. As Collier et al. (2004:3) pose the question: "What forms of political analysis, moral reflection and techno-scientific practices are being mobilized by actors (scientists, policy makers, planners) in shaping – and operating in relationship to – something called biosecurity?"

Several anthropologists have responded to Collier et al.'s (2004, 2008) challenge and, furthermore, have done so using AI as their ethnographic object. Nick Bingham and Steve Hinchliffe (2008) examine attempts to develop a worldwide

standard for AI risk assessment and management through WHO-prescribed mass culling strategies in Cairo. Bingham and Hinchliffe provide a detailed analysis of the features of biosecurity as a general form of reasoning and practice. In Porter's (2013) study, AI in Vietnam has shaped public health discourse on bird flu interventions, as well as how humans should conduct themselves in relation to poultry animals as a form of ethical reasoning. In contrast, Lowe (2010) underscores where AI in Indonesia escapes the biosecurity practice and discourse of Lakoff and Collier (2008), especially as it pertains to the securing of basic infrastructure. Such infrastructure, Lowe points out, is generally lacking in Indonesia. Instead, she proposes the viral cloud as a different way to think of how AI has shaped realities in the Indonesian context. Taking up biosecurity from yet another angle, Frederick Keck's (2008) examines the development of biosecurity as it is inflected through food safety in France. His interest in biosecurity lies in understanding how an anthropological contradiction between humans and animals manifests in the form of biosecurity and food safety.

Given the productivity of AI as a topic for asking the kinds of questions anthropologists are interested in today, the poultry operations in BC's Fraser Valley seemed to be well suited for my own anthropological explorations.

### **Biosecurity in Practice**

As I prepare to visit poultry farms in the Fraser Valley, I wonder about how safe it will be to enter the barns. Will the poultry producers supply me with a disposable biosecurity suit? What steps will I have to take to safely interact with the birds?

A saleswoman in a specialty store selling duck products responds to my request to tour the duck farm. If I want to enter the barns, she tells me, I will have to wear a different set of clothing and pair of shoes. I presume out loud that this must be a precautionary measure against getting sick from the birds. The saleswoman looks curiously at me before correcting my statement: "No, it's to protect the birds from *you*." Her comment stops me in my tracks, disturbing the set of assumptions

that I've laid down as groundwork to conduct my exploration of AI. I must have things mixed up.

 $\sim$  \*  $\sim$ 

The commercial poultry producers that I meet in the Fraser Valley stay close to proper biosecurity protocols: they agree to give me interviews but don't offer tours of their operations.

"Avian flu was the first time that makes you aware that there are diseases transferrable between animals and humans," admits one producer responding to questions about whether or not he is concerned about his own health, "But it's not something I think about a lot." His response – that it's uncommon to think about poultry animals as public health threats – is fairly typical among the producers and veterinarians that I meet. Birds are just birds; they hardly count as threats to human health let alone a new other that requires the development of new modes of ethical conduct. During the 2004 outbreak itself sickness and death were restricted mainly to poultry. Unlike in Southeast Asia where there were a high number of human cases of AI, during the 2004 BC outbreak there were only two laboratory-confirmed cases of H7N3, which manifested as mild conjunctivitis or eye inflammation (CDC 2008). The affected individuals were poultry workers involved in the culling operations.

Dr. Evans, one of the veterinarians I speak to, explains that H5N1 does not pose a very high risk to humans. Speaking for himself, Dr. Evans wouldn't be concerned about going onto a farm where AI has been detected. Moreover, he thinks that a lot of the farmers feel the same way about AI insofar as it comprises a negligible public health risk.

"But," Dr. Evans admits, "*financial* health is certainly a concern." At the moment, "stamping out" AI is the approach to handling this federally notifiable disease. The consequences can be devastating with the depopulation of flocks, periods of quarantine, financial and emotional distress. As Dr. Evans points out, "There are more risks besides the potential health risks in a case of avian flu."

This observation bears itself out in statistics. At the biological level, the AI outbreak had a terrific toll on poultry animals and other bird species in the Fraser Valley. In total, 17 million birds were culled during the outbreak (Bowes 2007). While only 42 commercial flocks were declared to be infected premises, a total of 410 farms were depopulated representing 90 percent of commercial poultry farms in the Fraser Valley (Bowes 2007). The reason for this incongruence lies in the poultry industry's decision to implement voluntary 'strategic depopulation.' Consequently, farms found within a three-kilometer radius of an infected premise underwent depopulation. Altogether, 15 million test-negative birds were slaughtered through strategic depopulation (Bowes 2007).

The mass cullings had painful economic effects on producers. Gross economic costs arising from the outbreak amounted to more than \$380 million (Etsell and Halkai 2004). To compensate for test-positive bird losses, the federal Health of Animals Act paid out \$63.7 million to poultry producers (Etsell and Halkai 2004). These financial costs don't include the inestimable losses inflicted on the specialty bird industry (squab, commercial ducks and geese, game birds, etc.). Furthermore, it's estimated that about 1700 people lost their jobs or experienced reduced employment, leading to an estimated total of \$156 million in uncompensated losses to the poultry allied service industry (Teichroeb 2004). Producers and veterinarians recalling the outbreak mention how the economic impact of the outbreak extended beyond the actual depopulation to the period of non-productive downtime. It took some operations up to a year and half to begin running at pre-outbreak levels of production once more.

For producers in the Fraser Valley, the 2004 outbreak demonstrated the entanglement of these operations in business transactions and partnerships, shared farm services (e.g., feed suppliers, egg collectors, chicken catchers, veterinarians), and encounters at Tim Hortons coffee shops, the producers' local haunt. AI had not brought into view a shared biological identity amongst humans and animals so much as underscore: first, the link between birds' biological health and producers' financial health; and second, the connectedness of poultry operations in the valley such that they comprised one interrelated whole instead of autonomous units. The

shared-ness of this reality simultaneously brought into view its fragility: biosecurity only works if everyone follows the rules. As the wife of one producer stated: "We all need rules." Rules can restrict, she explains, but they can free people, too. She's happy that other farmers follow the rules but she and her husband must follow them, too. "It's no different than road rules," she says, "we're happy because it protects all of us."

Post-2004 biosecurity protocols coded forms of social and ethical conduct for producers in the Fraser Valley. Practically speaking, this required changes in business. As one producer put it, biosecurity is "the new reality." He recalls telling his business partners that, today, biosecurity protocols are just part of "everyday practice." If they want to do business with him, they will have to comply with recommended biosecurity measures. Since business infrastructural networks in the Fraser Valley coincide with biological routes of infection, biosecurity post-2004 not only maps itself onto the reality of business but alters the manner in which business can be conducted. What happens on one farm is now the business of others. Complying with biosecurity is *not* carried out to protect collective human-animal health but to protect the health of the birds and, by implication, producers' financial interests.

Excited by these findings, I sought to find out more to elaborate upon the reality that appeared to be emerging in the wake of the 2004 AI outbreak. But even as I pursued this line of inquiry, I was led elsewhere.

### **Biosecurity and Its Other**

My interviews with commercial poultry producers open with a standard question: "What kinds of biosecurity measures do you take?"

"The basic, most important things are fresh air, clean feed, and clean water," replies Gary, a producer who runs an egg-laying farm made up of about 20 000 birds. After making this first requirement clear he follows up with an inventory of other procedures: washing hands, wearing fresh coveralls upon each entry into the barn, dipping and scrubbing boots in antibacterial baths, pressure-washing tires and

trucks, erecting fences and signs, locking barn doors, supplying barn-specific shoes and coveralls.

The first item that Gary lists – the provision of basic nutrition and living conditions<sup>9</sup> – seems out of place relative to the locks and fences, impermeable surfaces and disinfectants that characterize the list of biosecurity measures. Rather than orienting the set of prohibitions and permissions that comprise biosecurity around disease prevention, providing basic nutrition and living conditions directed producers' activities towards the elaboration of a *disease-free zone*. What *is* a 'disease-free zone'? An investigation of biosecurity, concerned with the prevention of disease, was strangely silent on this 'disease-free zone.' Aside from securing an indeterminate space, biosecurity could not specify the content of this disease-free zone.

So biosecurity, the ethnographic object on poultry farms in the Fraser Valley, would point away from itself to other paths of inquiry, field sites, and anthropological curiosities.

<sup>&</sup>lt;sup>9</sup> While there have been plenty of journalistic as well as anthropological accounts of the living conditions in which farm animals are raised, my research does not aim to describe in detail or morally evaluate industrial farming practices.

FIELD SITE II:

Department of Ecosystems and Public Health

## Transitions

The University of Calgary's Veterinary Medicine School (UCVM) was established in 2008 as the first veterinary program in Alberta. On the UCVM website, the veterinary school links its inception to the 2003 mad cow crisis in Alberta.<sup>10</sup> The explicit configuration of UCVM around human-animal interfaces is further reflected in the sharing of facilities between UCVM and the University of Calgary's Faculty of Medicine to encourage collaboration between human and animal health professionals. The inclusion of an Ecosystems and Public Health (EPH) Department, in addition to the Departments of Production and Animal Health, Equine Health, and Investigative Medicine, is meant to reinforce UCVM's mandate to understand health as it emerges at the intersection of human and animal relations. Although the focus of most work conducted at the UCVM reflects Alberta's cattle industry, UCVM and its EPH Department caught my attention because of how it had situated its own creation in relation to a zoonotic disease (i.e., BSE). In particular, the adoption of "One Health" – according to the UCVM website, a framework that aims to strengthen connections between human and animal medicine - offered itself as another way into understanding avian flu - just as virological, social, cultural anthropological, and biosecurity modes of analysis had provided distinctive modes of understanding.

UCVM's orientation around human-animal interfaces is only one change among many in the field of veterinary medicine. Dr. Bergen, a senior UCVM faculty member, has been witness to several shifts in the veterinary practice over the span of his career. As I interview him about biosecurity and the potential of animal health surveillance to manage the risk of emerging infectious diseases in livestock, our conversation turns to changes in veterinary practices that used to define the field.

<sup>&</sup>lt;sup>10</sup> In 2003, veterinary officials in Alberta confirmed a case of mad cow disease (i.e., bovine spongiform encephalopathy or BSE). The infected cow was removed from the food chain for both humans and other animals; however, the incident led the US, Japan, South Korea, Australia, and other countries to impose temporary import bans on Canadian beef. At the time of the crisis, a total of CAN \$460 million was granted to ranchers through a federal-provincial aid program to alleviate the economic toll of BSE (CBC 2006).

"Well, we [veterinarians] used to be very task-orientated," Dr. Bergen tells me in the interview (July 2012), "I mean, when I graduated we made our living from sick baby calves and calvings. Boy, I would say there's very few practices that do that anymore. (...) And I guess when I graduated a lot of what we did was surgery. But a lot of what we do now is pathology." Today his students provide consultations to producers on what kinds of vaccinations their animals will need, in addition to selling them the necessary pharmaceuticals. Dr. Bergen also observes that many of his recent graduates provide services to improve animals' reproductive efficiency based on scientific models.

"The science in doing that is fallacious," Dr. Bergen argues in reference to a particular method of evaluating bull fertility, "But I'm impressed as I go around and look at my students everywhere..." He lets out a low whistle. "Boy they spend an *awful* lot of time doing that. That's almost job one for veterinarians now."

"So would you say that veterinarians have been moving towards herd health?" Dr. Bergen leans back in his chair, considering my proposition.

"Nowadays when I sit in my office taking calls, instead of people calling about one pneumonia, they're calling about an outbreak of pneumonias. Instead of calling about one cow that's down, they're calling about a herd of cows that's down. The fire has just gotten bigger. But it's still a fire and it turns out that that's still predominantly what we deal with: disease and pestilence."

"So even though we like to say we just deal with health and wellness, I'm always a little suspicious: What the hell do you do?" Dr. Bergen pauses. Raising an eyebrow, he leans forward and repeats his question: "Well, *what do you do* for health and wellness? I mean, how does that make you money? I mean, you tell that to a farmer: 'What do you mean, you're going to come out and look at my healthy herd?' Really? And what will you do? Make it healthier? That's a much more complicated concept. So, we're predominantly used for disease and pestilence."

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Despite Dr. Bergen's insistence that disease treatment is the primary function of veterinarians, various faculty members at UCVM and the EPH Department are interested precisely in pushing veterinary medicine beyond its conventional responsibilities. The EPH Department members come from a variety of academic backgrounds: epidemiology, biology, anthropology, veterinary medicine, ecology, chemistry. Although they come from different backgrounds, they share in common an interest in health problems that dip in and out of different areas of expertise and, moreover, cannot be contained within a single discipline. For one faculty member, who had felt like an "outlier" straddling numerous departments before coming to the EPH Department, her research interests had shifted as if moving through ever widening concentric circles. She started in conventional veterinary medicine looking at individual animals but felt dissatisfied with this approach. As she began to work more closely with wildlife it dawned on her that the health of these animals depended on the health of the environment around them. Another researcher explains that she had had long term interests in wildlife health and diseases as well as diseases transmitted between humans and animals. In a more conventional veterinary college, she says, she would have had to pick between public health or the study of wildlife as part of physiology. Joining the EPH Department made it possible for these two researchers and others to *not* feel obliged to choose any traditional discipline over another.

As these researchers indicated, their interests lie in health as it emerges at the intersection of three coherent entities: animals, humans, and environment. Such a concern would seem consistent with UCVM's overarching adoption of 'One Health' as a guiding framework. In both human and animal medicine 'One Health' has gained traction within the last decade, particularly since the outbreak of H5N1 AI in Hong Kong in 1997, followed by a string of other emerging zoonoses including SARS, Nipah virus, Ebola virus and West Nile virus (Welburn 2011; Davis 2011; Kahn et al 2010). In fact, about 75 percent of emerging infectious diseases have zoonotic origins (Davis 2011). Given this context, scientists argue that it's untenable to continue putting humans at the center of efforts to fight disease. 'Health' with its anthropocentric focus must be extended beyond humans to include animals and the

ecosystems in which they live. As veterinarian Sue Welburn (2011) defines 'One Health':

It goes beyond comparative medicine to link animal and human health together with the ecosystems in which they live, focusing on the current and potential movements of zoonotic diseases among human, domestic animal and wildlife populations and recognizing that human, animal and ecosystem health are inextricably linked. (Welburn 2011:614)

Given these links, 'One Health' encompasses collaborative efforts to work across medical, veterinary, public health, ecosystem, and environmental areas of expertise, as well as at local, national, and global levels to achieve optimal health for humans, animals, and the environment (Welburn 2011; Frank 2008). In veterinary schools in Canada and the United States, efforts have been made to integrate 'One Health' into curricula so that it becomes a part of standard veterinary education (Conrad et al. 2009; Cribb and Buntain 2009).

In these shifts, the role of veterinarians has expanded again: veterinarians are being explicitly recruited to not only safeguard animal health but to mediate disease prevention at the animal-human interface. In some ways, veterinarians' tasks don't deviate far from the defining features of traditional animal medicine: disease and pestilence. Veterinarians still take on the tasks of minimizing disease risks in animals (whether through disease treatment or prevention strategies) but these activities by extension help reduce the likelihood of disease in humans. In One Health discourse the major difference is that veterinarians must now secure 'health' – more precisely, a disease-free zone – along a zoonotic continuum that includes humans, non-human animals and, as others would argue, plants (Fletcher et al. 2009). Accordingly, freedom from disease is determined relative to the absence of disease in other living entities; in other words, humans and animals are encompassed within the same zone of biological vulnerability.

### **One** Health

"The joke among wildlife health people," Dr. Gianelli says menu in hand, "is that One Health is about *One* Health or *human* health." We're having lunch at a popular Vietnamese restaurant across the street from campus and, once again, I've forgotten to bring pen and paper. I must invent mnemonic devices to help me remember our conversation.

Once the server departs with our orders we continue discussion. As Dr. Gianelli intimates, in One Health discourse there is concern for the health of other beings – non-human animals and plants – insofar as it impinges on human health. Dr. Gianelli isn't comfortable with this anthropocentric bias and prefers the term 'ecosystem health.' Thinking about *ecosystem* health brings into view a larger system that encompasses a host of different living entities, in which humans are only one among many living beings. In this way, the ecosystem and its component parts – whether they are human or non-human – shift into focus as potential points of interest for understanding health. If one studies a parasite in the moose population up North, there may be implications for moose and, perhaps more remotely human health, but as a study this would be principally about ecosystem health. Dr. Gianelli snaps apart his chopsticks as our noodles arrive. This is why it's possible to study parasites in ungulates in the Arctic, he says, and still consider it to be health research.

My understanding of 'health' is set into motion like continents set adrift. A whole other world of 'health' comes into view that, in turn, dismantles and recomposes 'health' as a concept. In Dr. Gianelli's view, there is a need to completely recast understandings of 'health' so that humans don't form its reference point. What would 'health' look like if it is not defined in anthropogenic terms? *Can* 'health,' as a presumably anthropogenic notion, transcend human beings as a referent? Is there a way to speak about the 'health' of non-human entities, whether as individual beings or as a whole ecosystem? The glimpse of 'health' that Dr. Gianelli offers in our conversation displaces humans from the origin on the axes of thinking, and shifts the coordinates for negotiating (human) health – in its social,

cultural, psychological, political, and economic varieties – to an entirely different and yet to be specified set of considerations, problems, and questions.

#### "Ecosystems and Public Health"

As Dr. Gianelli made evident, several of the researchers I spoke to would not explicitly brand their work 'One Health' and some would even contest its underlying assumptions. As initially conceived of in terms of public health hazards, where freedom from disease in animals can be subsumed to the absence of disease in humans, and freedom from disease is conflated with 'health,' the assumption that "*Their* health is *our* health" makes One Health. Not all research in the EPH Department, however, makes a direct link to human health nor is an effort always made to form this connection. The very name of the Department seemed to hold some clues about the inter-species zone in which researchers were working and the ways that 'health' emerged in this space.

At first, explains Dr. Clarke in an interview, EPH members didn't want to use the term 'One Health' because it was "more or less patented" and had specific meanings from in both human and veterinary medicine. But in the end, the term 'One Health' won out. First, it was already widely accepted and understood in the veterinary field and second, it could gesture broadly towards the kind of work carried out in the Department.

"We do use that One Health approach, but we don't just look at medicine and veterinary medicine," Dr. Clarke says in an interview (July 2012) to further qualify the Department's uptake of One Health, "we look at the broader scale of things which includes your economics, it includes your environmental health and environmental setting and it very much looks at the concept of wellness rather than disease."

"What Dr. Harris will tell you," she says referring to another Department member, "is that when a lot of people took up One Health, they talk about zoonotic diseases. We're looking at more than that. (...) David Waltner-Toews at Guelph would probably have a similar perspective in that he was one of the key people who established a lot of interest in this sort of thing. But he was using the term, I think, 'ecohealth'." FIELD SITE III:

Ecohealth Field School, New Brunswick
#### In Transit

On the first day of the week-long ecohealth field school, students and course instructors take the bus to Memramcook, a small community just outside of Moncton, the capital of New Brunswick. Despite being in transit, the bus is a vehicle for educational opportunities, a form of teaching that follows the contours of the landscape. Passing out of the city into the salt marshes, S.<sup>11</sup> tells us about the river that runs alongside the road, rising and falling in sync with the pull of the moon, making palpable things that fall outside the boundaries of even this planet. As a child growing up in the area, S. and her family affectionately renamed the river the 'Chocolate Milk River' for its smooth, brown colour.

The bus follows yet another bend in the road. "Where do you usually find windy roads?" C.<sup>12</sup> asks. We consider her question in silence. She continues. "Usually, you'll find them along rivers or in the mountains where humans are forced to follow the landscape." The road straightens for a short stretch. I look out the windows and challenge myself to read the landscape, to become sensitive to cues of vegetation and tar, concrete and water courses. Geologic records in the making. But for now, I must rely on others to make visible what I can't see.

# What is 'Health'?

We disembark at Memramcook and file into the community center. I unfold the slip of paper in my hand and consider the statement written there:

### 4. Retired public health nurse from Moncton health district.

The description designates the role that I must assume in this activity, called "What is 'health'?" The immediacy of this question catches me unprepared: here I find myself staring at the very question that, until now, only I have posed to others.

<sup>&</sup>lt;sup>11</sup> S.'s disciplinary areas of expertise include chemistry and biochemistry.

<sup>&</sup>lt;sup>12</sup> C.'s disciplinary area of expertise includes philosophy.

Aside from the host of questions that follow in its wake, the question "What is 'health'?" is striking in its being asked. Questioning turns 'health' into an unknown, making it available as a space of experimentation and exploration.

The activity plays itself out in three parts. First, I find the other 'nurses' and together we formulate a definition of health that would be plausible given our role. We each derive formulations of 'health' that originate in our training, whether in public health, epidemiology, or anthropology. These are elements that comprise our conceptual equipment for conceiving of 'health.' After some discussion we agree that, according to a retired public nurse, 'health' is:

A relative condition that depends on one's stage in life and position in society, and consists of two major components: 1) Physical wellbeing, including good nutrition and living in a good physical environment; and 2) Psychological wellbeing, including a sense of safety and self-empowerment, as well as the absence of psychiatric disorders.

Afterwards we disperse to our final group indicated by the number on the slip of paper: Group Four. At the table I'm surrounded by a female salmon and her offspring seven generations from now, a pregnant waitress from a small community, an Albertan international shale gas company CEO overseeing a project in New Brunswick, a scientific advisor to the Minister of Health who regularly votes left but is currently working within a conservative government, a master tradesperson from a small riverside community who works for the forestry company, and an Acadian forest in springtime.<sup>13</sup> The diversity of entities present anticipates the multiplicity of 'healths' at stake.

We go around in turn describing how we have defined 'health' according to our respective roles. To begin, says the Acadian forest, it would like to remain a forest. But to retain its identity as a forest doesn't just require the right climactic conditions and a set of living things; it entails engaging in a negotiation with these

<sup>&</sup>lt;sup>13</sup> Other possible perspectives as suggested in the ecohealth field school training manual (McCullagh et al. 2012) include: an unborn moose, Provincial Ministry of Health, birch tree seeds, and a child who plays in a creek.

various entities and processes to determine the forest's identity. Hence, 'health' for the forest is the capacity to renew, specifically the ability to renew negotiations with species in an ecosystem.

Our attention turns to the master tradesperson. 'Health' for him is a matter of having a good income to purchase food, a home, clothing, and other basic necessities. Employment in the forestry company (that incidentally uses the Acadian forest as a supply of lumber) ensures his livelihood. Moreover, employment in the forestry company provides health benefits. At the same time, as a master tradesperson that does woodworking, he relies on the same Acadian forest as the forestry company to sustain this craft – an activity that not only supports his livelihood but gives provides mental and emotional wellbeing.

With each definition the repertoire of conceptual tools at our disposal grows increasingly diverse: from biomedical understandings of health, to the social determinants of health, to concepts of 'identity' and 'renewal,' the range of concepts comes from not only different disciplines (public health, natural resources management, biomedicine, psychology, and ecology) but include re-workings of 'health' at different points in time.<sup>14</sup> The very exercise that we engage in is another attempt to develop existing conceptual equipment to give form to a new understanding of 'health.' I cannot help but note that this ready availability of conceptual equipment around the idea of 'health' stands in contrast to the 'diseasefree zone' circumscribed by biosecurity in the Fraser Valley. Insofar as 'health' was the absence of illness, a 'disease-free zone' and 'health' were co-terminous with one another. And yet, to begin the labour of conceptualizing something beyond (and radically different from) a 'disease-free zone' seemed to require an entirely different kind of thinking and conceptual equipment. Even as the idea of a 'disease-free zone' opened up the possibility for thinking differently, this concept had to be left behind in order for 'health' to come into being on its own terms.

As we compare the four groups' definitions of 'health' in the last part of the activity our conceptual handiwork becomes apparent. On a chart at the front of the

<sup>&</sup>lt;sup>14</sup> From the WHO's (1948) definition of 'health' as more than the absence of disease or infirmity, to 'healthy lifestyles' (Lalonde 1974), to the idea of 'health' as a resource (Epp 1986).

room, a course instructor jots down concepts common to all four definitions: 'adaptation,' 'resilience,' 'change,' 'interdependencies,' 'tensions between levels/scales', and 'access to resources.' Disregarding the dispersal of these concepts throughout other bodies of literature the arrangement of these concepts in one place points to a common object: 'health.' Furthermore, 'health' is multiple. In the activity, posing the question "What is 'health'?" contests an all-encompassing definition of 'health' in the singular. Diffracted through various entities – public health nurse, lobster, CEO, Acadian forest and others – 'health' differentiates into a gamut of contrasting and sometimes conflicting range of 'healths.'<sup>15</sup> As one course instructor points out, the consumption of lobster to improve human's nutritional 'health' is anathema to health of the lobster itself; this is one of many "trade-offs" that become evident when lobsters and forests are put in conversation with nurses and CEOs. The ensuing task of negotiating a common definition of 'health' is an equally important, if not more difficult, challenge for researchers trying to develop an understanding of this idea and state of being.

One course instructor remarks that her group members had to play down their roles to negotiate successfully. In agreement, a student describes his strategy of accommodating different perspectives by thinking of 'health' at a general level – whether at the systemic structure of the forest, the social structure of the waitress, the ecosystem for mussels, or the economic level for the CEO. Throughout the negotiation process students have refused to reject any one definition of health and instead try to accept them all. But to account for the perspective of *all* entities renders the task of defining common 'health' a living, irresolvable quandary. F.,<sup>16</sup> however, chooses to see this challenge differently.

"There's beauty in ambiguity," he comments.

<sup>&</sup>lt;sup>15</sup> In some ways, this recognition and description of multiple 'healths' resembles the task of traditional anthropology, in which multiple 'cultures' are the objects of elaboration. The parallel suggested here has interesting implications, especially given anthropology's criticisms of the 'culture' concept since the mid-1980s. To make analogous claims about the contingency of 'health' as an object of analysis is not to discount this as a useful concept but to indicate its temporal and spatial specificity as a problematization.

<sup>&</sup>lt;sup>16</sup> F.'s disciplinary areas of expertise includes biology and political ecology

Perhaps, as F. suggests, there is a more positive way to view the sorting out of difference that characterized this activity. Whereas shared identity initially formed the premise of collecting and sorting out difference, in the second part of the activity the premise for bringing together difference are shared stakes in a common world or, more specifically, a collective interest in 'health.' Approaching the world through 'health' allows for the assembly of a common world and, at the same time, a way to negotiate difference that remains dynamic and refuses finality.<sup>17</sup> "Health," says one field school participant says, evading my demand for a precise definition of this concept, "is more a process of negotiation." The ecohealth researchers that she has met are more comfortable with working definitions.

Looking at the front of the room where the groups have posted their definitions of 'health,' I consider the activity once more: "What is 'health'?" The question suggests a line of inquiry other than the exploration of 'health' as a multiplicity. In this other mode of questioning, 'health' becomes visible as a contingency, an idea that required certain conditions of possibility to come into existence.<sup>18</sup> For the time being, however, this line of inquiry is not pursued.

### What is 'Ecohealth'?

Drawn onto the flipchart at the front of the room is a six-pointed asterisk, each ray representing one of the principles of ecohealth: 1) Systems thinking; 2) Transdisciplinary research; 3) Participation; 4) Sustainability; 5) Gender and Social

<sup>&</sup>lt;sup>17</sup> In *We Have Never Been Modern* (Cambridge, MA, Harvard University Press, 1993), Bruno Latour powerfully demonstrated the non-necessity of modern-pre-modern (as well as nature-culture, object-subject, and realist-idealist) conceptual divides, in *The Politics of Nature: How to Bring the Sciences Into Democracy* (Cambridge, MA, Harvard University Press, 2004) Latour raises the problem of how to reassemble previously divided entities into a collective. If the composition of this collective can no longer base itself upon natureculture divides, then the question of how to compose and arrange a common world is eminently political. Politics will be a process of determining the very distinctions that matter in the negotiation of power. In what ways can 'health' potentially convoke a common world? To what extent can the negotiation of 'health' offer a way to navigate the politics of assembling a common world?

<sup>&</sup>lt;sup>18</sup> See Georges Canguilhem's "Health: Crude Concept and Philosophical Question" (trans. Editions Sables, 2000 [1988]) for a brief examination of the concept of 'health'

Equity; and 6) Knowledge to Action. The students are asked to reflect on how these principles manifest in our own research projects: which principles are part of our research? Which ones have we not considered? To classify a research project as 'ecohealth,' does it have to incorporate all six principles? Why consider these principles in the first place?

Q.<sup>19</sup> plots a hypothetical research project onto this ordinate plane. She indicates the relative importance of each principle to the project by making a mark that is closer to or further away from the origin. What looks like a mutant starfish emerges with incompletely developed limbs in the regions of 'participation,' 'gender and social equity,' and 'knowledge to action' – the principles that are supposedly less significant to the hypothetical project.

"You may not need every piece," Q. explains. A research project will not be discounted as ecohealth if it does not address one or more of the principles directly. Conversely, there isn't a reward for designing a project that thoroughly integrates all six principles. Ecohealth is not reducible to a set of principles, nor do these principles constrain the possible forms in which an ecohealth project can take shape. (Still, I observe that my anthropological project remains unplottable on these axes).

In fact, the six principles of ecohealth are a recent formulation. These principles come from *Ecohealth Research in Practice* (2012), edited by Dominique Charron – one of the few instructional materials that specifically address how to conduct ecohealth research.<sup>20</sup> Previously, there were three 'pillars' of ecohealth: 1) Transdisciplinarity, 2) Multistakeholder Participation, and 3) Gender and Social

<sup>&</sup>lt;sup>19</sup> Q,'s disciplinary areas of expertise include human ecology and public health. <sup>20</sup> There are plenty of materials on various methodologies and theories that go into ecohealth (e.g., systems theory, complexity theory, public health, social determinants of health, adaptive governance, resilience, etc.) but materials that specifically and explicitly link human health to environmental health are sparse. There are two main reasons for singling out this edited volume. First, its publication at this timepoint indicates ecohealth's current stage of development. Second, its publication was supported by Canada's International Development Research Centre (IDRC), indicating the close involvement of this granting organization in the making of ecohealth. Charron herself is IDRC's ecohealth program leader. Unlike other instructional materials, Charron's edited volume collects and synthesizes a growing mass of previous publications and research experiences into a single source, a reference point. At the same time, the significance attributed here to Charron's edited volume does not eclipse the importance of other sources on ecohealth.

Analysis. But to Charron, the 'pillars' metaphor did not reflect the diversity of ecohealth projects, or the adaptability of this approach in different scenarios.

"The way of doing ecohealth is not fixed," W. tells me during the session break, "but you have to find the right language to express that." Otherwise, W. warns, suggestions can become programmatic. Charron had not wanted to list in a step-by-step manner what happens in ecohealth research but to illustrate an orientation in thought towards a problem. As Q. said to conclude her presentation: "It's a philosophy, a perspective that you put on your project. That's why I like the 'approach' word so much. Although it's a stance, it's a mobile sort of thing."

The students variously nod or continue to look at the flipchart, their expressions unreadable. If any of us had come here in the hopes of taking away a set of an easily packaged list of "do's and don't's," definitions, or directives, we will be disappointed. The goal of the field school is to develop an attitude. At best, the course instructors can give us bearings on how to approach the world and ourselves as researchers, which will help us carry our projects out into the world.

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The malleability of the ecohealth approach is mirrored in the diversity of 'schools' of ecohealth. W. rattles off a list of approaches: conservation medicine and disease ecology is a framework that works at the intersection between ecological disruption of wildlife, livestock, and human health and survival<sup>21</sup>; 'ecosystem health' adapts medical diagnostic models to ecosystems as 'patients'<sup>22</sup>; 'global ecological integrity' is an approach that aims to achieve sustainable life for present and future generations by conserving 'wild' nature, understood as environments

<sup>&</sup>lt;sup>21</sup> In the US, the EcoHealth Alliance (formerly known as the Wildlife Trust) is a key pioneer in the field of conservation medicine. The goal of EcoHealth Alliance is to "integrate innovative science-based solutions and partnerships that increase capacity to achieve two interrelated goals: protecting global health by preventing the outbreak of emerging diseases and safeguarding ecosystems by promoting conservation" For more information on the EcoHealth Alliance, see: http://www.ecohealthalliance.org

<sup>&</sup>lt;sup>22</sup> See Robert Costanza et al, *Ecosystem Health: New Goals for Environmental Management*, Washington, DC: Island Press, 1992.

undisturbed by anthropogenic influences<sup>23</sup>; and the 'sustainable livelihoods approach' (SLA) takes up problems of poverty and economic growth as the primary route to promoting human development and conserving the environment (DFID 1997).<sup>24</sup> In each of these approaches ideas of sustainability, human health and wellbeing, and ecological understandings are configured in slightly different ways. Despite variation, all of these approaches can be considered part of a widening field of ecosystem approaches to health.

Even the way in which researchers doing ecosystem approaches to health have organized themselves, as an international *association* rather than as a foundation, center, or alliance, underscores their reluctance to reduce 'ecohealth' to a single methodology, set of principles, or subject matter.<sup>25</sup> Ecohealth researchers are widely distributed in various disciplines, including biochemistry, public health, communications, philosophy, veterinary medicine, epidemiology, global health, environmental sciences, and sociology, to name a few. The kinds of questions they ask can include inquiries on how climate change influences patterns of vector-borne diseases, to rising anti-microbial resistance, to building local health systems capacity. The creation of an association allows differences to co-exist rather than subsuming them under a single program. The conjunction in "International

<sup>&</sup>lt;sup>23</sup>For more information on 'global ecological integrity,' see Laura Westra et al., "Ecological Integrity and the Aims of the Global Integrity Project," in *Ecological Integrity: Integrating Environment, Conservation and Health,* Laura Pimentel and Reed Noss, eds. Washington, DC: Island Press, 2000.

For information on the Global Ecological Integrity Group, see: <u>http://www.globalecointegrity.net</u>

<sup>&</sup>lt;sup>24</sup> Å 'sustainable livelihood' is defined as comprising: "the capabilities, assets (both material and social resources) for a means of living. A livelihood is sustainable when it can cope with and recover from stresses and shocks and maintain or enhance its capabilities and assets both now and in the future, while not undermining the natural resource base" (DFID 1999). Since its introduction in 1991 by Robert Chambers and Gordon Conway, the SLA has since been integrated into the programming of Oxfam, the United Nations' Development Programme (UNDP), and the UK Department of International Development (DFID). For more information on 'sustainable livelihoods,' see: Chambers and Conway (1992); William Solesbury (2003)

<sup>&</sup>lt;sup>25</sup> "There is no single best or even (as yet) dominant approach, and this is reflected in the number of different frameworks and approaches put forth under the banner of ecohealth, and the gamut of research presented in the journal EcoHealth...This diversity is an asset to the growing field of ecohealth and is consistent with its inclusive and transdisciplinary principles." (Charron 2012:6-7)

Association of Ecology *and* Health" (IAEH) has been strategically selected; while "and" brings together two conventionally distinct problem areas, it does not specify how the two are connected. There are plenty degrees of freedom to explore how these linkages can be made and to what extent.

A few of the course instructors are quick to point out that the variant of ecohealth espoused by Charron (2012) is the school of thinking initially established and promoted by the International Development Research Centre (IDRC), an important Canadian granting agency. In the design and delivery of the current field school the "IDRC school of thinking" has been a strong influence and merits attention.<sup>26</sup>

In 1970 the Canadian government established the IDRC "to help developing countries use science and knowledge to find practical, long-term solutions to social, economic, and environmental problems" (IDRC 2010:6). At the time of its founding, IDRC supported four divisions of research with the following themes: agriculture, health and healthcare delivery, information science, and social sciences. In its first decade of work the IDRC tended to reflect this single focus on single commodities, single crops, and single centers of economic activity. Over the last forty years, shifts in policy, funding structures, scientific sensibilities and corresponding research approaches at the national and international levels have led to the development of new research programs and priorities. In addition to the original four, themes now listed on the IDRC website include governance, economics, evaluation, environment, and natural resources. The IDRC has also grouped its supported

<sup>&</sup>lt;sup>26</sup> This account of ecohealth draws mainly on Charron's (2012) introduction. In doing so, I do not intend to recapitulate her description as a history of ecohealth based on indisputable facts. I want to reiterate Charron's presentation of ecohealth, not to render a coherent narrative as Charron does but to draw attention to her assemblage of elements (institutional actors, individuals, international agreements, etc.) and their arrangement in relation to one another. Here a particular problematization of 'health' arises that is situated within a history of human development and from which 'ecohealth' emerges as a new conceptual apparatus. The conditions of possibility for making this link, which was neither natural or inevitable, is something that I would like to study in more depth but is beyond the current scope of my thesis.

projects into different programs<sup>27</sup>, under which ecohealth is included as part of the Agriculture and Environment Program.

In her account, Charron (2012) situates ecohealth as an emergent research approach arising from attempts to handle persistent and refractory issues in human development. She observes that lower income countries bear a disproportionate burden of disease, population growth, poverty, environmental degradation, and economic exploitation. As well, impoverished peoples tend to live in degraded environmental settings. Thus, problems conceived of as social, economic, environmental, or health-related are not just occurring in separate, parallel domains but are inextricably linked and interdependent. Charron points out that various international agreements - from the Millennium Development Goals, to the WHO's revised International Health Regulations (2005), the report Preventing Disease Through Healthy Environments (Prüss-Üstün and Corvalán 2006), the Commission on the Social Determinants of Health (2008), and the Intergovernmental Panel on Climate Change's working group that addresses human health and wellbeing – have increasingly realized that social and environmental concerns are linked to health and wellbeing.

Charron draws attention to similar calls being made in the scientific literature to integrate social and ecological understandings of health (McMichael 1999, Parkes et al 2003). Citing Renauld DePlaen and Catherine Kilelu (2004), she notes that researchers were frustrated with the limitations of addressing increasingly complex problems to make a real difference in local communities from within their own discipline.

Ecosystem approaches to health (or ecohealth) fits the shape of the problem as outlined above. <sup>28</sup> As defined by Charron:

<sup>&</sup>lt;sup>27</sup> Other IDRC programs include: Global Health Policy, Middle East Special Initiatives, Science and Innovation, Social and Economic Policy, Canadian Partnerships, Donor Partnerships, Evaluation, and Fellowships and Awards.

<sup>&</sup>lt;sup>28</sup> Based on my forays in the literature, the portmanteau 'ecohealth' most commonly refers to the IDRC school of thinking. 'Ecosystem approaches to health' refers more generally to a field of research that gains coherence because of the links made between environmental and

Ecosystem approaches to health (or ecohealth research) formally connect ideas of environmental and social determinants of health with those of ecology and systems thinking in an action-research framework applied mostly within a context of social and economic development. (Charron 2012:6)

Importantly, Charron acknowledges that her description of 'ecohealth' refers specifically to the IDRC's initial school of thinking. Since the IDRC's establishment of an ecohealth program, a diversity of approaches has sprouted into existence, which the IDRC draws upon these in developing its own ecohealth approach today.

The seminal article by Gilles Forget and Jean Lebel (2001) offers an alternative rendering of ecohealth's emergence.<sup>29</sup> More specifically, Forget and Lebel provide a comprehensive overview of series of shifts in public health thinking on national and international levels. The movements they track include a growing recognition that: human health is not just the effect of internal factors but shaped by environmental circumstances (Lalonde 1974); health is not reducible to a single cause but is is shaped by multiple factors (Rochon 1984); and health can be thought of as a resource rather than as a consequence of internal factors (Epp 1986).

In parallel Forget and Lebel describe a shift towards integrated management of natural resources, which arose specifically out of studies conducted by the International Joint Commission (IJC) for the Great Lakes in the 1970s.<sup>30</sup> Burdened with the task of understanding how best to reduce the environmental degradation of

human health but diverge in their assumptions about how these links can, or should, be made and how they can be studied.

<sup>&</sup>lt;sup>29</sup> Charron (2012) makes clear in her introduction that Forget and Lebel's (2001) article played a formative role in the IDRC school of ecohealth and made possible Charron's own history of ecohealth. An important difference between the two accounts of ecohealth lie in the lapse of time –since 2001 there have been various international agreements that explicitly address links between health and ecology– that allows Charron to account for ecohealth in a way that wasn't yet possible for Forget and Lebel.

<sup>&</sup>lt;sup>30</sup> The Great Lakes are located along the Canada-United States border and count among the world's largest freshwater bodies, representing 21 percent of the world's freshwater reserves (Forget and Lebel 2001). Due to increased industrial and agricultural growth along its shores post-World War II, the lakes became a dumping zone for industrial and human wastes. Until indicated otherwise in studies conducted during the 1980s, it was assumed that the lakes could tolerate this treatment.

the Great Lakes IJC scientists realized that reductionist models of water quality management and rational analysis of information were inadequate. In 1978 the IJC developed an integrated program for managing water resources that took into consideration all elements affecting the Great Lakes Basin, including water, air, land, and living organisms including humans. Out of this approach arose the concept of 'healthy ecosystems.'

In their alignment of these dual movements Forget and Lebel (2001) propose outlines for a new way of thinking called an 'ecosystem approach to human health' as a way to link integrated environmental management, or 'healthy ecosystems,' with an ecologic approach to health. Furthermore, in the Preface to their article Joseph LaDou resituates this approach within the context of the IDRC. Given that the IDRC is committed to helping developing countries "find practical, long-term solutions to social, economic, and environmental problems," then "the ecosystem approach to human health as proposed in this journal makes public health the central consideration of global development" (LaDou 2001:S1).

'Health,' as a unifying concern, allows a new way to understand the diversity of approaches to ecohealth. Gesturing at all the present course instructors, W. points out that they mostly come from health sciences backgrounds. In this gesture, W. simultaneously indicates the existence of an invisible array of alternate objects of interest that ecohealth researchers choose *not* to take up.<sup>31</sup> What does an approach to health allow for that would not otherwise be possible through an alternate object of analysis?

As fieldwork continued, I learned that possible responses to this question would yield themselves up to view in brief often tangential ways and, most importantly, in their own time.

<sup>&</sup>lt;sup>31</sup> Other objects of interest that have been taken up by different research groups include 'resilience' (see work from the Stockholm Resilience Center or Resilience Alliance), 'sustainable livelihoods' (see Solesbury 2003 for an overview of how this approach was taken up by the UK's Department for International Development), or 'biocomplexity' (see work from the ongoing project at the University of Wisconsin-Madison: 'Biocomplexity: Complex Interactions of Riparian Land, People, and Lakes': http://biocomplexity.limnology.wisc.edu)

#### "Think like a drop of water"

*Watersheds as settings for health.* The statement flashes on the screen as Q. presents her research on ecohealth and watersheds. Working closely with a provincial health authority, the project she helped design aimed to link social and environmental determinants of health through a framework of watershed governance–a concept that she proceeds to explain. Watersheds, as Q. points out, are critical. No matter where we live, work, or play, we're always situated within some kind of watershed. Yet, watersheds are frequently overlooked.<sup>32</sup>

"Healthy settings,"<sup>33</sup> Q. explains, often coincide with anthropogenic units such as municipalities, counties, health authorities, provinces, or states. The kind of environmental and resource management that develops based on these human constructs are unable to account for biophysical ecosystems. As pointed out in a recent report on ecohealth and watersheds (Morrison et al. 2012:3), the use of anthropogenic units has created "a disjuncture between the objects of management and biophysical processes—in this case a disconnect between health and nature." The project that Q. helped lead was designed precisely to resituate healthy settings within their specific ecological contexts (i.e., to nest settings for health settings within the environment as an antecedent setting for health).

In the project, the exploration of links among ecosystems, health and society was positioned within a physical place defined by the movement of water over and

<sup>&</sup>lt;sup>32</sup> The emerging significance attributed to biophysical settings in public health parallels an increasing interest among anthropologists in the concepts of 'space,' 'place,' and 'landscape,' which long served as the backdrop to other phenomena of interest and remained largely unproblematized. To date, studies of 'space' have involved critically examining how 'space' is conceptualized and how these frameworks subsequently shape ways of thinking and practice (see for example, Lefebvre 1991; Massey 2005); the social production of space (see for example, Low and Lawrence-Zúñiga 2003); an anthropology of landscape (see for example, Hirsch and O'Hanlon 1995) and the co-constitution of nature-culture materiality (see for example, Raffles 2002). This literature offers much in the way of thinking about watersheds as 'settings for health' that I bookmark for later examinations. For now, I wish to draw attention to an interest in 'space' and 'place' as a point of potential correspondence and difference in ecohealth research and anthropology.

<sup>&</sup>lt;sup>33</sup> Q. builds on the settings approach to health first introduced in the Ottawa Charter for Health Promotion (1986), stating that: "health is created and lived by people within the settings of their everyday life; where they learn, work, place and love" (WHO 1986)

through land. Watersheds lend themselves extraordinarily well to thinking and practice: at the same time that they constitute self-organizing biophysical units, their boundaries coincide with social-ecological systems,<sup>34</sup> and comprise ecological units amenable to natural resource management. Moreover, Q. points out that watersheds were effective in coupling watershed management to health: water is "the bloodstream of both the anthropogenic world and the non-human natural world" (Falkenmark and Folke 2002:2). Cast in these terms, it was easy for government, industry, and members of the general public to relate to and grasp the vital importance of watershed management to health management. Conceptual analogies of upstream determinants of health and downstream effects on health in health promotion discourse take on a new literality.

Watershed management made apparent the inadequacies of partitioning the world into 'sectors,' 'disciplines,' 'communities,' and 'cultures'; to succeed in effective watershed management no one actor or institution alone could take on the multifaceted issues related to water. Furthermore, it required stakeholders – from researchers, practitioners, policy-makers, and members of the general public – to rearrange boundaries that marked jurisdictions, designated responsibilities, and specified commitments. Through collective efforts, stakeholders had to develop new modes of cooperation and decision-making. But how could people from widely dispersed domains of knowledge and practice arrive at a common vision with respect to watershed management?

"I think that it makes a difference when you change from thinking about 'hazards' to thinking about 'home,'" Q. observes, "it creates a different sense of why connections are important." Traditionally, watershed management had concerned

<sup>&</sup>lt;sup>34</sup> According to Marion Glaser et al. (2008)'s working definition: "A social-ecological system consists of a bio-geo-physical unit and its associated social actors and institutions. Social-ecological systems are complex and adaptive and delimited by spatial or functional boundaries surrounding particular ecosystems and their problem context." Importantly, Thomas Jahn (2009) notes that in this definition social-ecological systems are understood to be "concrete units in the real world of spatial-temporal phenomena." Jahn (2009) further situates the necessity of 'social-ecological systems' within a specific moment of the 21<sup>st</sup> century. Upon entering what some have called the *Anthropocene* –a new geological epoch marked by systemic interdependencies among human and non-human processes across temporal and spatial scales– Jahn argues that social-ecological systems have the potential to overcome divides between 'society' and 'nature.'

itself around drinking water supply, sanitation, and contaminants –an orientation that harkens back to biosecurity and disease prevention. But this focus pushed out of view the importance of watershed management as a context for producing health – for supporting livelihoods, employment, food and service provision, and culture. For Q., watershed management conceived in terms of a "context for health settings" could allow stakeholders to traverse, collectively and productively, a shared terrain in living, thinking, and action related to watershed management. Referring again to the report on ecohealth and watersheds (Morrison et al. 2012), Q. states that watersheds have the potential to provide a "place-based setting" for the production of health.

As suggested in Q.'s presentation, ecohealth researchers' calls for increased attention to biophysical 'settings' bring into the arena familiar struggles with natureculture divides that have riddled anthropological debates. The problem for ecohealth researchers, however, does not lie primarily in understanding how 'nature' and 'culture' are co-constituted through anthropogenic ways of thinking and practice (although this is addressed in the ecohealth researchers' adoption of 'socialecological systems' as a concept) or the manner in which 'setting' or 'place' as organizing frameworks are conceptualized (an issue that has yet to be taken up more centrally in ecohealth research on watersheds). As indicated in Karen Morrison et al.'s (2012) report, the problem lies in how to re-think the world using a different terms of reference – in this instance, 'health' and 'watersheds,' which bring together heterogeneous elements across scales and compose the world in new ways. On one hand, there is the challenge of how to re-think 'health' through the concept of watersheds as a biophysical unit; on the other hand, the challenge of how to re-think the world through watersheds.

Q. addresses the students: "Think like a drop of water: where will I drain to?" How can following a drop of water allow for a new way to navigate the world differently–a way that does not begin from 'society' or 'nature' but starts elsewhere and according to a different order? Furthermore, what can these waterways subsequently suggest in terms how humans can, should, or must move through the world?

45

#### Dissolution

Field school sessions move in and out of walled classrooms. Once more, we escape the confines of the classroom for the coastal community of Bouctouche on the coast of New Brunswick. F. and I make our way along the beach, watching others test the ocean edges. A handful of figures walk tens of meters into open water without sinking. For the tallest of them, the water comes no higher than knee-level. In this moment, walking measures the depth of the ocean, connecting an un-seeable firmament of sand with a distant sand bar rising just above the ocean's surface. One of the course instructors shrieks as she plunges into the frigid Atlantic waters. Sun, sand, and water seem illusory after sitting for two hours on the school bus on the way to Bouctouche.

Preoccupied with assumptions that allow ecohealth researchers to link environmental health to human health, I seek clarification from F. about the difference between an 'ecosystem' and 'environment.' He answers my question tentatively, making propositions and then adjusting them, as he makes clear to himself what he means. The environment, F. begins, includes external things but – he pauses here – then there are questions about *boundaries*. He stops short and looks up at the beach. In the heat of the noonday sun, F. begins once more.

There is the ocean and it has salt in it, he says simply. Energy from the sun causes evaporation, which causes molecules in the ocean to evaporate into the air, so that we smell the ocean and breathe in the molecules, which in turn enters our blood and then our brain. The effect is a change in our consciousness as it immerses itself in the outdoors environment compared to inside the bus. And when we breathe out, F. continues, we change the composition of the air around us. "We're an open system," he states.

As in many conversations, my question does not receive the answer it is looking for but instead opens up space for other response and further questions.

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#### **Delineations (And Their Uses)**

After lunching on the beach, students and course instructors turn into the Bouctouche interpretive center for the afternoon's session.

"So what do we consider to be an 'ecosystem'?" R.<sup>35</sup> asks, as if continuing my conversation with F. where it left off. Seeing that no one has raised their hand she goes on. "It's what we decide it to be. We put boundaries on it."

The context in which she sketches out "boundaries" as a tool for thinking occurs within a presentation on 'scale.' Her example: a watershed. A 'watershed' is a basin-like landform demarcated by ridgelines and other highpoints that descend into lower elevations. A watershed carries rainfall and snowmelt from higher elevations down into the soil, groundwater, creeks, and streams, which converge into rivers or lakes and eventually the sea. Watersheds can be defined at the level of small streams and tributaries, to river basins, lakes or inland seas. At each scale, different sets of issues come into play – a fact that plays a critical role in watershed management. Drawing on hierarchy theory,<sup>36</sup> R. explains that understanding at a given scale requires knowing about the level above and below the one of interest. This has implications for defining the parameters of a problem: streams within river basins, lessons on scale occurring within classrooms, ecohealth researchers studying systems from within their own frames of understanding, anthropologists going into the field to study ecohealth researchers. Boundaries bounded by boundaries.<sup>37</sup>

<sup>&</sup>lt;sup>35</sup> R.'s disciplinary area of expertise includes population health and environmental sciences <sup>36</sup> Hierarchy theory derives from general systems theory and is concerned with how an observer chooses criteria for identifying or describing levels. Complex systems, the structures of which are dynamic and often unpredictable, present a particular challenge to observers. To observe the system, one must not create stable sets of criteria but instead develop a set of decision-making skills that enables observers to conduct analyses that match changes in the observed system itself (Allen 2006).

<sup>&</sup>lt;sup>37</sup> Among various reflections on anthropological fieldwork, Rees's (2012) article examines fieldwork as something other than a mode of 'data collection' or as a method that can be dissembled into components and reassembled into a program, but as an intellectual assay that generates knowledge of a specific quality. In his article but also in his argument for what fieldwork today consists of, Rees (2012) claims that the task of fieldworkers is to render up for view "the field" – as more than the backdrop to data collection or as an

The materials for this session include a sheet of newsprint, coloured markers, and a problem statement: "Eating chicken meat is a way for children in New Brunswick to perform better in school." Together, students and course instructors must tease out the hidden implications of this proposition.

We begin with the production of chickens for food. Farmers need a specific feed mixture containing corn and soy. Soy in poultry feed tends to be sourced from Brazil where land has been cleared for intensive agriculture. In addition to Brazilian rainforests, large-scale fisheries become implicated through the generation of fishmeal as a source of protein in poultry feed. With the involvement of the fishing industry, child labour halfway around the world becomes drawn into the problem field. Meanwhile, back in New Brunswick the poultry operations releases waste into the surrounding environment with yet to be determined effects. At each step in the process, fossil fuels are consumed and greenhouse gases emitted – an issue, the course instructors remind students, that is exacerbated by previously mentioned deforestation.

Where the range of expertise of one person in the group fails, another person steps in to make suggestions. The limits of the problem are constrained only by the dimensions of paper provided for the exercise, the amount of time we have available, and the imaginations of the people involved. The problem statement explodes into a drawing of coloured arrows, stick figures, labels, layers, and symbols.

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epistemological task of self-reflexivity – as it comes into being via chance encounters, circumstance planned or otherwise, and what cannot be anticipated prior to fieldwork.



Figure 1: Complexity map generated during field school session

Things material and immaterial, localized and diffuse, measurable and immeasurable, biophysical and social are brought together on a single plane. To an anthropological observer, there is a resemblance between the heterogeneous ensemble of chickens, corn, fish, Brazilian forests, greenhouse gas emissions, and Canadian children lumped under the problem of health and wellbeing with a collection of trees, humans, clouds, birds, seasons, fish, and weather grouped under an animal totem – the latter being a problem that puzzled anthropologists studying Australian aboriginal groups in the early twentieth century.<sup>38</sup> Although the ecohealth

<sup>&</sup>lt;sup>38</sup> Emile Durkheim tackled the problem of totemism in his *Elementary Forms of Religious Life* (Oxford, England: Oxford University Press, 2001 [1912]). For him, humans' logical ability to classify the world (i.e., organize things along lines of similarity and difference) arose from social organization as a model for thinking. In contrast, Claude Levi-Strauss (1962a, 1962b) proposed that classifications arise out of an intellectual propensity to order

researchers and Australian aborigines are geographically and temporally remote from each other, an anthropologist could ask similar questions of both: what allows for *these* particular things to be grouped together according to *this* order, and not others? What particular world is presented to ecohealth researchers or to Australian aborigines that requires ordering? In each of these cases, what orders of existence and thinking become apparent? Furthermore, what new orders do they allow for?

The complexity map is bewildering in yet other ways. A sense of proportion collapses at the same time that the map brings into existence other dimensions: 'non-linearity,' 'emergent properties,' 'scale,' 'feedback loops,' a 'nested hierarchy of levels.' Moreover, mapping 'complexity' has led to the proliferation of connections; looking for connections tends towards inclusion such that more and more seemingly incommensurable things can be drawn up into a picture of complexity. As an anthropologist, this impulse to make connections and find them everywhere looks familiar and yet out of place in its familiarity within the context of ecohealth.<sup>39</sup>

The usefulness of mapping lies in its ability to render something problematic in the world, bring it into existence in a particular way, and make this particular configuration usable. Maps are not only usable as a final product that can be pointed to, transported elsewhere, and deployed as arsenal in debates but useful for the process of being mapped.<sup>40</sup> Through mapping, we simultaneously produce and

the world. What concerned both these authors (as well as me) was an interest in the relation between modes of human classification and the constitution of the world.

<sup>&</sup>lt;sup>39</sup> As Marilyn Strathern (1995) makes apparent, in British social anthropology 'the relation' as a construct of thinking has given rise to a whole complex of anthropological problems – the relation between individual to society, the elaboration of political and economic systems, the relation between values of one system and another – not to mention the effect of complexity itself. But whereas Strathern drew upon systems theory to make visible the cross-scale, self-organizing, and holographic characteristics of 'the relation,' these features are not readily seen as emerging from (or constitutive of) prevailing ways of thinking in systems theory. Complexity, as systems scientists encounter the phenomenon in actuality, cannot be reduced to the conceptual frameworks that they have developed to engage with it. For these reasons, I argue that complexity as dealt with by systems scientists is not amenable to the same analysis that Strathern applies in her examination of 'the relation' in British social anthropology.

<sup>&</sup>lt;sup>40</sup> Latour (1986) examines in detail the properties of visual representations or 'paper-work' (e.g., mobility, immutability, of varying scale, still, superimposable, etc.) that make them such powerful devices in scientific argumentation and reasoning. Latour, however, focuses

become trapped by the entanglement of things implicated in a problem. But more importantly, we become sensitized to the illimitability of problems, that our attempts to move closer to the interior of a problem to gain a 'deeper' understanding of it only gives way to a problem unbound, diffused, and indefinite. Once visible, the map comprises material with which we can grasp a problem, whose elements can be classified, re-arranged, elaborated, separated, and superimposed. Hopefully, mapping a problem will reveal something to us that could not otherwise have become visible – an unexpected route of inquiry, or a pathway amenable to intervention.

Students and course instructors pause to examine our handiwork. It's a mess. There are no self-evident start or end points, no axes of orientation, and an abundance of arrows diving from one thing to the next. One course instructor has drawn things in purple and another in orange and red; blue and pink signify gendered facets of the problem statement. How are we to help children in New Brunswick perform better in school when eating chicken causes deforestation in Brazil, generates fossil fuels that contribute to climate change, and impoverishes children on the other side of the world? Sensitive to the sense of helplessness that this map can generate, the course instructors quickly try to pre-empt any looming anxieties.

"I think that there's a degree of liberation in knowing that, in studying things that are dysfunctional, we can change their trajectory," R. offers. "Just because we can see things as all connected doesn't mean that we can't effect change." Politicians, she points out, thrive on uncertainty precisely because it gives them the opportunity to change things. Put another way, uncertainty – while it may be a constraint in decision-making – is at the same time the condition of possibility to act in the present moment.<sup>41</sup> But R.'s comment seems to imply more than this, in

on the effectiveness of 'paperwork' when it is ready at hand rather than at the process of paper *work* that goes into producing a visual representation.

<sup>&</sup>lt;sup>41</sup> Niklas Luhmann (1998) observes that in modern society, decisions must be made with the knowledge that today's actions will become the past and hence irreversible, while knowing that the future is also imminent in actions taken now. From the perspective of the present things remain underdetermined and the present emerges as a crucial moment of possibility: "We also know that much of what will be true in future presents depends on decisions we

suggesting that uncertainty (or under-determination) can allow for a particular kind of action – one that changes a given situation. As Luhmann (1998) points out, it is through carving out a space for the present, as something that is not fully determined by its past nor precluded by its projected futures, that politicians or ecohealth researchers acquire freedom to act. Thinking and acting *from the perspective of the present* is an opening onto the unknown.

"Uncertainty shouldn't be disempowering," R. states, "we're not that powerful but we shouldn't let uncertainty unduly disempower us."

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**Figure 2:** Driving Forces, Pressures, State of Environment, Exposures, Effects, and Actions (DPSEEA) framework illustrate issues of childhood exposure to contaminants in Benin, Africa

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must make now. The two are related: the dependence of future circumstances on decision making and the break of the continuity of being between past and future. Decision making is possible only if and insofar as what will happen is uncertain" (Luhmann 1998:67). In other words, it is precisely the uncertainty not knowing the effects of today's actions in the future that is both profoundly paralyzing and enabling.

Despite her reservations, Q. outlines the Driving Forces, Pressures, State of Environment, Exposure, Effects, and Actions (DPSEEA) framework.<sup>42</sup> This is the model that she used while she was a graduate student but which collapsed upon application to a research problem. Still, the tool has its uses.

"So you see, we can spend all our time down here," she points to 'effects' and 'exposures.' "But you have to keep in mind what's happening at all these different levels."

"You'll find that as you think about your projects, your frameworks and thinking will evolve. You'll see which frameworks work best for you at which time." She looks around at the circle of students to see if there are any questions. One of the students raises his hand. Immersed in thinking about complexity mapping, he finds himself un-blackboxing items, making visible to himself the network of processes and actors that are involved. Purchasing a bag of coffee, the student observes, neither begins nor ends at the cash register.

"Is a framework a way of making sense of the world?" he asks, "Is a model something that helps me view things from a human perspective, or a moral and ethical perspective?" He casts around for another way to formulate his question. "I guess what I'm trying to ask is, *is this how you see the world*?"

Through his sincerity towards the course discussion, the student articulates a specific attitude, a mode of engaging the tasks set before him. If these models of complex problems call for certain adjustments in research practice, then what corresponding shifts do these models call for at the level of everyday conduct? At the same time and of a different order, what kind of scientific practice is implied in the creation of these models? Developing these conceptual frameworks to "make

<sup>&</sup>lt;sup>42</sup> The DPSEEA framework (WHO 1997) sees health impacts as deriving from certain 'driving forces' (D) that lead to pressures on the environment (P) such as production, consumption, and waste generation. In turn, these pressures influence changes in the state of the environment (S), such as environmental pollution or increased risks of natural hazards. Exposure (E1) arises at the moment of human contact with these hazards, leading to potential health effects (E2). Lastly, policy and other actions (A) can be taken to mitigate or prevent adverse health effects. According to Forget and Lebel (2001), this framework was adapted from the Stress Response Environmental Statistical System (SRESS) that was created in the 1970s to track cycles of environmental changes (Rapport and Friend 1979).

sense of the world" is not so much about elaborating facts of nature or constituting the world in the very process of constructing these frameworks,<sup>43</sup> so much as representing the world in a way that models how one can approach reality. And yet, these researchers are re-constituting the world in a way that brings into existence a different relation to it – one that requires engaging with the world as a complex place.

Meanwhile, the student waits for a response.

"The short answer to that question," Q. says to his question about whether or not she sees the world as depicted by a model, "is sometimes." A framework, she continues, is more a heuristic, or tool that enables her to learn.

"I have to be very honest – and this is very personal," Q. admits, "but it's a temporary relief." She tells us how, with a ready model in hand, she can let herself land somewhere, recognize things, and see patterns. Q. will see how a framework lines up with how she has seen other things. But a model, she warns, doesn't represent reality accurately, or represent reality sufficiently. "When you choose a model," Q. states, "you have to be actively critical. It's not the right thing to think that you have it all figured out."

From the way that course instructors have tried to remain optimistic in spite of the enormity and complexity of problems facing them, this admission of limits does not appear to arise out of resignation, defeat, or apathy. Arguably, it grows out of recognizing a challenge – and having the courage to meet it. Perhaps for ecohealth researchers it is not enough to know, or to think they know. Instead they must actively yield up to critique not only the ways in which they understand the world but their everyday practices as informed by these ways of understanding. As Michel Foucault (1997:49) put it: "...critique will be what he is going to say to knowledge: do you know up to what point you can know?" Q.'s advice seems to go

<sup>&</sup>lt;sup>43</sup> As historian of science Gaston Bachelard (1934) argued – albeit in reference to physics – science does not just describe phenomena in the world but produces them in the process of scientific work. The example Bachelard gave was the separation of isotopes in a mass spectrometer. These isotopes were not discovered because they exist *a priori* but because a technical and conceptual space of scientific discovery had been prepared to allow for these isotopes to exist (and hence, be discovered). "They [scientific objects of knowledge] are techno-epistemic products cast in the special form of embodied theorems" (Rheinberger 2005:27).

even further than this: it isn't sufficient to make critique an activity separate from research work but must be integrated as one of the crucial elements of ecohealth research. Here, she suggests that how ecohealth researchers produce knowledge about the world will entail scrutinizing the limits of these ways of knowing.

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It's now the students' turn to produce a complexity map of our research projects. On one sheet of newsprint I have written 'avian flu'; on the other, I have begun to name all the ecohealth researchers and their institutional affiliations. All the other students appear content to work with one sheet of paper.

I fret discontentedly about my unsuccessful attempts to map 'complexity' but can't overcome my own resistance to the activity. I could easily reel off a list things involved in avian flu and show their linkages: viruses, wild birds, industrial poultry operations, backyard flocks, high stocking density in the Fraser Valley, the BC Chicken Marketing Board, poultry producers, spring migration patterns, increasing consumer demand for chicken meat, international trading regulations, the CFIA, provincial and national testing laboratories, veterinarians. (Coincidentally, this approach would be equally applicable in a project that documented the emergence of avian flu as an assemblage). But mapping the complexity of avian flu, or its heterogeneity, are not the central concerns of my project.<sup>44</sup> Furthermore, to configure my interests in 'avian flu' as a problem of complexity from an ecohealth perspective would be disingenuous – I don't want to conduct an ecohealth project of avian flu but begin an anthropological analysis of ecohealth.

I abandon the first sheet of newsprint and redirect my energy towards drawing out the relations amongst ecohealth researchers. My efforts here resemble more the construction of a kinship chart than a 'complexity map,' and yet, I'm not deducing social relations among ecohealth researchers so as to discern the group's

<sup>&</sup>lt;sup>44</sup> To see how an ecohealth perspective has been applied to avian influenza, see David Rapport, EcoHealth Consulting, *Avian Influenza and the Environment: An Ecohealth Perspective*, undated.

underlying moral, political, or economic systems.<sup>45</sup> Making explicit the relations amongst these ecohealth researchers instead allows me to gain a partial understanding of ecohealth as it emerged out of these relationships. Perhaps anthropology today can be about something other than human social relations while drawing them out just the same.

# Where the Wild Things Are (Not)

**Figure 3:** *"Where the Wild Things Are (Not)"* Depicted above is a rich picture map developed by a group of students in response to the question: "What are the implications of shale gas development on child health in New Brunswick, from the perspective of animals?"

<sup>&</sup>lt;sup>45</sup> As Marilyn Strathern (1995) points out in her precise analysis of how 'the relation' has shaped anthropological thinking, British social anthropologists posited that social relations were the basis of economic, political, and moral systems. Thus, by mapping social relations one could elucidate these other systems. At the same time, Strathern notes, by making social relations its empirical object British social anthropologists turned anthropology into a proper scientific discipline. Does a study have to be about social relations to be considered anthropological? In what ways can a study that is not about social relations still be considered anthropological, if at all? How would the inclusion of these studies potentially re-define the discipline of anthropology itself?

Our final project as students in the field school involves reflecting and presenting on the current issue of shale gas development in New Brunswick<sup>46</sup> in the form of a 'rich picture map.'<sup>47</sup> "What can ecosystem approaches to health contribute to the shale gas issue in New Brunswick in relation to children's health?" Each group of students is assigned one of three perspectives from which to consider this question: 1) Children; 2) Animals; and 3) Plants and Minerals.

"It's up to you how you interpret this question," Q. explains. The three perspectives are the voices that the course instructors hope we can explore: what goes unheard by, or untold to, human adults? How can these voices be expressed, heard, or shared?

The 'animals' group peer curiously at us from behind masks depicting a lobster, deer, and wolf. Equally intrigued, we in the audience look back at these 'animals' wondering what difference in perspective they hope to introduce. The group, it appears to me, has decided to approach the given problem by taking up animals as subject positions. While not the easiest point of entry, in adopting this approach the students seem to specify the stakes they have chosen to contend with in this problem: the trouble is not how to grant animals interiority (i.e., on what grounds or according to what principles can animals claim feelings, conscious thought, or self-awareness) but how to test the limits of what the students know and can know. Entering into the subject positions of animals challenges the group to explore the extent of their experiences and modes of understanding as human beings.

<sup>&</sup>lt;sup>46</sup> In the last two years, the Provincial Government of New Brunswick announced plans to develop its shale gas reserves to generate income for the province. Conventionally, oil is extracted through vertical drilling to reach oil reserves. Geologists have been aware of the existence of oil sources in shale gas formations but could not tap these sources because of technological shortcomings. Recent developments in horizontal drilling and hydrological fracturing ('fracking') have now made shale gas extraction possible. While these innovations make available new reserves to sustain growing consumption of oil, shale gas reserves tend to yield oil for a year's time before running dry. Furthermore, the extraction of shale gas requires 7.5 million to 19 million litres of water for 'fracking' that becomes radioactive and chemically contaminated in the process (CBC 2011). This water must be put into underground impermeable injection wells for storage.

 $<sup>^{47}</sup>$  As Q. notes: "With rich picture mapping, you draw what *is* – you draw people and things – real things that exist." She observes how this mode of mapping allows people to draw what they know and what they want to know. A rich picture map can complement a more conventional concept map.

As the students enter this new terrain of animal subjectivity, they explain that they have resorted to experiences familiar to them – mainly fear and confusion – which they assume are commensurable among humans and non-human animals. The group's choice to use 'fear' and 'confusion' does not go unremarked by other students. Had the group considered the usefulness of these terms?

"Yes," the student disguised as a deer replies, "we thought about using other terms but thought that would be equally problematic." She stops short of explaining the dilemma outlined in her own answer.

In my own analysis of the problem, there is first the question: what it is like to be an animal? And tailing this question is the problem: how can we know what it is like to be an animal? From my understanding, the group's recourse to faculties of sympathy allow them "to share at times the being of another" (Coetze 1999:34) and circumvent the necessity of reason, consciousness, or a soul as grounds for identification with non-human animals. But sympathy puts distinctively human capacities at the center of claims to knowing and experiencing what it is like to be an animal, falling short of entering a non-human animal's experiential space. Humans, I assume they reason, must be able to know what it is like to be an animal because humans are animals themselves. Furthermore, what humans hold in common with non-human animals goes beyond shared biological material to something shared at the experiential level. If this is the group's logic, the students have located shared experientiality not in embodiedness but in emotional states, specifically 'fear' and 'confusion.' But here the group would encounter another dilemma: even if it is possible for humans to fathom the experiences of non-human animals, in what terms could these experiences be described, if any anthropocentric terms would be at all appropriate?

Despite this predicament, it appears that an understanding of 'fear' and 'confusion' enable the group members to explore non-human animal experiences – not because they offer an entry point into the experiences of non-human animals but because they trace the edges of students' ways to understand and describe the experiences of non-human animals. Tenuously but unafraid, the group use these

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terms to gesture towards a space that eludes knowability for this group of students as human beings.

In the same category as 'fear' and 'confusion' is 'silence,' all of which are coded in red on the group's rich picture map to indicate their emotional valence. As one of the students explains, the emotional facets of 'silence' are belied by animals' "lack of 'voice' in our human-centric society." That is, 'voice' understood by the students as political representation. Allowing myself to further their analysis, at a more fundamental level 'voice' also refers to the capacity for language – an attribute that has long fuelled debates about human/animal distinctions. This understanding of 'voice' is brought into tension with the goals of the students to go beyond human modes of understanding. On one hand, if it's assumed that language is a uniquely human trait and 'voice' is only ascribed to those beings that demonstrate language, then the students' claims about a 'lack of voice' is anthropocentric.<sup>48</sup> On the other hand, if an understanding of what is necessary to achieve a 'voice' in politics is generalized beyond language (whether or not it is a uniquely human trait), then animals' apparent 'lack of voice' points to failures in current modes of human understanding as much as shortcomings in the politics shaped by these assumptions.<sup>49</sup> The students, however, do not clarify their take on 'voice' beyond an understanding of its relation to political representation.

"So now we want to pose a question to all of you," the student speaking from behind the wolf mask begins, patently concerned: "How human-centric was our project?"

The wolf, deer, and lobster look out at us uncertainly, waiting for an answer. We, their human audience, look back at them looking at us. Or more precisely, we look back at the students looking at us through the look of an animal. The only

<sup>&</sup>lt;sup>48</sup> A comprehensive survey of human-animal scholarship on this debate is beyond the scope of this thesis. For key arguments about verbal language as a key distinguishing feature (or not) between humans and non-human animals, and which informed the ideas presented in this thesis, see Berger 2009, Coetze 1999, Sanders and Arluke (2007).

<sup>&</sup>lt;sup>49</sup> Eduardo Kohn (2007, 2012) argues that nonhuman life forms have the ability to represent the world through nonverbal means. His claim removes from humans their exceptionality as a species to represent the world through language. More interestingly and as Kohn argues, such an expansion of modes of representation demands reconsideration of what it is to be human.

'animal' that intervenes here is a thin paper mask, a constructed device that disrupts, albeit incompletely, the continuity of a human gaze. It is not the wolf that looks back but the student looking through the look of a wolf. The eyes that fill the holes in the mask allow the audience on one side of the mask to see reflected therein the look given to animals. On the other side, the students bear the brunt of a human gaze looking at animals. The exchange is circular, self-referential; we are only able to examine the look we give to animals while the animal itself slips quietly out of view.

Instead of offering an answer, I return the question to the wolf-student: "Your question assumes that we shouldn't be human-centric. Do you think that we should remove human bias?"

He hesitates for a moment. "I don't think that we should remove our human bias completely but we should at least try to integrate other perspectives."

"I think that we can't get outside what we know and think," a course instructor adds in support, "we can't see the world through eyes other than our own. But the point is to be able to shift our perspective."

I wonder: how can ecohealth researchers "shift" their perspective? In what ways can they consider other non-human perspectives? From the goal of trying to 'see' from the perspective of animals, the students have instead brought into view the look human ecohealth researchers give to animals. While animals are not at the center of the field of view, neither are humans the main focus. In this look, the students offer an indirect way to engage animals as the animals that are addressed in looking – and conversely, the humans that make this address to animals through looking. In other words, perhaps there is no way for students to relate directly to non-human animals as humans do with other humans, but must instead attend to their own relations to animals. The masks that the students produced are one potential way for ecohealth researchers to address the specific challenge that animals pose to ecohealth researchers.<sup>50</sup>

<sup>&</sup>lt;sup>50</sup> Given the various moral and scientific criticisms leveled at anthropomorphism Lorraine Daston and Gregg Mitman (2005) ask: "Can we ever really think *with* animals?" Daston and Mitman want to examine the *fact* of anthropomorphism in human thinking, i.e., that thinking with animals has and continues to be useful in human thinking, although how this is done varies with time and place. As Daston and Mitman (2012:6) point out: "When humans

But as indicated in my conversations with several of the course instructors, prior to even the problem of a "shift" in perspective is the awareness among ecohealth researchers that their own understanding of looking at animals is only one among many perspectives on human-animal relations. Besides doing research directly with animals in projects to rehabilitate fish populations or to monitor poultry flock health, through their work in various settings ecohealth researchers have found themselves in the kind of company that includes raven reincarnations, yam wives, puma shape-shifters. In the study of one course instructor, claims that gods were punishing an indigenous group of people with a poor harvest was included as an equally plausible working hypothesis next to reasons of drought and other biophysical conditions. To date, ecohealth researchers have not tried to unify this multiplicity of perspectives on human-animal relations, whether through arguments based on evolution (Deacon 1997), semiotics (Kohn 2007, 2012), perspectivism (De Castro 1998), or multiple ontologies (Descola 2005). While such a move could be useful in their attempts to think about non-human animals, stopping short of this move does not render ecohealth researchers incapable of taking seriously the interiority of animals or the ways in which others understand the interiority of animals. Ecohealth researchers can learn from these other cosmologies, integrating elements into their personal or research worldviews - but only to the extent that there remains a space for the possibility of things to be otherwise. In this manner, other cosmologies are instructive in that they throw into relief the contingency of researchers' ways of knowing and being, and make room for a multiplicity of other ways of knowing and being.

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imagine animals, we necessarily reimagine ourselves, so these episodes reveal a great deal about notions of the human – the 'anthropos' of anthropomorphism." The kind of work that ecohealth researchers are doing extends into this domain of anthropomorphic exploration, testing current ways of understanding 'anthropos' as it takes form in ecohealth research.

It's now my group's turn to present our rich picture map. Of the remaining two perspectives, my group has had the distinct challenge of being the plants and minerals group.

Unlike the 'animals' group, my group hadn't felt confident assuming that concepts of 'experience' or 'perspective' could be applied in our undertaking. How could we know if there was anything in plant or mineral ways of being that approached what is described in human terms as 'experience' or 'perspective'? The grouping together of plants *and* minerals, or life and non-life understood scientifically, was itself a curiosity. In the former case, we could still ask: what is like to *be* a plant? But do minerals even have a *way of being*? Each kind of thing – plant and mineral – had to be treated separately to consider the distinctive challenge that they posed to ecohealth researchers. If animal subject positions stretched students' ways of knowing to their limits, plants pushed us even further past this point.

Minerals raised a provocation in its own category. Whereas questions of experience in the case of humans, animals, and plants could be generalized to considerations of what constituted life or being in general, minerals fell outside this expanded scope of intelligibility. How are we to comprehend things like minerals, which come in and out of existence over millions of years far beyond the normal human time scale, and furthermore, with or without humans themselves? If minerals escape culture and even life itself, then what are we to make of it? What *is* a rock?<sup>51</sup>

In the early stages of planning our rich picture map, we had guardedly watch the 'animals' group cut up construction paper and fashion masks for themselves.

"I think that other people are taking it too literally," remarked one of my group members, "I think it's important to ensure that plants and minerals are represented, to know what entity protects them on the micro-scale and in policy." As a group, we collectively agreed with his proposition – this was an approach that can bypass the more fundamental challenges posed by plants and minerals. We diverted our energy instead towards 'giving voice' to plants and minerals in the face of plans

<sup>&</sup>lt;sup>51</sup> For an examination of the challenges posed by rocks to anthropologists, see Hugh Raffles, "Twenty-Five Years is a Long Time," *Cultural Anthropology* 27, no. 3 (2012): 526-534.

to develop shale gas in New Brunswick. In our presentation, we show how politicians at all levels fail to recognize the significance of these entities, let alone try to represent them. The burden of doing Environmental Impact Assessments,<sup>52</sup> in which plants and minerals receive some consideration, is left to industry to initiate; meanwhile, governmental and non-governmental agencies either lack the political will or resources to take on this responsibility when industry does not do so. Furthermore, in Canada the management of natural resources falls between provincial and national jurisdictions, creating a void of representation that plants and minerals fall into.

The floor opens up to questions and one of the course instructors raises her hand.

"What is the role of the rock?"

My group members and I blank. In our efforts to bring the rock into the terrain of human politics, we have rendered the rock in terms that we're familiar with. But in doing so, we have left the rock untried. Or more specifically, we have not tried our ways of understanding against the challenge posed by the rock.

We fail to take the risk that the student-animals took. In their exploration of the propositions they put to themselves, and *despite* the problems that riddle the question of animal subjectivities and human-animal distinctions, the student-animals have at least tried. They lay bare their own assumptions and put at stake their own understandings of human thinking and experience to be challenged, defended, rendered inadequate, and re-tested. In an effort to move beyond their own understandings, the students are able to catch a glimpse of something beyond themselves, albeit in relation to the understandings developed from this viewpoint. This moment lasts for only the duration of the question period. And yet, it is an opening. Here, a becoming is not so much the realization that we become in concert

<sup>&</sup>lt;sup>52</sup> In Canada, Environmental Impact Assessments (EIA) are conducted to predict the environmental effects of a proposed initiative, as well as suggest measures to mitigate potential adverse effects, before giving approval to carry out a project. The legal incorporation of EIAs into government policy began in the United States in the 1960s. Since then, EIAs have been institutionalized and practiced in more than 100 countries, including developing countries (Jay et al. 2007). The relative effectiveness of EIAs has been the subject of critical examination (see Judith Petts, ed. *Handbook of Environmental Impact Assessment: Volume 2: Impact and Limitations* (London: Wiley-Blackwell, 1999)).

with a multitude of others both human and non-human, as a moment that can collapse at any time and needs to be actively created and re-created. What becomes is somehow less than the moment of becoming, freed from terms of finality.

## "We are nature thinking about it/herself"

"Nature has no preference."

The statement is repeated so often during the field school that it belongs to everyone and no one at once. Humans, Bluefin tunas, redwood cedars or the poliovirus could disappear from the planet and it would not matter to Nature. *Nature is indifferent*.

The researchers seem to say these things with stoicism, mustering the resolve to work within given limits of existence. They may not be able to change this fact of life but they forge onwards nonetheless, bravely defying circumstances in their endeavours to effect positive change. In this view Nature is re-entrenched as something apart from researchers and beyond their control.

On the last day of the ecohealth field school, however, I find a post-it note fastened to the top of my poster on avian flu:

"We are nature thinking about it/herself."

The quote swings open like a door onto an undefined expanse, questions tracing the edges of known areas and pointing to unmarked spaces.

Q., who attached the comment to my poster, admits that it's a quote from someone else though she can't remember from whom. Despite its brevity this response brings into existence a particular constellation of *orientations* – positions developed in relation to past, present, and future understandings of the world, research practices, and researchers as members of a global community. In particular, the quote that Q. shares – as an observation, a proposition, or a provocation – is itself situated in relation to a body of work that precedes the field school.

In the work of David Waltner-Toews, a Canadian veterinary epidemiologist, James Kay, a systems theorist, and Nina E. Lister, an urban and regional planning expert, as well as other influential thinkers in the ecohealth field, this approach is based on a key assumption:

It is the premise of the work in this book that the reality humanity inhabits can only be known through our perceptual organs (primarily, the eyes and ears) and their technological extensions. We are inside the world and have evolved within it. We have no external observer to tell us when we have got it right. (Waltner-Toews, et al. 2008:x)

Human ecohealth researchers cannot be separated from so-called 'Nature' as a reality, whether seen as impassive or benevolent. But importantly, Waltner-Toews et al. (2008) do not state, as an apparent corrective to this view and in the other direction, that humans are *natural* beings. They suggest something different:

Insofar as our species interacts with other species and the landscapes we live in, we are *ecological beings*; insofar as we consume and excrete nutrients and use energy, we are members of ecosystems. (Waltner-Toews, et al. 2008:ix, emphasis added)

To move away from romanticizations of a pristine or 'wild' nature and the nature-culture impasse that it entails, Waltner-Toews et al. (2008) suggest thinking in terms of ecosystems rather than in dualisms where 'humans' and the 'natural environment' are opposed to each other.<sup>53</sup> Moreover, in the conceptual space carved out by ecosystems thinking an array of anthropogenic settings can be taken into consideration – settings that were previously excluded from environmental management because they were not properly 'natural.' As Waltner-Toews et al. (2008) emphasize:

<sup>&</sup>lt;sup>53</sup> The kind of ecohealth research outlined here gestures towards the kind of political ecology sketched out by Latour (2004), in its attempts to work away from these distinctions altogether rather than insert 'nature' into 'politics' (and hence re-assert nature-culture divides).

An urban landscape is certainly a social system. It is also as much an ecosystem as any rural landscape or wilderness. Just as the restructuring of landscapes by cattle, elephants, or coral do not change scientific abilities to describe those landscapes in ecosystemic terms, just so urban restructuring by people does not change the essential ecological nature of a city. (Waltner-Toews et al. 2008:ix)

The shift away from concepts of 'nature' as separate from humans entails adjustments in the kinds of objects that ecohealth researchers take up for possible intervention. Following the idea that there is no 'nature' separate from human beings, ecohealth researchers do not assume that there is a pure physical environment in which they can intervene.<sup>54</sup> As Martin Bunch (2003) re-iterates citing other ecohealth researchers (Kay and Schneider 1994):

...it is our interactions with the physical environment that need to be managed, not the physical environment per se. This suggests that models within an ecosystem approach should address not only biophysical elements and processes, but human activity and relationships. (Bunch 2003:184)

The significance of humans to the ecohealth approach is underscored in still stronger terms in earlier publications:

The Ecohealth approach is *anthropocentric* – managing the ecosystem revolves around seeking the optimal balance for human health and well-being, rather than simply on environmental

<sup>&</sup>lt;sup>54</sup> Ecohealth researchers, however, would not go so far as to deny that science can no longer able to discern natural laws or physical facts about the 'nature' of reality (e.g., the structure and action of chemical contaminants, the workings of physiology or geological processes). These modes of scientific knowing and practice still comprise an important part of ecohealth research. Their criticism is directed more towards the consequences of thinking in terms of nature-culture divides, which can reproduce the very problems that researchers contend with.
protection. *Thus, its objective is not to preserve the environment as it was before human settlements appeared.* The presence of human beings creates a new dynamic whereby people's social and economic aspirations need to be considered, particularly since people have the power to control, develop, and use their environment in a sustainable way, or to abuse it. (Lebel 2003:xii [emphases added])

Put mildly, humans and their influences cannot be bracketed from consideration. More than this, Lebel (2003) indicates that humans cannot be ignored precisely because humans are capable of modifying ecosystems on a scale and intensity not demonstrated by other species. But as Bunch et al. (2003) suggest, perhaps human beings or, more specifically, their relations to an ecosystem, can be the very entry point into understanding an ecosystem rather than being an obstruction to knowing an 'external' reality. Is this anthropocentric? An easy answer can be provided by pointing to ecohealth researchers' explicit admission of this bias in describing the assumptions that underpin this approach. However, the shifts in which ecohealth researchers have worked away from nature-culture divides requires reconsideration of ideas about anthropocentrism. Within a framework of ecological relationships, what is anthropocentrism?

The quote that Q. shares with me can be oriented with respect to these previously developed trajectories. But the quote also constitutes in itself a thoughtprovoking relation to the present moment: what orientation towards science is entailed in saying, "We are nature thinking about it/herself," when science is traditionally understood as the practice of knowing nature? What does this do to ecohealth resarchers' knowledge of 'nature' (not to mention the concept of 'nature') but to scientific knowledge itself? But as a first step, to what present moment is science re-orienting itself?

As described by Waltner-Toews et al. (2008), human beings as a species have accelerated the speed and scale of changes that were already complex, diverse, and dynamic to begin with. As a result, there is significant scientific uncertainty

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around ecosystem change. At the same time, there is an urgent need to make decisions on emerging problems that frequently link human well being, global environmental and climate change. In these situations, how is action to be taken "where the facts are uncertain, values are in dispute, the decision-making strategies are high, and there is a sense of urgency that decisions be made" (Waltner-Toews et al. 2008:xi)? More specifically, how are *scientists* to take action in this environment of uncertainty? This question already implies a different orientation of science to its own practices, goals, and ethics: science is not limited to the elucidation and description of reality but to actively solving real-world problems.

According to Waltner-Toews et al. (2008), however, science must continue to develop beyond today's context of decision-making and scientific practice that manifests as qualitatively distinct from before. Contending with today's complex problems requires the incorporation of "both science as we have come to know it and pushes its boundaries into realms of policy and philosophy" (Waltner-Toews et al. 2008:xi). This involves the broadening of expertise to a larger collection of people and a change in the role of expertise "from giving correct advice to sharing information about opinions and trade-offs" (Waltner-Toews et al. 2008:xi).<sup>55</sup>

The above orientations can be aligned once more. If 'nature' is no longer a useful concept for contending with today's realities, and science is no longer just about the elaboration of 'nature' – in addition to claims that scientific practices must be re-formed to reflect new realities – then what kind of science do ecohealth researchers practice? In his examination of uncertainty as a modern phenomenon and how people grapple with it, Luhmann (1998) points to a new mode for self-observation in which attempts to understand what the world *is* shift towards efforts at understanding the world as it comes into being through observers' frameworks of knowing. In other words, experts do not make authoritative claims about the constitution of the world but interrogate the world as it is constituted through

<sup>&</sup>lt;sup>55</sup> Such a description closely resembles what Luhmann (1998) called a "politics of understanding," where environments of increasing uncertainty undermines authority and is replaced by the negotiation of reference points for decision-making.

experts' modes of thinking and practice.<sup>56</sup> Such an understanding appears to emerge in the writing of Waltner-Toews et al.:

Scientific concepts rarely reflect simply an objective understanding of empirical reality. As the history of the ecosystem approach suggests, their evolution reflects not only our changing understanding of nature but our evolving sense of the role of science, and ultimately, of our place in the world. In describing nature, we describe ourselves. (Waltner-Toews et al. 2008:xiv)

Juxtaposed with the above claim made by Waltner-Toews et al., Q.'s quote returns anew: "We are nature thinking about it/herself." The quote is not so much brazen as *brave*. Without an external 'nature' or 'culture' as its diametrical mate, which have long stabilized the floor upon which understandings of the world stand, then what referents can researchers turn to? Bravery is required to not only relinquish these concepts but to take up the task that follows: namely, bringing into the realm of scrutiny researchers' own modes of thinking and understanding that give form to reality. To question one's own assumptions and put these frameworks at stake in one's own analysis is not an easy challenge (Rees n.d.). It is a test of the limits of what can be known and is at the same time, "an experiment with the possibility of going beyond them" (Foucault 1984:50).

What place does such a task of critique, which requires time for reflection, have in practices of ecohealth research that demand timely action?<sup>57</sup> Having explored the potential territory sketched out in Q.'s quote, how can critique be

<sup>&</sup>lt;sup>56</sup> This is not an epistemological problem, whereby scientists take issue with how we know the world. Such a viewpoint assumes an external reality that is knowable if only we had the right tools. For ecohealth researchers, the objectives of scientific practice do not lie within the description of 'nature' or cross-examinations of how we can claim to know 'nature' but elsewhere.

<sup>&</sup>lt;sup>57</sup> 'Timely' as a concept stands in contradistinction to the 'untimely' – a concept developed by Rabinow et al. (2008) for thinking through how to conduct an anthropology of the contemporary. In brief, the 'untimely' constitutes a certain critical distance that the anthropologist strikes in relation to the curiosities they track, while staying close to these curiosities as they develop in the field.

returned to its original starting point? Perhaps the task of critique and its place in ecohealth research can be better understood by refusing to erect divides between thinking and action. To think about whether or not one chooses to participate in the process is an act in itself –one that is furthermore necessary to the act itself.<sup>58</sup> In this way, thinking and action are mutually constitutive rather than opposed to each other: to hold up to view one's modes of understanding is not only an act but one performed out of choice.

<sup>&</sup>lt;sup>58</sup> In Foucault's view, there is a fundamental relation between thought and action, insofar as: "Thought is not what inhabits a certain conduct and gives it its meaning; rather, it is what allows one to step back from this way of acting or reacting, to present it to oneself as an object of thought and to question it as to its meaning, its conditions, and its goals" (Foucault 1997:117). Since thought is not given, it constitutes an action of its own (Rabinow 1997:xxxv).

# CONCLUSION

The realities that arose out of 'AI' in each of the field sites I visited remain fragile, discontinuous with one another, and importantly, still under formation. Although I began from virological understandings of 'AI' in the Fraser Valley I was led in new directions (and, coincidentally, away from virology itself) so that I could follow the overflow that 'AI' had released and which required ordering. It appeared that 'AI' had spilled into social and economic domains. Even further, 'AI' had generated a whole new set of technical and political practices called biosecurity that performed the work of ordering the emergent reality that 'AI' brought into existence. The development of One Health and ecohealth suggested equally powerful ways to reorder reality and, in doing so, re-constitute what is already in the world. As my movement across these domains suggested, I came across something that was 'AI' and yet *not* 'AI.'

The realities enacted in these field sites, however, are neither firmly established nor fully determined. Exactly the opposite: each ordering of reality is only a tentative proposition that must be subjected to considerable testing, revision, and re-testing – or altogether abandonment. The orders of reality as suggested in each field site are hardly secured, let alone lasting. What implications does this have on my findings as I have described them above? Based on this understanding of the field, what kind of relationship to fieldwork and its end (as temporal time point) or ends (as the production of results), is required from anthropologists?

Rees (2012) has used the image of a wellspring to describe this dynamic of the emergent. "Like a well," Rees (2012:30) says, "the new springs forth, bifurcates in all directions, is explorative, perhaps wild, almost certainly chaotic and incoherent; it likely has not yet given rise to a broad stream in a stable river bed — and maybe it never will for it may just as well ooze out and disappear. The very aim of studying the emergent is to capture the openings, the bifurcations, the troubles, the jumping forth of the new causes." In undertaking this task of studying the emergent, the anthropological fieldworker must be prepared for the appearance and – just as likely disappearance – of whatever curiosity she may be tracing. The potential transience of these curiosities does

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not permit anthropologists to be any less attentive in their fieldwork – if anything, this task demands even more refined sensitivities to what comes in (and out) of being.

Just as anthropological curiosities are in a continual process of becoming, fieldwork cannot come to a final end. Allowing for the emergence of these yet-to-beknown-somethings demands openness not closure. So in casting for a way to conclude this particular project, I can think of nothing more appropriate than making a call for further inquiry – to seek out how the various things-that-are-'AI'-and-yet-not-'AI' continue to mutate what is already in the world and give rise to new realities.

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