



**FRAME
WORKS
INSTITUTE**



We Need a Ground Crew for Environmental Health Working Upstream:

Using Explanatory Metaphors to Improve Public
Understanding of Environmental Health and Its Workforce

A FRAMEWORKS RESEARCH REPORT: MAY 2014

Eric Lindland, Andrew Volmert and Abigail Haydon

In collaboration with Tracy Kolian and Amanda Raziano
of the American Public Health Association

Table of Contents

Introduction	3
Executive Summary.....	5
Ground Crew for Environmental Health.....	5
Upstream Environments, Downstream Health	7
What is an Explanatory Metaphor?.....	9
Why Environmental Health Needs Explanatory Metaphors.....	10
Why and How We Test Explanatory Metaphors	11
Two Effective Explanatory Metaphors for Environmental Health	14
A Ground Crew for Environmental Health.....	14
Evidence from Qualitative Research.....	15
Evidence from Quantitative Research.....	20
Strategies for Using the Metaphor.....	21
Upstream Environments, Downstream Health.....	24
Evidence from Qualitative Research.....	25
Evidence from Quantitative Research.....	30
Strategies for Using the Metaphor.....	30
Conclusion	33
About the FrameWorks Institute.....	35
Endnotes	36

Introduction

The research presented here was conducted by the FrameWorks Institute for the American Public Health Association (APHA) with funding from the CDC's National Center for Environmental Health (NCEH)/Agency for Toxic Substances and Disease Registry (ATSDR). The research is part of an ongoing effort to develop effective strategies and tools to help those working in the environmental health sector communicate more effectively with the American public and policymakers about their field and its work. In particular, this research has focused on developing tools, specifically *Explanatory Metaphors*, that can help people better understand *what environmental health is and why environmental health work is so critically important*. Because of their power in creating new ways of understanding issues and information, developing Explanatory Metaphors is a key part of this process. The end goal of the project is to build a common message platform that members of the field can share and use to create a public and political commitment to promoting healthy environmental conditions and reducing harm associated with environmental hazards.

Explanatory Metaphors are frame elements that fundamentally restructure the ways that people talk and reason about issues. They do this by referencing a topic that is more familiar to people as a way for understanding one that is less familiar. As such, these tools are useful in efforts to shift the mental frameworks that people access and employ in processing information.

Following its multi-disciplinary and iterative approach to communications research (Strategic Frame Analysis™),¹ FrameWorks researchers have unpacked and distilled what Americans know about environmental health. This research has focused on how Americans' understandings of environmental health are shaped by a shared set of assumptions — what anthropologists call “cultural models.”² These shared assumptions allow individuals to navigate their social worlds and make sense of the experiences and information they encounter. However, as part of their role in meaning-making, cultural models can sometimes work to limit people's ability to think about new ideas, and can make some messages and potential solutions “hard to think.”

Earlier stages of this project have identified several areas where the American public is challenged in its understanding of environmental health and the work of those comprising the environmental health sector.³ This research has shown that, while members of the public are concerned about environmental health *threats*, they do not have readily available ways for understanding the importance of environmental health *work*. This

results in difficulty identifying or describing the range and function of those environmental health institutions, practices and professions that are in place on their behalf. Likewise, neither of the phrases “environmental health” nor “environmental public health” are familiar to most.

Consistent with central concerns within the environmental health sector, public attention to environmental health threats is focused on exposure to contaminants, and the threat that such exposures pose to human health. However, unlike experts, the public has difficulty thinking *beyond* this contaminant model and struggles to consider broader environmental health factors and challenges, such as those of built environments, social determinants of health, energy usage and climate change. Finally, public thinking about how best to address environmental health challenges consistently focuses on taking action at the personal and household level, while attention to policy-level solutions is muted, and narrowly focused on information dissemination and the regulation of contaminants.

The Explanatory Metaphor research described here was directed at identifying metaphors that could help shift and elevate public thinking beyond these problematic cultural models, and towards more productive ways of thinking about environmental health. It is important to note at the outset, however, that even the best Explanatory Metaphors cannot accomplish everything that needs to be done in reframing a complex domain like environmental health. A parallel trajectory of research for this project has identified a value frame, *Fairness Across Places/Opportunity for All*, that is effective in reorienting the public’s attitudes about the environmental health sector, and increasing support for devoting additional public funds to environmental health work.⁴ Other frame elements (messengers, exemplars, visuals, tone, explanatory chains, social math) might also be tasked with addressing other routine misdirections in public thinking. Toward that end, this report can be read as one in a series of explorations designed to identify effective elements in a larger strategy for communicating about environmental health and the work of this sector.

Executive Summary

FrameWorks' research process found two metaphors — *Ground Crew for Environmental Health* and *Upstream Environment, Downstream Health (Cascading Effects)* — that are powerful in productively channeling how Americans talk and think about environmental health. These two metaphors accomplish overlapping, but also differing, tasks. *Ground Crew for Environmental Health* elevates the salience and importance of environmental health work and the training, expertise and multidisciplinary necessary to promote environmental conditions necessary for human health. *Upstream Environment, Downstream Health* makes visible how a wide range of environmental conditions create human health impacts, and enables people to understand the need for early intervention efforts that prevent environmental health problems before they arise. These two metaphors, and summaries of our recommendations for their use, are presented below.

Ground Crew for Environmental Health

An airport ground crew uses its technical expertise to repair, maintain and coordinate the planes at an airport to keep them working and safe — this takes skill, planning and highly specialized training. Just as the ground crew at an airport makes sure everything goes smoothly on the runway and eventually in the air, there is a ground crew for environmental health. People on the environmental health ground crew use their expertise and skills to help ensure we build and maintain environmental conditions that are healthy for people to live and work in. We need to make sure that our “ground crew” for environmental health has diverse skills, is highly trained, and can work together to ensure that our environmental conditions are built and maintained for people’s health.

The comparison of the work of environmental health to the work done by an airport ground crew was highly successful in redirecting public thinking towards productive understandings of, and support for, the environmental health sector. Across research methods, the metaphor helped members of the public think more expansively about:

- The importance of environmental health work.
- The multidisciplinary scope of environmental health work, and the breadth of skills and professions required to effectively *promote* environmental conditions for human health and *prevent* the unsafe conditions that would undermine it.

- Why environmental health work should be a public priority.

The following features of an airport ground crew's work were essential in creating these productive effects: (1) that the work of the ground crew is important to the overall functioning of air travel; (2) that there are multiple skills, professions and tasks organized around a common goal; (3) that there is a shared orientation towards safety and efficiency; and (4) that there is a mandate to prevent problems before they arise and pose a risk to passengers and others.

Participants were universally familiar with the idea of a "ground crew," and the language of a "ground crew" was durable and "sticky" in people's talk — easily passing between research participants and persisting through extended discussions.

The metaphor also helped inoculate against the public's strong tendency to think about health in highly personalized terms — that environmental health concerns operate at the individual or household level, and that individuals are primarily responsible for addressing environmental health concerns and threats. Instead, primed with the metaphor, participants talked about health inputs and outputs at the *population* level, and about the importance of having people who have the knowledge and expertise to take effective action at this macro level.

The following are empirically-based recommendations for how best to deploy the *Ground Crew for Environmental Health* metaphor in messaging:

1. Clearly specify the domain of the airport whenever setting up and building out the metaphor — by saying, for example, "Just as there is ground crew at an airport, we need a ground crew for environmental health ..." Grounding and locating the metaphor in an airport is key to many of its productive effects.
2. Continue to explicitly link and mix the source of the metaphor (airport ground crew) and its target (environmental health) by using phrases like "*environmental health ground crew*" and "*a ground crew for environmental health.*"
3. Provide examples that link specific airport ground crew functions (mechanic, inspector, engineer, etc.) to specific environmental health functions.
4. Emphasize the *proactive* and *preventative* functions of an airport ground crew, and link those functions to the work of environmental health.

5. Feel free to point to a broader array of airport functions that have productive comparisons to environmental health, such as design or monitoring.
6. Avoid early references to *health care* systems, as they trigger unproductive individual-level thinking about health care as a consumer good in the domain of personal choice.
7. Specify the relationship between environments and health when applying the metaphor by using phrases like “*environmental conditions that affect human health.*”

Upstream Environments, Downstream Health

We all live “downstream” from a range of environmental factors and conditions that affect our health. By ourselves, we can’t control all the things that happen “upstream” in our environments. That is why we need people who specialize in working upstream to create positive environmental conditions for human health. These environmental health professionals understand how upstream factors have downstream effects, and can pay attention and intervene to ensure that what flows and cascades downstream is healthy and safe for all of us.

The *Upstream/Downstream* metaphor derives from the field of environmental health itself. However, within the field, the term has become a technical term of art whose metaphorical power is often not recognized and, as a result, this language is generally not used as a communications tool with the public. This research demonstrates that this is a missed opportunity, as the metaphor, if articulated and used in the right way, is effective in helping the public better understand environmental health.

The *Upstream/Downstream* metaphor helped members of the public think about:

- How environmental factors beyond the control of any individual actor affect health.
- The broad range of environmental factors that impact health.
- The importance of *early* intervention and *prevention* efforts, and the need for environmental health workers who are trained and specialized doing this proactive and preventative work.

Research participants applied the concepts of “upstream” and “downstream” to think more expansively about the ways that environmental conditions can impact human health. In particular, the metaphor provided people with a way to reason about how environmental

events and conditions that exist *upstream* are not subject to the control of actors and populations that experience effects *downstream*. This put people's focus on the importance of preventative measures, and in support of the agents and institutions who act and work upstream. In so doing, the metaphor inoculated against people's tendency to attribute primary control over health to individuals and households. The idea that upstream factors "cascade" into downstream effects on health conditions also facilitated productive thinking about how environmental factors can have diverse and cumulative effects on health. The metaphor was easily communicated, and the language of "upstream" and "downstream" was sticky and pervasive in research participants' talk.

We offer the following recommendations for communicators to use in deploying the *Upstream Environments, Downstream Health* metaphor:

1. Provide examples that explicitly link upstream conditions to downstream effects, and make visible the macro-level process by which these effects occur. This strategy is critical to prevent people from defaulting to an assumption that individuals are best equipped to solve most environmental health problems through personal action.
2. Avoid examples involving water sanitation or river pollution. These examples risk triggering literal interpretations of the metaphor as only being about contamination of waterways, and restrict other ways the metaphor can help broaden understandings of environmental health.
3. Provide examples that do not involve contamination in general to broaden application of the metaphor beyond the dominant *Contaminant* cultural model.⁵
4. Begin with, and consistently use, the language of "upstream" and "downstream." This language proved sticky and "easy to think" for the public, and thus provides the cognitive foothold that the metaphor needs to gain traction. The language of "cascading effects" should be introduced secondarily, after the basic idea that environments lie *upstream* and affect health *downstream* has been established.
5. Fill in public thinking by providing concrete examples of the kinds of public institutions and agents that can operate effectively upstream, and what this work looks like. Examples of upstream work that has effectively improved health outcomes are especially important, given the public's tendency to think fatalistically about the ability of large efforts to actually improve outcomes.⁶

What is an Explanatory Metaphor?

An *Explanatory Metaphor* is a bridge between expert and public understandings that helps members of the public think more productively about a topic. FrameWorks defines an Explanatory Metaphor as a research-driven, empirically tested linguistic analogy that captures and distills a concept through reference to existing patterns of assumption and understanding. It does this by using something that is familiar to people (this might be an everyday object or process, a well-known location or event, or the like) as a *source* domain, and mapping some of its familiar features onto a *target* domain that is less familiar or well understood. By pulling out salient features of the familiar topic and mapping them onto the less familiar topic, Explanatory Metaphors can help people organize information into a more clear picture in their minds. This has the potential to make people better critical thinkers and more careful media consumers who are ultimately better situated to think about an issue and what should be done about it.

On the basis of this theoretical perspective, FrameWorks has built a robust, reliable protocol for determining what an effective Explanatory Metaphor looks like and how it behaves.⁷ An effective Explanatory Metaphor:

1. improves understanding of how a given phenomenon *works*;
2. creates more robust, detailed and coherent discussions of a given target concept;
3. can be applied to think about how to *solve* or *improve* a situation;
4. inoculates against dominant but unproductive patterns of thinking that people apply to understand the issue;
5. is highly communicable and can be shared easily among individuals without major breakdowns or unproductive mutations;
6. is a linguistic resource for social interaction (people can incorporate it into their stories and conversations); and finally,
7. is self-correcting. When a breakdown in thinking does occur, people can re-deploy the metaphor in its original form to once again clarify key aspects of the issue.

Why Environmental Health Needs Explanatory Metaphors

When designing and testing Explanatory Metaphors, FrameWorks' researchers employ the results of earlier qualitative research, as well as cultural models and metaphor theory, to arrive at an understanding of the specific communications challenges presented by the particular topic.⁸

In light of this background, we determined that Explanatory Metaphors on environmental health should accomplish the following cognitive tasks:

1. Help people understand *how* environments shape human health through diverse means, often at the population level and beyond the control of any individual.
2. Provide a basis for understanding why *prevention* and health *promotion* are important.
3. Facilitate people becoming more articulate about *why* environmental health work is important, and why it should be a public priority.
4. Make visible the *breadth* of professions and skills required to effectively promote environmental conditions for human health.

FrameWorks researchers developed and tested two metaphors to address these tasks. The first metaphor, *Ground Crew for Environmental Health*, was directed towards the third and fourth tasks from the list above, and centered on raising the profile and salience of environmental health work. The second metaphor, *Upstream Environments, Downstream Health*, was directed towards the first two tasks and addressed people's understanding of the relationship between environments and human health.

Below, we briefly discuss the process by which FrameWorks' researchers identified, developed and empirically tested the power of *Ground Crew for Environmental Health* and *Upstream Environments, Downstream Health (Cascading Effects)* to broaden public understanding of what environmental health is and why a diverse environmental health workforce is so important. We then present the findings from this research, and conclude with specific recommendations about how best to deploy these communication devices in messaging about environmental health. The Appendix provides more specifics about the research methods employed.

Why and How We Test Explanatory Metaphors

Most people can easily identify, and even generate, metaphors to explain, teach or argue points and ideas. They are a pervasive feature of our discourse, speech and reasoning. At the same time, metaphors are also features of mind at deeper levels of operation, often at levels that operate below conscious awareness. Each metaphor proposes a re-categorization of a concept in mind and, because concepts already exist in an internalized web of other meanings, these re-categorizations activate other concepts, categorizations and relationships. In short, metaphors have far-reaching and hard-to-detect cognitive consequences. Frequently, these consequences may endanger the very communications goals that the metaphor is intended to serve.

Because of this potential for unintended, negative effects in relation to communications goals, FrameWorks tests a set of Explanatory Metaphors to observe and measure their *actual* effects in shaping thinking and reasoning, and the ways they are deployed in social conversation. These tests allow us to observe what happens to metaphors as they live and breathe in complex cultural, political and linguistic ecologies. Testing metaphors also inoculates against armchair guesses and assertions about any given metaphor's effectiveness based on assessments of "what most people think" or "what most people know," an *ad hoc* approach that can have unpredictable, and often counterproductive, results on public thinking.

A final reason for testing is that many of the most persistent metaphors that we use in our daily language have evolved over long periods to fit their cultural circumstances. We use such metaphors because they are present in our language and our culture, and they are present in our language and culture because they have outlasted, or proven themselves to be more cognitively fit than, other related attempts. Because communicators do not have the luxury of taking long periods of time to see what might emerge naturally, we compress this evolutionary schedule to produce metaphors with immediate cognitive and social fit.

FrameWorks has developed a multi-method process to systematically develop and empirically test simplifying models. These methods are summarized below, and described in greater detail in the Appendix.

Test I: On-the-Street Interviews

In the Spring of 2012, FrameWorks' researchers conducted On-the-Street (OTS) Interviews with 98 people in Austin, Texas, Frederick, Md., and Boston, Mass. These one-on-one, 10-15 minute, videotaped interviews tested the capacity of 14 candidate Explanatory Metaphors to facilitate more productive and robust discussions about environmental health. Each interview was divided into two parts. In the first part, we asked a series of open-ended questions about the environmental factors that impact human health, and about who is responsible for ensuring the health of the people in those environments. In the second part of the interview, the interviewer presented one of the 14 candidate metaphors using a standardized, but conversational, script, and then asked the same line of questioning (in rephrased language) from part one. Two researchers independently analyzed the resulting video data, looking for patterned ways in which each of the candidate metaphors affected individuals' thinking and talking about environmental health.

Test II: Quantitative Experimental Research

Analysis of the On-the-Street interviews was used to winnow the set of candidate metaphors and refine existing iterations. FrameWorks researchers then designed a large-scale quantitative survey to test and demonstrate the varying efficacy of the remaining candidate metaphors. The survey was conducted online with 1,800 participants, weighted by age, gender, race, education and political partisanship to statistically match the population of registered voters in the United States.⁹

Eight metaphors and one control condition were tested using the same set of questions as outcome measures. These questions were designed to capture respondents' understanding of the scope of the environmental health field; their ability to relate environmental health problems to more distal causes and better understand the causal relationship between environmental conditions and human health; and their ability to identify the people responsible for addressing environmental health challenges. (Examples of these questions are provided in the Appendix.)

Test III: Persistence Trials

Persistence Trials (PTs) are a qualitative method that mimics the game of telephone and has pairs of participants pass, or transmit, an Explanatory Metaphor to other pairs of participants. Persistence Trials give researchers multiple opportunities to see how participants react to and use the metaphor, how and how well the metaphor travels and

“persists” as it is passed between individuals, what parts of it are “sticky,” and how it appears to change participant thinking on the target issue.

Based on the results of the OTS interviews and quantitative experiment described above, versions of both *Ground Crew for Environmental Health* and *Upstream Environments, Downstream Health* were tested in Persistence Trials in two locations: Nashville, Tenn., and Towson, Md. These sessions included more than 30 participants who were recruited to assure variation in gender, race/ethnicity, education level, occupation, residential location (urban, suburban, rural), community involvement and self-reported political affiliation.

Test IV: Usability Trials

The final method involved putting both *Ground Crew for Environmental Health* and *Upstream Environments, Downstream Health* into the hands of environmental health experts and asking them to use the metaphors in a short presentation to members of the public about the field and work of environmental health. The purpose of Usability Trials (UT) is not only to validate the usability of the metaphor, but also to observe *how* it is usable: What sorts of questions does the metaphor help experts answer? Can they discover aspects of the metaphor that researchers may have overlooked? Does it give experts the resources they need to communicate important ideas? How could the metaphor be improved to make it more powerful in its explanatory effects and more usable by communicators?

A total of six Usability Trials were conducted in Boston, Mass., and Washington, D.C., with six pairs¹⁰ of environmental health experts. The resulting data were used to make final refinements to each metaphor to maximize its effectiveness and usability.

Two Effective Explanatory Metaphors for Environmental Health

Employing this research process, FrameWorks' research team developed, and empirically tested, a total of 14 different candidate metaphors in varying iterations. These included metaphors about highway junctions and crossroads, circulatory systems, ropes and tethers, waves and ripples, architecture and electrical wiring, lifeguards, sailing, software, design, weaving, and processes of immersion and molding, as well as airport ground crews and riverine cascades. Over the course of the research process, two of these Explanatory Metaphors, *Ground Crew for Environmental Health* and *Upstream Environments, Downstream Health*, emerged as highly effective tools for aligning public and expert thinking around the challenges of environmental health and the need for a robust and well-supported environmental health sector.

Below, we review the development of these Explanatory Metaphors through the iterative research process. We discuss their general effects, summarize the empirical evidence that demonstrates their explanatory power, and describe the specific advantages they confer when used strategically to communicate about environmental health.

A Ground Crew for Environmental Health

Across the multiple phases of development, testing and refinement, the comparison of the environmental health sector to the operations of an *airport ground crew* consistently provided members of the public with new and more productive ways to think about environmental health work. The metaphor also proved highly usable by experts in communicating about their work and its importance to members of the public.

An airport ground crew uses its technical expertise to repair, maintain and coordinate the planes at an airport to keep them working and safe — this takes skill, planning and highly specialized training. Just as the ground crew at an airport makes sure everything goes smoothly on the runway and eventually in the air, there is a ground crew for environmental health. People on the environmental health ground crew use their expertise and skills to help ensure we build and maintain environmental conditions that are healthy for people to live and work in. We need to make sure that our “ground crew” for environmental health has diverse skills, is highly trained, and can work

together to ensure that our environmental conditions are built and maintained for people's health.

I. Evidence from Qualitative Research

The *Ground Crew for Environmental Health* metaphor showed several strengths throughout the multiple qualitative stages of FrameWorks' research process:

A. Positive Applications and Effects

Across the OTS interviews and PT sessions, research participants successfully applied the idea of an airport ground crew as a way to think more expansively about environmental health and the environmental health sector. The following were particularly effective ways in which the metaphor helped people think about the environmental health field and its work.

- 1. The Source Domain is Highly Familiar.** Research participants were universally familiar with the idea and purpose of an airport ground crew — to facilitate the timely and safe flight of airplanes and their passengers and cargo. Not a single participant needed the idea of an airport ground crew explained to them, and all participants were able to talk in some form about the functions and personnel of a ground crew.
- 2. People Easily Map from Source Domain to Target Domain.** Participants applied the idea of an airport ground crew as a way to think and talk differently about the work of environmental health. Put another way, the idea of an airport ground crew provided a *source* for pulling out new ways of thinking about a less familiar topic — the work of environmental health. There is a set of consistent features of an airport ground crew that participants were able to consistently map onto environmental health work in ways that aligned their thinking with the messages experts wish to communicate. Several features of an airport ground crew proved to be particularly useful in creating this productive alignment between expert messages and public thinking:
 - The work of the ground crew is essential to the overall functioning of air travel.
 - Airport ground crews involve, and depend upon, multiple skills, professions and tasks that are part of a larger team that is organized around a common goal.

- Airport ground crews are oriented towards safety and efficiency.
- Airport ground crews have a preventive mandate — they work to prevent problems before they arise to limit risks to passengers and others.
- Often, the work of a successful ground crew is taken for granted and happens “behind the scenes,” even as it remains critical to the fluid and safe operations of air travel.

All four of these aspects of ground crews, and their productive application to environmental health, are reflected in the following quotes taken from PT sessions:

Participant: I took the metaphor as, with a plane, everybody has to work in concert, whether it's the ticket agents, whether it's the people at the gate, the maintenance people who have to keep the upkeep of the plane or it could crash, the pilots have to be up to date on the newest technology and able to fly the plane, the company that actually runs the plane has to have some sort of customer service or nobody's going to want to fly with them, everybody — air traffic controllers, other airports, they all have to — and with environmental conditions and our health, I think everybody has to take responsibility, including us, the government has to do regulations everybody, for whatever's affecting the environment negatively, we have to make those changes and do the right thing.

—

Participant: My take is that everybody — if the environment's the plane, everybody has to work together to make it work. Numerous groups, everybody has to pitch in.

—

Participant: What we wanted to explain or teach you today is relating environmental health to when you think about an airplane at the airport. When you think about that plane and all of the skills and training and ability to make sure that that plane is a well-oiled machine, so to speak, when you relate that to your health — and when you think about that, a lot of times we may not be as extensive and as thorough of a job — but when you think about the plane ... and what it takes to get the airplane to run, would you say you actually put that much thought into your environmental health?

Experts participating in UT sessions were also able to bring forward and make explicit these features of an airport ground crew while using the metaphor:

Expert: We would like to suggest that environmental health, this concept of taking care of the environment, is very similar to how a ground crew works. There are different teams, different individuals and groups of individuals who are out there making sure that the airplane, the conditions surrounding the airplane, are in a good condition, because after all, if they don't, there are certain things that can go wrong. From the extreme, a crash, the airplane could have a very catastrophic event, to minor things that, if it's not taken care of — maybe it doesn't look like there's anything wrong, it all functions, it flies from point A to point B, everybody gets there safely, but it's not functioning to its full potential ... Very similar to the environment, we need different groups working together to take care of the environment so that, again, using the analogy or metaphor of the airplane ... we want to take care of the airplane because of who's in the airplane, the passengers. In the same way, we want to take care of the environment so that the residents of the planet stay healthy.

—

Expert: The functions, it strikes me, are in terms of looking at a ground crew, or looking at maintenance of an aircraft, and everybody working together, communicating effectively, to fulfill the ultimate goal of keeping everyone safe. A lot of environmental health work and workers require that they have specialized training in order to do that, to make the most of what the resources are, to be able to keep the public safe.

—

Expert: That behind-the-scenes maintenance that the ground crew does Mechanics that are somewhere — I'm not sure where, if I've ever seen them — must check the log of flights and how many miles a particular plane has logged, and when routine maintenance on that particular aircraft needs to take place.

- 3. The Source Domain is Highly Generative.** Both members of the public and experts went “off script” to generate new ideas and productively expand their talk about the field. During PT sessions, for example, participants identified a variety of actors who help to ensure the safety of flights — often moving beyond the scope of a ground

crew to talk about other actors, such as flight attendants, pilots, ticket agents and air traffic controllers.

Participant: Think of an airplane as the environment. And it takes a pilot to fly it, all these many groups of people — the baggage handlers, the air traffic controllers, the ticket takers — it requires an awful lot of people to keep it running smoothly. That's the metaphor; you have to think of it in those terms and relate that to how you can improve the environment, and the environmental conditions that shape human health.

This ability to move fluidly within the broader source domain of the airport is highly encouraging, as it creates a cognitive space for thinking about environmental health work that — once filled in by experts — can yield a textured understanding of the full range of roles played by environmental health workers. As another example, during UT sessions one expert compared the work of researchers who investigate how environments affect health to the work of engineers who explore the principles of airplane design to best ensure safety and comfort.

Expert: If you have your academic researchers, who would those folks be? They could be the engineers who design the thing; they could be the mechanics who are analyzing what's happened to the airplane.

Likewise, both experts and members of the public referenced the air traffic control tower to talk about communications and surveillance work. In short, the airport domain provides a readily accessible, rich cognitive terrain for generating a broader set of important associations with the environmental health sector and its diverse, multidisciplinary professions.

- 4. Opening a Space for Community Participation.** During PT sessions, some participants used the metaphor to argue that community members needed to “join the ground crew” and become active agents of environmental health.

Participant: There's all these people working in concert to get one mission done, and that's to get you from point A to point B, safely and as quick as possible. What we're trying to show you is that ... with the environment, it takes not just one person, not just the government to say we need to regulate this, it takes everybody who needs to be involved as a team, in concert, to fix the environment so that we can shape human health.

In these applications of the metaphor, the underlying premise of a diverse team built around a common goal opened a space for people to think about teamwork and collaborative efforts. Talk about community involvement focused, in particular, on communication and information dissemination efforts — the idea that community members should be active in helping others understand how local environmental conditions are impacting health. This underlying model of teamwork is part of what gives the metaphor its strength, and represents a highly productive feature of the source domain that can be applied to thinking about environmental health work.

B. Inoculation Against Problematic Defaults

FrameWorks' cultural models research on environmental health has found that the public has a strong default to thinking about health in highly personalized terms through a model of *Health Individualism*.¹¹ This model asserts that each person creates his or her own health destiny, and differences in health outcomes result primarily (if not exclusively) from individual and household-level choices and actions. Notably, the *Ground Crew for Environmental Health* metaphor consistently inoculated against this model and, instead, moved people to talk about health inputs and outputs at the *population* level. In the face of the dominance and unproductiveness of the *Health Individualism* model, this inoculation effect represents a major strength of the metaphor. This effect is best explained by looking to intrinsic features of the source domain — planes are typically occupied by dozens, if not hundreds, of people, and, over the course of a day, many thousands of travelers pass through an airport. This aspect of airports and ground crews, which is inherently about populations, was fluidly mapped onto the environmental health sector and its functions, and onto the people who have the knowledge and expertise to take effective action at this macro level.

C. Communicability

Communicability refers to the faithfulness of transmission of the Explanatory Metaphor among research participants. In analyzing video of PT sessions and OTS interviews, FrameWorks researchers look for the repetition of exact language and key ideas, and, during PT sessions, the stability of the central metaphor as it is passed between individuals and pairs of participants. Communicability varies significantly among the Explanatory Metaphors that FrameWorks tests, making it an important measurement of the effectiveness of any one metaphor.

The *Ground Crew for Environmental Health* metaphor proved to be highly communicable, both from researchers to the public (during OTS interviews) and from experts to the public

(during UT sessions), as well as between and among members of the public (during PT sessions). During both OTS interviews and PT sessions, participants quickly picked up and used the “ground crew” term to talk about a team of experts who work to protect people’s health from environmental issues, and used the term consistently throughout their conversations. During PT sessions, the basic contours of the metaphor were faithfully transmitted through each generation of transmission.

D. Self-Correction

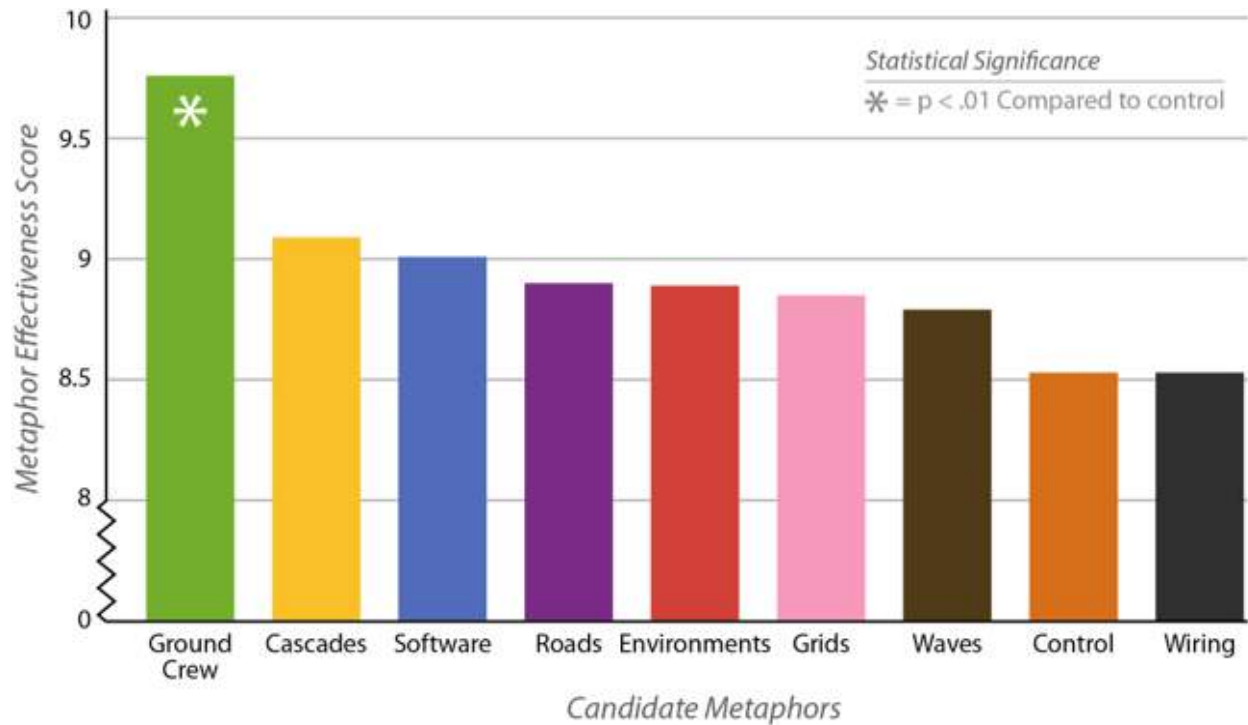
Self-correction refers to an Explanatory Metaphor’s ability to “snap back” and reclaim the contours of its productive use following a deterioration or mutation of the concept in discussion — for example, if one structural feature of the metaphor is forgotten or falls out of conversation. An important measure of an Explanatory Metaphor’s strength, self-correction occurs when this feature reasserts itself in subsequent discourse *without being cued by the moderator*. Once used as part of a communication strategy, Explanatory Metaphors are put into public discourse, where their use will be beyond the control of the original communicator. It is therefore important that a concept have sufficient integrity and internal coherence to regain its productive use in conversation if certain features devolve into less productive formulations.

A prominent example of self-correction concerned the application of *Ground Crew for Environmental Health* to the health care system. There were certain instances in which participants in PT sessions fell back on the default assumption that environmental health is about health care, and positioned the plane as the human body and the ground crew as health care practitioners. However, as discussion continued, informants were able, of their own accord, to correct this usage, reverting to the proper positioning of the plane as the environment and the ground crew as the people who maintain the environment to ensure the health of “passengers.”

II. Evidence from Quantitative Research

The quantitative experiment described above showed that, among eight metaphors tested, *Ground Crew for Environmental Health* resulted in the greatest shifts in public understanding of environmental health and environmental health work. Questions in the experiment were spread across three batteries addressing (1) the scope of the environmental health field, (2) the causal relationship between environmental conditions and human health, and (3) responsibility for dealing with environmental health problems. These three measures were aggregated into an overall effectiveness score for each metaphor. Figure 1 shows the results of this experiment:

Figure 1: Experiment Results



The vertical axis represents the average number of questions that respondents in each condition answered correctly (ranging from zero to 16). Participants in the *Ground Crew for Environmental Health* condition answered 1.25 more questions correctly than respondents in the control group. This difference is statistically significant at $p < 0.01$. These results clearly demonstrate *Ground Crew for Environmental Health's* strong comparative advantage at increasing knowledge relative to other candidate Explanatory Metaphors and to the control condition.

III. Strategies for Using the Metaphor

Based on the empirical findings described above, FrameWorks offers *Ground Crew for Environmental Health* as a new strategic frame element to help build support for the environmental health sector and increase its salience in public thinking and discourse. It is important to recognize, however, that the metaphor cannot be simply dropped into messaging under the assumption that its positive entailments and full potential will be realized. Instead, maximizing the productive entailments of the metaphor requires an intentional and careful deployment of the metaphor as part of a larger communications strategy. We suggest the following recommendations for its use:

- 1. Invoke the broader domain of the airport.** Communicators should reference the broader domain of the *airport* when using the metaphor, in order to avoid confusion with the more general idea of a “grounds crew” — or a team of people who maintain the grounds of a property or campus. While property grounds crews also do multiple tasks requiring multiple skills, their scope of work is less diversified and lacks many of the positive entailments associated with an airport ground crew — including the critical importance of the work, the attention to safety, the need for preventive measures, and the sophistication and technicality of many of the skills (e.g., aviation technicians, engineers).

Another reason to talk specifically about *airport* ground crews is because of people’s tendency to revert to a more abbreviated linguistic use. During both OTS interviews and PT sessions, participants often dropped the modifier “airport” and talked, instead, simply about “ground crews.” While conversation generally circled back to talk about airports, dropping the term “airport” allowed conversation, at times, to drift to more generalized talk about people working “on the ground” to do important tasks.

- 2. Fill out understandings of the sector.** As noted, members of the public can readily map from the source domain of an airport to the target domain of environmental health work. This mapping happens with varying degrees of specificity, however, and, in some cases, participants had difficulty applying their understandings of airports and airport ground crews to their understandings of environmental health because of their limited knowledge of the latter. We therefore recommend that communicators use the metaphor to introduce knowledge by drawing parallels between *specific* airport ground crew roles and environmental health functions. In this way, new knowledge about the spectrum of environmental health work can “piggyback,” so to speak, on what is already familiar — as illustrated in the expert quote below:

Expert: Using the metaphor, as it relates to public health and environmental public health, there are certain roles: There are the roles of the communicators. Air traffic controllers have to be able to talk with pilots of other airplanes to prevent mid-air disasters You look at the ground crew, the ground maintenance folks to ensure the runways are in good condition Similarly to public health, you have the importance of service providers Finally, a key element of environmental health is the research team, always trying to understand what can be done to prevent new problems in the future. That would be similar to the mechanics, looking at the airplane, always trying to understand how it functions and where the weak spots might be So those are the various

teams in an airport setting, very similar to environmental health, the different types of teams that need to work together to ensure that we have this healthy environment in which we all live so that we're all safe and as healthy as we can be.

The iteration of the metaphor provided at the beginning of this report is not itself a complete message, but, rather, a productive frame within which to communicate about environmental health. The metaphor gives people a useful way of organizing and retaining information, but specific examples of environmental health work need to be incorporated into the message in order for the public to gain a concrete and detailed understanding of environmental health as a profession.

3. Emphasize the proactive and preventative functions of an airport ground crew.

Among the most dominant cultural models held by members of the public is a *contaminant model*, which identifies a substantial threat to human health from exposure to toxic contaminants in the environment. While entirely consistent with a core priority and focus within the environmental health sector, the *dominance* of this model in public thinking narrows people's understanding about what environmental health is and what kinds of environmental health work are important. The *Ground Crew for Environmental Health* metaphor demonstrated only partial success in helping people think past the contaminant model to a broader array of environmental health factors and impacts. Yet, one of the metaphor's most productive and powerful entailments is that it points people's attention to the preventative measures that are taken to ensure that airplane travel is safe. In addition to baggage handlers and ticket agents, people also think about the inspectors and mechanics, and the broader system of measures taken to ensure that air travel happens safely.

To that end, communicators should give examples of parallel functions (between source and target domains) to help build out the positive ideas of prevention, surveillance, and attention to safety and well-being. For example, "Just as inspectors do a visual inspection of an airplane before it's cleared for flight, so too there are people who inspect environments — whether they are restaurants, swimming pools or workplaces — to ensure they are healthy for humans."

4. Feel free to point to a broader array of airport functions. Throughout the various stages of research, both public and expert participants expanded the metaphor beyond that of an airport's ground crew — talking also about members of the air crew, the air traffic control team, and even the engineers who design safe, reliable and comfortable

airplanes. Many of these other airport personnel and functions are conducive for productive comparison to environmental health, and include important health promotion analogues around functions of design, monitoring and promotion.

5. **Use phrases that link the source and target domains.** Use phrases like “*environmental health ground crew*” and “*a ground crew for environmental health*” to explicitly link the source and target domains, and help prevent the public from falling back on default understandings of either environmentalism or health care.
6. **Avoid referencing health care systems.** If discussion of the metaphor remains too general, its application can fall back on the default assumption, identified in our cultural models research, that environmental health is mostly about *health care*.¹² Communicators should therefore avoid references to the health care system, and instead *explicitly* flag the relationship between the environment and human health when applying the metaphor — for example, by comparing “the plane” to the environment.

Upstream Environments, Downstream Health

Across the metaphor research process, various iterations of an upstream/downstream Explanatory Metaphor, with its embedded “cascading effects” entailment, performed consistently well in helping members of the public think more productively about the relationship between environmental conditions and human health at the population level. It is important to note that the language of “upstream” and “downstream” is already widely used within both public health and environmental health professions. However, this language has become so familiar in the field, serving as terms of art, that the language is often taken for granted as technical terminology and, in turn, is generally not used as a tool in communications with audiences outside the profession. This research shows that this internal language holds tremendous promise for external communications with the public, and that the current practice of using the term predominantly within the profession represents a missed opportunity.

We all live “downstream” from a range of environmental factors and conditions that affect our health. By ourselves, we can’t control all the things that happen “upstream” in our environments. That is why we need people who specialize in working upstream to create positive environmental conditions for human health. These environmental health professionals understand how upstream

factors have downstream effects, and can pay attention and intervene to ensure that what flows and cascades downstream is healthy and safe for all of us.

I. Evidence from Qualitative Research

A. Positive Application and Effects

Across the OTS interviews and PT sessions, research participants successfully applied the metaphor as a way to think more expansively about the ways environmental conditions can impact human health, and about the importance of early preventive measures.

- 1. The Source Domain is Highly Familiar.** Not surprisingly, people have an easy time referencing the underlying source domain of the explanatory metaphor — the downward flow of water as rivers, streams and creeks, and the existence of cascades, rapids and waterfalls in many of those water flows.
- 2. People Easily Map from Source Domain to Target Domain.** Across qualitative research, participants were able to apply the idea of a river or creek as a way to think and talk differently about the ways in which environments can affect human health. Participants in both PT and UT sessions consistently mapped the following features of a flowing or cascading river onto the topic of environmental health.
 - Events that happen upstream flow downstream and affect downstream locations.
 - Events that happen upstream are beyond the control of downstream actors.
 - Intervening upstream can positively affect what happens downstream.

When mapped on to the topic of environmental health, these features provide people with an “easy to think” way to understand how environmental events and conditions precede (both temporally and causally) human health impacts. These features of rivers can be seen in the following quotes from participants in the PT sessions:

Participant: Our first concern is on the environmental cascades. The example that we were given was that things that happen upstream, as they bring their problems down from the river to the lake, as an example, create some problems for those of us who live around the lake.

—

Participant: Climate change is upstream, and we're getting the effects of it downstream.

—

Participant: Overall, the theme is, environmentally speaking, everything we do, in terms of human beings, can affect the environment either positively or negatively. No matter where you are in the ecosystem, whether you do something “upstream” so to speak — doesn't mean necessarily water — but anything, can affect people “downstream” and how they receive it.

In UT sessions, experts were similarly able to use the core *Upstream/Downstream* metaphor to explain how environments impact health, and were particularly attuned to the possibility of intervening upstream.

Expert 1: How your community is designed, do you have sidewalks and things like that, that's an upstream thing that will impact your body or your health.

Expert 2: And the reality of whether you can bike to school or not, or whether you can go for a safe walk with your family.

—

Expert: Upstream things happen that impact our health downstream We can do things upstream to prevent this from happening so that downstream our health is not impacted. There are people who work upstream to ensure that, downstream, these health impacts don't happen.

—

Expert: All of the different factors that surround us can influence our health. A lot of these things happen at a certain point upstream, and as we're living our lives day to day, a lot of these things, such as pollution, other environmental hazards, get into our environment, and they come down and they have an impact on our health.

- 3. The Metaphor Heightens Attention to Prevention.** The metaphor reoriented people's thinking towards the importance of *upstream prevention* to avoid *downstream health impacts*. In so doing, it provided a cognitive slot — “upstream” — that allowed people to assign agency and responsibility beyond the individual or family level, shifting thinking to the population level and the agents who operate at that level. Participants discussed the importance of having professionals and public agencies in place who can “get in front” of problems before they happen — or, as one PT participant put it, we need “keepers of the streams.”

Participant: You get into emissions — what’s pumped into the air obviously affects our health. You can take it even broader, in terms of downstream with the food chain, how beef is properly handled, or vegetables, that whole thing — *e coli*. We’re downstream obviously from things like that. There’s a lot of things that have to happen up the chain, and if it’s not handled properly, then it can negatively impact a whole lot of people.

Experts in UT sessions were also able to use the metaphor to explain how preventive environmental health work at various locations “upstream” protects people “downstream.”

Expert: Broadly, we’re looking at putting into place protections for the public, to protect them against things that are happening “upstream” from them, that are happening at a point that is out of their reach, that is unfortunately going to trickle down at some point and impact them. An example would be a power plant that is emitting toxic chemicals into the environment. Maybe you can’t go up and turn it off. But in order to prevent those plants from exposing the public to those unhealthy levels of air pollution, we have a public health workforce in place to ensure that the regulations are being enforced, to ensure that the air is clean to breathe, to ensure that the public knows when the air is unhealthy so that they can make informed decisions.

—

Expert: We can’t control everything upstream, but we can act midstream to cultivate resiliency and change outcomes.

- 4. The metaphor uses a simple system to communicate complex concepts.** The prototypical simplicity of a riverine system is one of the great advantages of this metaphor. Movement and directionality are built into the metaphor, as are causes and effects, and starts, middles and finishes. These simple aspects of the metaphor provide a powerful basis for thinking about a wide range of relationships. As one public participant said, “Everyone can imagine a flowing stream, and it flows downstream, not up.” Yet, the fact that rivers are dynamic, and often complex, systems also proved to be a productive entailment of the metaphor. Rivers flow in ways that are not always predictable, can have multiple tributaries flowing into them, and multiple channels that get carved on their descent. They have variable width, depth and speed, and waterfalls, eddies and rapids are regular features. The unpredictability of their flow and the fact that downstream impacts can be multiple

are both potentially productive entailments of the root metaphor of the flowing river.

These metaphorical entailments were tested from the start of the research process with attention to the idea of “cascades” and “cascading effects.” The research showed that this secondary entailment served to open up a conceptual space for envisioning the environment as a dynamic system that has multiple, often compounding, effects on health. The following is an example from a UT of how experts made effective use of the notion of “cascading effects” to articulate the idea that environmental factors build on one another to produce health impacts.

Expert: Consider the rivers upstream. What happens upstream impacts what happens downstream. What we’re talking about is, our environments are impacting our health downstream. There’s a cascading effect. As each ... different input into the river ends up coming and adding and cascading, there’s a downstream impact on human health.

Experts also found the metaphor useful as a way to talk about climate change and its impacts on human health — as a way to take something very macro and situate it “upstream,” and then talk about the various ways that its effects ripple and flow down to impact human health. In the process, they opened up a space for public discussion about what can be done to mitigate these effects.

B. Inoculation Against Problematic Defaults

Consistent with the deep temporal and causal entailments described above, the *Upstream Environments, Downstream Health* metaphor also helped restructure people’s thinking about *control* — that is, it structured the understanding that environmental events and conditions that exist upstream are not subject to the control of actors and populations that are downstream.

This feature derives from the underlying spatial dimension of the metaphor, which builds in distance between what happens “upstream” and effects “downstream.” This understanding of distance between environmental conditions and their effects on health is apparent in the following comment from a PT participant.

Participant: What we’re saying overall is that there are problems that we create in one area that seem to run off and affect the rest of us, or other groups, downstream.

By shifting the locus of control *upstream*, the metaphor fundamentally inoculates against the *health individualism* model and redirects people's thinking and talk towards the understanding that there are many factors that *cannot* be subject to individuals' control. In short, the metaphor provides people with a way to talk about factors that are beyond personal or family control, effectively shifting focus from an individual to a population-level perspective.

C. Communicability

In part because of the easy applicability of the source domain to the target domain, the idea that there are upstream environmental factors and conditions that can flow downstream and impact human health was easily communicated via the metaphor. In addition, the language of "upstream" and "downstream" was very sticky. When asked to repeat the metaphor at the end of one PT session, one representative participant recalled the core "upstream/downstream" language and was able to restate it in succinct and effective terms:

Moderator: What was the metaphor?

Participant: The metaphor was: Anything that happens upstream affects everyone downstream.

D. Self-Correction

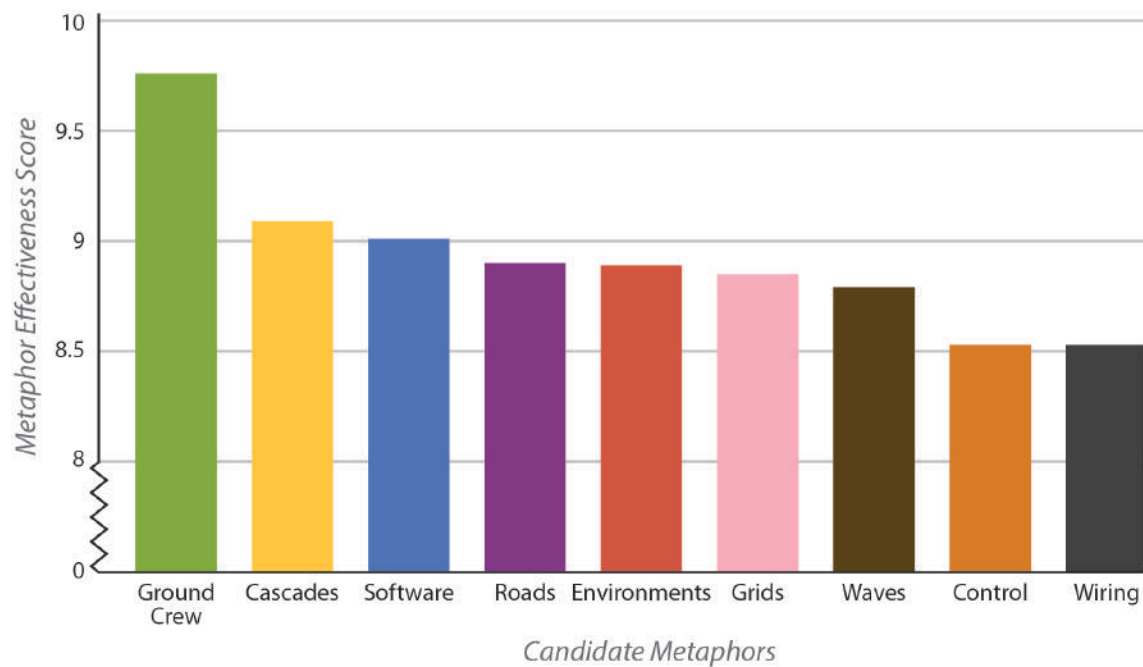
Because the core *Upstream/Downstream* metaphor was highly communicable, and transmissions of it were generally faithful to the original version of the metaphor presented, there was little opportunity to observe self-correction in PT sessions. The cases of problematic application that were observed were due less to distortions of the metaphor and more to the limited information provided along with the metaphor — an issue we address below. That said, there were cases where some of the core positive entailments of the metaphor fell away in one or more transmissions of the metaphor. In those cases, the metaphor often served to revive some of those core features. Consider, for example, the following statement from the conclusion of one PT session. Asked what entailments had fallen away during transmission of the metaphor across three generations of participants, a member of the first participant pair, who had originally been taught the metaphor by a FrameWorks researcher, responded:

Participant: The environmental workers if you will, and how important it is that we have those people in place to monitor those things that are flowing "down river" into the "lake." That's the only thing that's missing.

II. Evidence from Quantitative Research

In the quantitative experiment, the *Upstream Environments, Downstream Health* metaphor showed the second-largest effect on knowledge of environmental health issues. Furthermore, it outperformed all metaphors on one measure of people’s understanding of the need for an explicitly public role in creating healthy environmental conditions for people to live in, with large and statistically significant results on this question. While the overall metaphor effectiveness score was not significantly different ($p < 0.16$) from the control condition using conventional parameters, we brought the metaphor forward into subsequent phases of research based on its strong performance in the qualitative research, as well as the strong results in the experiment on the specific outcome of public responsibility for environmental health work. Figure 2 shows the results of this experiment.

Figure 2: Experiment Results



III. Strategies for Using the Metaphor

Based on this research, FrameWorks offers the *Upstream Environments, Downstream Health* Explanatory Metaphor as a tool to help people better understand the importance of empowering agents “upstream” who can take preventative action on behalf of protecting human health “downstream.”

As noted above, *Upstream Environments, Downstream Health* originally derives from the usage of “upstream/downstream” language in the profession of environmental health. It was recruited at the onset of this research based on its clear utility and explanatory power as a metaphor within the sector. What the subsequent research process has shown, however, is that the metaphor must be articulated in the right terms and used in the right ways for it to be effective with a public audience. This research provides critical information about how the metaphor should, and should *not*, be used. As with *Ground Crew for Environmental Health*, the right strategies need to be used for the metaphor to be successful in communications and messaging. We describe these strategies below.

1. Begin with, and consistently use, the language of “upstream” and “downstream.”

This language proved “easy to think” and sticky for the public, and thus provides the cognitive foothold that the metaphor needs to gain traction. It provides the cognitive foothold the metaphor needs to gain traction. Additional metaphorical language to dramatize consequences — for example, “cascading effects” — can be introduced secondarily, but only after the basic idea that environments lie upstream and affect health downstream has been established: “When upstream solutions are put in place — increasing car and fuel efficiency, for example — it affects the health of people downstream who enjoy better air quality and reduce their carbon footprint. These actions have cascading effects when better air quality allows more people to exercise outdoors, further enhancing their health.”

2. Point attention to, and provide examples of, upstream agents and institutions.

The upstream/downstream metaphor is useful in redirecting people’s thinking about *control* away from individuals and households, and towards more antecedent macro causes. Yet, communicators must specify for the public those professions and organizations that work “upstream” to promote health and prevent health problems. Concrete examples of upstream work are especially important, given the partial trend toward *fatalism* revealed in FrameWorks’ cultural models research. It showed that, in the absence of knowledge about effective agents, the public can conclude that environmental threats are “too big” for anyone to address.¹³ Clarifying that there are specific people and institutions capable of working upstream to deal with these threats is vital to counter this thread of fatalism.

3. Include health examples. When deploying the *Upstream Environments, Downstream Health* metaphor, communicators should provide examples of *how* upstream conditions lead to downstream effects. Beyond the *Contaminant* model, the public has a limited

understanding of how environments impact health, so it is crucial that experts “fill in the blanks” by providing clear, concrete examples of both risk management and health promotion. It is important to note that the metaphor is not the message — instead, it is a way of giving people a productive way to orient towards, and process, the message. Using the metaphor to *set up* productive thinking about examples and more detailed explanations of process is therefore an essential part of reframing this issue. In developing examples, communicators should emphasize macro-level causes and link these clearly with micro-level effects, to prevent people from defaulting to the assumption that individuals can solve environmental health problems themselves.

- 4. Avoid using polluted rivers as lead examples.** In contrast with *Ground Crew for Environmental Health*, for which extensive talk about the source domain of airports can prove highly productive and analogical mapping from source to target domains is recommended, communicators using *Upstream Environments, Downstream Health* should avoid using direct reference to contaminated rivers or waterways as their examples. A better practice is to let the strength of *Upstream/Downstream* do its work at an *implicit* level, and make *explicit* references to other types of non-water-based causal relationships between environments and human health. Our research found that, once directed toward a broader set of environmental health relationships, the public was able to apply the metaphor more figuratively to a wide range of cases and impacts.
- 5. Be sure to go beyond contaminant examples.** Without explicit effort on the part of communicators, the *Upstream/Downstream* metaphor can trigger the *Contaminant* model of environmental influences by prompting people to think about things that “get into the water.” However, communicators can widen the metaphor’s focus beyond just contaminants by carefully selecting examples that don’t allow people to default to their *Contaminant* model — such as the health effects of climate change or the built environment.

Expert: We’re talking in sort of a pollution-type model, because we’re talking about waters and lakes and rivers, but our work is actually much broader than that. We also look at things like community designs, and how “upstream,” if you design a community with lots of sidewalks and trees and flowers, people downstream are going to be more likely to want to walk in the community, maybe be a little bit healthier, maybe use the community, have more social cohesion. So it’s much more than this pollution-type model, it gets a lot broader than that.

Conclusion

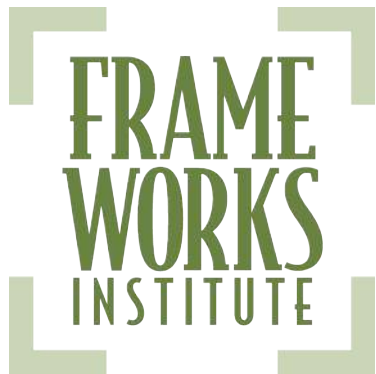
Communicators in the field of environmental health will benefit from strategic use of the two Explanatory Metaphors described in this report. Both the *Ground Crew for Environmental Health* and the *Upstream Environments, Downstream Health* metaphors have demonstrated their capacity to improve how the public understands what environmental health is, how environments and health are linked, and why a robust environmental health workforce is critical to our collective well-being. In line with the strategic recommendations provided above, communicators should use their judgment and creativity in deploying these metaphors in service of their specific communication goals and audiences.

It is important to note that both of these metaphors were shown to shift public research participants towards more collective and population-level thinking. This is an especially important framing maneuver on this issue, as it opens people up to better recognizing the value of public policy approaches to improving environmental health conditions. It also aligns with the findings from our previous research on value framing, which found that the collectivizing value of *Fairness Between Places/Opportunity for All* serves to reorient public thinking towards population-level thinking and elevate support for environmental health policies.¹⁴ This value helped people think of themselves as part of something larger, and to see solutions to problems as the responsibility of communities rather than individuals. In the process, it also contained an implicit call to collective action, premised in the implied juxtaposition between communities that have healthy environments and those that do not. Importantly, the *Fairness Across Places/Opportunity for All* value also discouraged zero-sum thinking, shifting people away from a marketplace model where one person's gain is another's loss and towards the idea that healthy environments for all is a worthy and achievable goal.

Because of the powerful ways that values serve to orient thinking around key commitments, communicators should place their value frame at the top of their messaging. Environmental health communicators should begin their messages with the value of *Fairness Across Places/Opportunity for All*, and then move into strategic use of the *Ground Crew for Environmental Health* and *Upstream Environments, Downstream Health* explanatory metaphors to fill out the specifics of how environmental health works and why a strong environmental health workforce matters. This sequence of an orienting value followed by explanatory metaphors can be followed by descriptions of the particular kinds of actions, policies and programs that would effectively respond to the commitments and

understandings just laid out. In short, effective use of the value and metaphors can set up productive communications about environmental health solutions and priorities.

Taken together, these values and explanatory metaphor frames can work to powerfully reframe environmental health as a critically important domain in our collective life as a nation, one where our core values of fairness and opportunity are at stake, and an important crew of professionals is hard at work upstream in the service of those values.



About the FrameWorks Institute

The FrameWorks Institute is an independent nonprofit organization founded in 1999 to advance science-based communications research and practice. The Institute conducts original, multi-method research to identify the communications strategies that will advance public understanding of social problems and improve public support for remedial policies. The Institute's work also includes teaching the nonprofit sector how to apply these science-based communications strategies in their work for social change. The Institute publishes its research and recommendations, as well as toolkits and other products for the nonprofit sector, at www.frameworksinstitute.org.

All rights reserved. No part of this publication may be reproduced, stored in a retrieval system, or transmitted, in any form or by any means, electronic, mechanical, photocopying, recording or otherwise, without the prior permission of FrameWorks Institute.

Please follow standard APA rules for citation, with FrameWorks Institute as publisher.

Lindland, E., Volmert, A., & Haydon, A. (2014). *We need a ground crew for environmental health working upstream: Using explanatory metaphors to improve public understanding of environmental health and its workforce*. Washington, DC: FrameWorks Institute.

Endnotes

¹ For more about Strategic Frame Analysis, see <http://www.frameworksinstitute.org/sfa.html>.

² Quinn, N., & Holland, D. (1987). Culture and cognition. In D. Holland & N. Quinn (Eds.), *Cultural models in language and thought* (pp. 3-40). Cambridge, MA: Cambridge University Press,.

³ Lindland, E., & Kendall-Taylor, N. (2011). *People, polar bears, and the potato salad: Mapping the gaps between expert and public understandings of environmental health*. Washington, DC: FrameWorks Institute.

⁴ Simon, A., Kendall-Taylor, N., & Lindland, E. (2013). *Using values to build public understanding and support for environmental health work. A FrameWorks research report*. Washington, DC: FrameWorks Institute.

⁵ Lindland, E., & Kendall-Taylor, N. (2011). *People, polar bears, and the potato salad: Mapping the gaps between expert and public understandings of environmental health*. Washington, DC: FrameWorks Institute.

⁶ Ibid.

⁷ Kendall-Taylor, N. (2010). *An empirical simplifying models research process: Theory and method*. Washington, DC: FrameWorks Institute.

⁸ Lindland, E., & Kendall-Taylor, N. (2011). *People, polar bears, and the potato salad: Mapping the gaps between expert and public understandings of environmental health*. Washington, DC: FrameWorks Institute.

⁹ The survey was administered by YouGov. For methodological details, see www.yougov.com.

¹⁰ In two cases, a trio of experts participated, while in one case, only one expert participated. In the other three sessions, two experts participated.

¹¹ Lindland, E., & Kendall-Taylor, N. (2011). *People, polar bears, and the potato salad: Mapping the gaps between expert and public understandings of environmental health*. Washington, DC: FrameWorks Institute.

¹² Ibid.

¹³ Ibid.

¹⁴ Simon, A., Kendall-Taylor, N., & Lindland, E. (2013). *Using values to build public understanding and support for environmental health work. A FrameWorks research report*. Washington, DC: FrameWorks Institute.