

Knowledge-Networks of Climate Change and Development:
How God and Technoscience Influence USAID Projects in Burkina Faso

by

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Knowledge-Networks of Climate Change and Development: How God and Technoscience

Influence USAID Projects in Burkina Faso

Thesis directed by Professor J. Terrence McCabe

Development organizations in West Africa are increasingly framing projects in terms of climate change. Scientific reports and local environmental knowledge seem to be in agreement that temperatures are increasing and rainfall is more variable. Yet this agreement belies vast epistemic differences that explain why the climate is changing, what type of development intervention is needed, who is responsible, and how projects ought to be implemented.

In this dissertation I examine the knowledges of the environment and development held by rural residents and development workers. Using Cultural Model Analysis, I reveal that there are two models of climate change in operation during the development moment. Residents of the communities Tama and Ouegoulega in central Burkina Faso hold Model 1, which states God is changing rainfall in order to punish poor social behaviors. Development agents hold Model 2, which defines climate change technoscientifically. The most significant factor that determines whether one holds Model 1 or Model 2 is the length of public education. The models of climate change, however, do not represent distinct epistemes, but are socio-historically interconnected through formal education and external government and development intervention. I also show that despite the socio-historical interconnections, the models are perpetuated through distinct social structures of acquisition.

Through semi-structured interviews, questionnaires, and participant observation, I reveal that the models of climate change are embedded within wider knowledge-networks that consist

of conceptualizations of development, capacity, and responsibility. I illustrate that within the development moment, the knowledges held by rural residents and development workers delineate a range of possible actions, or tactics, that facilitate the success of some projects while constraining others. This investigation reveals that development projects are social spaces in which residents and development agents subtly and overtly negotiate the truth-value of their knowledges. Understanding development projects in this way has implications for development policy and applications for cross-cultural collaboration.

To Moremom and Moredad

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List of Acronyms

2iE, International Institute for Water and Environmental Engineering

AL, anticipatory learning

CF, conservation farming

CILSS, Permanent Inter-State Committee for the Fight Against Desertification

CLTS, community led total sanitation

CMA, Cultural Model Analysis

CVCA, community vulnerability and capacity assessment

CVD, Village Committee for Development

EAA, Water and Sanitation for Africa

FIU, Florida International University

GHG, greenhouse gas(es)

GIS, global imaging systems

GLOWS, Global Waters for Sustainability

IK, indigenous knowledge

IPCC, International Panel on Climate Change

LEK, local ecological/environmental knowledge

LONAB, National Lottery of Burkina Faso

MUS, multiple use services

NGO, non-governmental organization

ONEA, National Office of Water and Sanitation

PA, Participatory Approach

REDD+, Reducing Emissions from Deforestation and Forest Degradation through conservation, sustainable development, and forest management

STS, Science and Technology Studies

TEK, traditional ecological knowledge

UNEP, United National Environment Program

USAID, United States Agency for International Development

USAID WA-WASH, United States Agency for international Development West Africa Water, Sanitation and Hygiene Program

USAID WAWI, United States Agency for International Development West Africa Water
Initiative

WASH, water, sanitation, and hygiene

Wi, Winrock International

List of Mooré Terms and Phrases

daba, hand held hoe

Mogho Naaba, supreme chief/emperor

naaba (pl. *nanamsé*), chief

naam, force of rule bestowed by God

nasaara-bengre, technical knowledge

nasaara-ponsgo, chemical fertilizer

nasaardamba, Western/foreign groups, white people

rog n miki, tradition, religious teaching; lit. born to find

pvgé tondo ba-ramba, to follow our fathers

sagan ka sekéte yé or *sagan ka ni wusgou yé*, the rain is not sufficient or there is not a lot of rain

tchakpalou, millet beer

teng-koori, sacred forest; lit. place of the stone

Tenga, Earth Goddess

tengsoaba (pl. *tengsoabadamba*), earth priest

wada, drought

wakata toémgo, environmental change or variability

Wendnam, God's presence/force in the world

yaa sida, it is true

zamana temdame, environmental change or variability

ziiga tuluma pasdame, increasing temperatures

List of French Terms and Phrases

animisme, animism

autopromotion, self-reliance

barrage, man-made lake

changement climatique, climate change

conseil, elected council member

douane, customs house

fête de Mouloude, celebration of Mawlid

gagner le temps, win time, to be efficient with one's time
Grande Marché, Large/Central Market
groupements des femmes, community women's groups
Il y a l'argent là-bas, There is money there
karité, Vitellaria paradoxa tree
la couche d'ozone, ozone layer
laves-mains, hand washing stations
Le Chaleur, The Heat (part of the dry season from March to May)
le loi de juillet 1900, the law of July 1900
le modernisme, modernity
les condiments, condiments, ingredients added to sauces
les Occidentaux, Westerners
lycée, secondary school, high school
moins cher, cheap, cost-effective
nééré, Parkia biglabosa tree
Nous sommes cultivateurs, We are cultivators
Nous sommes des pauvres, We are the poor
paillot, shaded structure outside of one's compound
petits frères, little brothers
pompe-en-corde, hand-crank rope pump (potable water pump)
pompe-en-vélo, bicycle-crank rope pump (garden pump)
pousse-pousse, wheelbarrow used to transport water jugs
puits-forage, well-borehole
quartiers, neighborhoods
ramassent le sable, gathering sand
responsibilisation, accountability
sensibilisations, information sessions, awareness-raising campaigns; lit. bringing sense
siège de force, seat of power
sous-développés, underdeveloped

CHAPTER ONE

INTRODUCTION

Excerpt from my field notebook, 5 December 2012

I've been participating in a climate change workshop that USAID WA-WASH has sponsored. The topic of the workshop is to teach NGO workers how to use the Climate Vulnerability and Capacity Analysis (CVCA) toolkit originally developed by CARE. The audience is composed of representatives from various NGOs including several who are official "implementing partners" of USAID WA-WASH. We've spent the week defining and teasing apart the differences between natural disasters, climate change, risk, vulnerability, and adaptation, and, most interestingly, how to gather this information through local knowledge. The point of the CVCA toolkit is to incorporate local knowledge into the scientific framework for climate change and adaptation; to build collaboration between development organization and community, and strengthen local capacity to adapt to climate change.

Today we've come to the village of Tama to work with community members and practice the CVCA methodology. We've met under an impressively large tree in the center of the community. The other NGO representatives and I sit on wooden benches and a few chairs that have been brought out for us. The community members sit on the raised roots of the tree; many women sit on small rocks or spread out pieces of cloth on the ground. We take several hours to

move through the CVCA worksheet, and it gradually becomes clear to me that the development workers and community residents do not see eye to eye.

We dutifully move through the questions of the worksheet, filling in the boxes labeled “Risk,” “Vulnerability,” and others, with community responses, but there is a level of editing in this activity. When we ask about risks that community residents perceive an older man begins talking about common illnesses in the community and how the women need a maternity clinic. One NGO representative steers him away from health and explicitly asks about the environment. “Water,” the man quickly responds, “the lack of water is always the problem.” We continue to explore this dimension of risk for the rest of the training session but I wonder if sanitation and health is part of community residents’ general definition of development and how that fits within overall community concerns and priorities.

We move on to residents’ knowledge about the lack of water and how they might identify difficult seasons or droughts. The assembled residents wait for the elder man to respond before they elaborate upon or add to his answer. No one contradicts him, and many click their tongues in agreement, when he replies that the lack of rain is “the will of God.” In the previous days’ training, we’ve been taught to ask for specific identifiers of drought such as migrating birds, insect infestations, or the conditions of previous seasons. The representatives ignore the old man’s response and don’t ask follow-up questions to explore this logic further. There’s no room for God on the worksheet.

* * *

Situated at the intersection of climate change and development, this study follows the activities of USAID WA-WASH, which stands for United States Agency for International Development

West Africa – Water, Sanitation, and Hygiene, as they design and implement several water management and agricultural projects in the communities of Tama and Ouegoulega in Burkina Faso. This study investigates how different knowledges of the environment influence individuals’ and groups’ interactions in the design and implementation of development projects.

USAID WA-WASH, while primarily concerned with water, sanitation, and hygiene (WASH) projects, positions climate change as the overarching context for their activities. This is a move that can be seen in many international development organizations due to the recent scientific reports from the Intergovernmental Panel on Climate Change (IPCC). The United Nations Environment Program’s (UNEP) IPCC is considered “the leading international body for the assessment of climate change” and is tasked with providing “the world with a clear scientific view on the current state of knowledge in climate change and its potential environmental and socio-economic impacts” (IPCC 2014). The most recent, Fifth Assessment Report from Working Group II noted that temperatures across the African continent are expected to increase more rapidly than in other parts of the earth. The report notes with “*high confidence* that heat waves and warm spell durations will increase, suggesting an increased persistence in hot days (90th percentile) by the end of the century” (Niang et al. 2014: 11 emphasis in original). The report goes on to note that for West Africa specifically temperatures will increase at a range between 3-6°C above the 20th century baseline. Precipitation models for West Africa, however, are less robust but there will likely be increasing variability in the start of yearly rains as well as an increased variability in duration and magnitude.

Yet USAID WA-WASH does not seem to strictly rely on scientific knowledge. The Year 1 Work Plan for Burkina Faso—the document submitted to USAID that details and directs all projects—for USAID WA-WASH notes, “The climate change adaptation thematic area is related

to all other themes. [USAID WA-WASH and implementing partners] will use local knowledge on climate adaptation strategies *as well as cutting edge research* to reinforce sound climate change adaptation practices and modify others based on local needs and conditions in Burkina Faso” (WA-WASH 2012d: 1, emphasis added). The CVCA toolkit of the opening vignette, for instance, is an example of the incorporation of local knowledge and cutting edge research. But not all local knowledge seems to be of the same social value.

I didn’t know it at the time, but the encounter in Tama for the CVCA training contained many themes that have become central to this study. First, and most obviously, is the clash of knowledges or the diverse means for explaining the same observable phenomena. But more than this, the encounter seems to be a subtle negotiation of what development is or ought to be. The negotiation is uneven, of course, signified in our spatial arrangements and the way women are spatially subordinated to men. Also the deference to the elderly man who became the community spokesperson suggests there is a social structure running through the negotiation. Finally, it is the development agents who edit what knowledge they receive from the community, fitting it into clearly delineated boxes.

The question then becomes: what types of local knowledge are incorporated (if at all) and what is the nature of this incorporation? In a foreword to the CVCA handbook, Robert Chambers lauds the toolkit for its “participatory values, processes and methods” (CARE 2014: i), but the process of filling out the worksheet seemed anything but participatory. The rejection of “the will of God” as an explanation for the lack of rain signals that such knowledge is inappropriate for the CVCA toolkit and for, ultimately, development. God does not immediately fit the logic of risk and adaptation and so it is rejected in favor of something more tangible, something observable. Moreover, the CVCA does not provide a methodology for how development agents

might scratch below the surface, to understand the reason for the lack of rain and the logic structure that makes “the will of God” correct to those who hold it. It is not that the CVCA toolkit demands logic. The CVCA toolkit demands a *particular type* of logic for assessing climate change and communities’ capacity to adapt.

The conflict of knowledge is not new to the climate change debate or within international development. Rodaslov Dimitrov (2010), a delegate to the United Nations Climate Change Conference in Copenhagen in 2009, has written a fascinating account of the international negotiations, both public and private, that ultimately derailed any substantive and lasting accord. Dimitrov shows that while the majority of delegates agree to the scientific framing of climate change as a problem, they nonetheless disagree about its implications: economic, political, environmental, social, etc. Likewise, Mike Hulme (2009) argues that the climate change debate glosses over how different groups conceive of science and how it works, what things are valuable, what individuals believe and fear, how risk is calculated, what governments ought to do, as well as the goals and processes of international development.

The central issue of this study is larger than the interactions between USAID WA-WASH employees and residents of Tama and Ouegoulega. This study, which treads in Hulme’s footsteps, argues that climate change and development are more than environmental, social, or even economic issues. They are, first and foremost, epistemic issues. This is the central perspective I take to Burkina Faso where international development organizations are attempting to build local capacity of vulnerable populations to mitigate and adapt to the effects of global climate change. The practical application of this research is to potentially add a small piece to the puzzle of cross-cultural collaboration

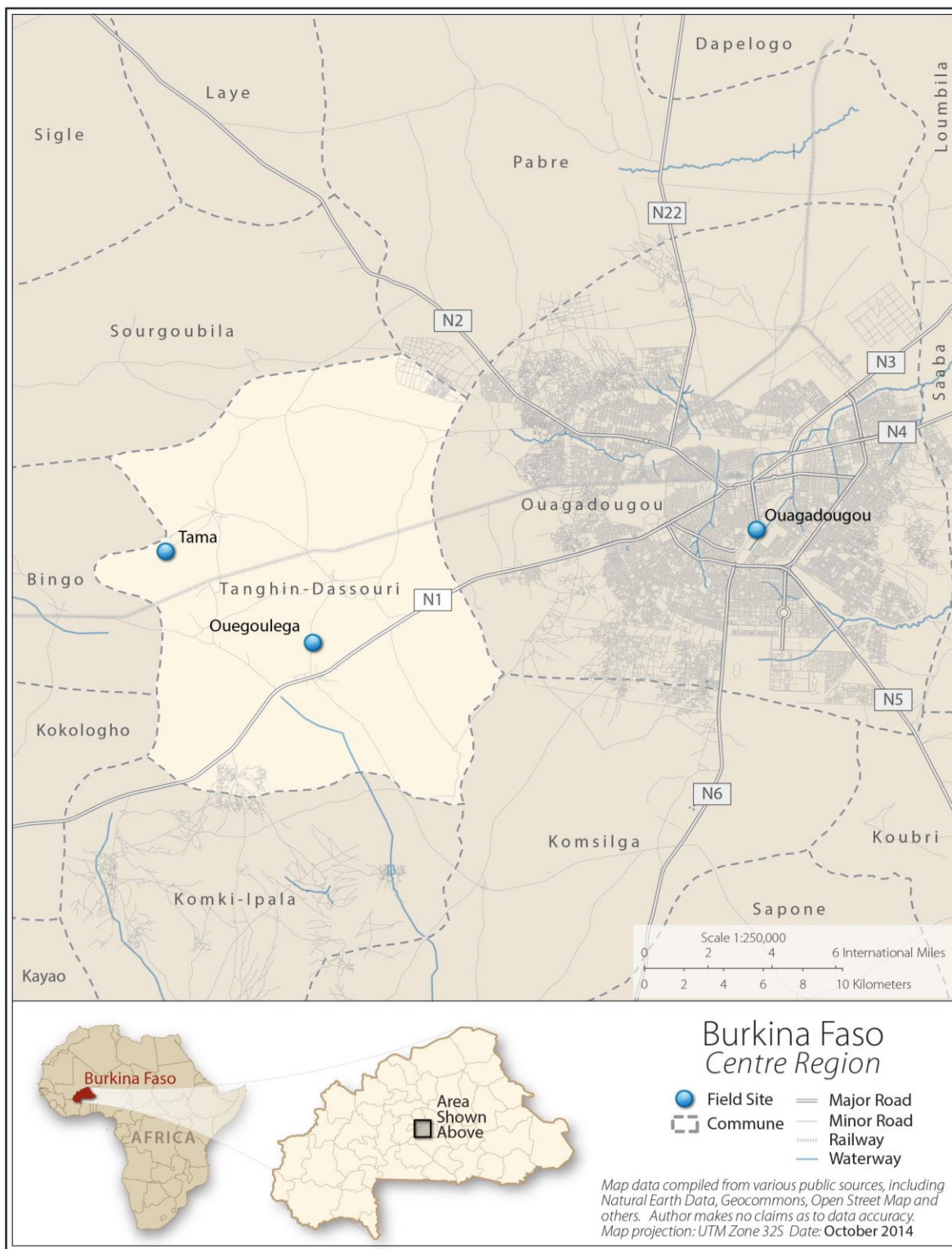
SCOPE OF THE STUDY

In this study, I explore the relationship between scientific and local knowledges. I do not contest the reality of climate change. Rather, I am interested in how climate change and development are “sociotechnical imbroglios” that are “simultaneously real, social, and narrated” (Latour 1993: 7). Moreover, I do not contest the humanitarian concerns of those who work in and for USAID WA-WASH, and rural residents’ desires for development. Instead, I see these concerns and desires as part of the sociotechnical imbroglio and I am interested in how such knowledges function socially during the development moment—during the implementation of development projects.

I analyze how knowledge travels between the three fieldsites of this study: the joint offices of USAID WA-WASH and Winrock International in Ouagadougou, and the villages of Ouegoulega and Tama in the Commune of Tanghin-Dassouri. I positioned myself between these fieldsites to see how the same knowledge functions in multiple contexts. During the year of fieldwork, I moved continuously through Ouagadougou, the capital city of Burkina Faso, and the Commune of Tanghin-Dassouri thirty kilometers outside the city. I conducted research in the joint offices of USAID WA-WASH and their implementing partner, Winrock International. Winrock, under USAID WA-WASH funds and direction, implemented several WASH and agriculture projects in the village of Ouegoulega (figure 1.1). I conducted research in these two locations, as well as the village of Tama, only ten kilometers from Ouegoulega. This community was included in the study because, not receiving any USAID WA-WASH intervention,¹ it presented the possibility of a comparative analysis in terms of the effects of development on local environmental knowledge.

¹ As I explain elsewhere, this was the case at the start of the fieldwork period. Near the end of the research, however, another USAID WA-WASH implementing partner initiated a point-of-use water purification project in Tama. This study did not closely follow that project.

Figure 1.1: Map of Fieldsites. The map shows Center Region of Burkina Faso in which the fieldsites are located. The Commune of Tanghin-Dassouri, with Tama and Ouegoulega, is highlighted.



There are three primary research questions that orient this study. First, what are the cultural models of the environment and climate change held by USAID WA-WASH employees and Tanghin-Dassouri residents, and how are they similar or different? Second, in what ways are the knowledges of the environment and climate change interconnected with one another, and with definitions of and ideals for development? Third, how do these knowledges of the environment, climate change, and development influence interpersonal and intergroup actions in the context of project implementation? In other words, I ask how different groups come to know the environment and climate change and how do they use those knowledges within the development moment.

Research Design and Methods

The initial design of this study was conceived as a comparative analysis of communities' responses to and influences from development intervention. I originally aimed to analyze how (if at all) community residents' knowledges of climate change shift with sustained development intervention. In consultation with the Regional Program Director for USAID WA-WASH, we decided that Ouegoulega could be a potential fieldsite because of the projects Winrock International had initiated at the start of the program, and because of the community's proximity to Ouagadougou and the Program office. USAID WA-WASH had already established an initial relationship with the local officials in Tama, only ten kilometers from Ouegoulega, but had, at the time, no set plans for projects in the community. Fortunately, both communities' officials, and the mayor of the Commune of Tanghin-Dassouri, agreed to my research proposal. For these reasons I included Tama and Ouegoulega within the project design upon arriving in Burkina Faso.

Of course, the research design was altered due to logistics and the reality on the ground. I had planned to use Cultural Model Analysis twice, once at the beginning of the fieldwork period and another at the end, in both communities in order to see how knowledges may or may not have shifted due to development intervention. This proved to be too ambitious for two reasons: (1) Cultural Model Analysis is a very time consuming methodology and (2) gauging shifts in community knowledge are likely better observed on the generational time scale. As a result, the comparative emphasis between communities was dropped in favor of a richer comparative analysis between the communities and development organizations. Tama remained within the research design since the shift occurred shortly after data collection began. Ultimately, the shift allowed for a richer investigation of the intricacies of knowledges and an examination of how different actors with different social positionalities use knowledge within the same context.

I made use of four primary methods to answer this study's research questions: participant observation, Cultural Model Analysis, semi-structured interviews, and questionnaires. Participant observation is, of course, the anthropologist's bread and butter. This method runs throughout this study, interwoven with the results presented in the following chapters. Participant observation strengthened the orientation of the research and directed my inquiries into climate change and development. To answer the first research question I additionally employed Cultural Model Analysis because it is an operationalized method that surveys a representative sample and extrapolates consensus. This method was invaluable for exploring the knowledges of climate change in Tama and Ouegoulega and the offices of USAID WA-WASH and Winrock International. I provide more detail about the methodological steps in Chapter Four where the data is discussed, but due to the geographical scope of the project certain modifications were made. Included within Cultural Model Analysis are extensive semi-structured interviews, which

I oriented to answer the second research question pertaining to knowledges of development. As with all fieldwork, however, interviews blended easily and effortlessly into informal conversations as my social relationships deepened. Finally, as the research evolved and the interconnections between my questions and the holism of culture branched out before me, I made use of several questionnaires to gather broad information about particular topics and from specific groups of people. In particular, I used questionnaires to verify the Cultural Model Analysis; explore community residents' and development workers' definitions of development and ideals for the future; perceptions of the environment, climate change, and development held by students at the secondary school in the Commune of Tanghin-Dassouri; a development workers' understandings of and attitudes toward water. All participant observation and interview data were analyzed using Atlas.ti qualitative analysis software.

Situated between the professionals of USAID WA-WASH and the residents of Tama and Ouegoulega, this study is situated between science and local knowledge. While it is easy to see the categorization of science and local knowledge as ontologically distinct, this study shows that they are socio-historically interconnected. The central theoretical argument of this work is that knowledges are best understood as networks with subtle and complex interconnections with the world, such that climate change and development are translated differently according to the knowledge-network one holds. I show that the interactions of such knowledge-networks facilitate in the development moment some actions while constraining others, complicating a social space for effective negotiation, collaboration, and project success.

Outline of the Study

There is a narrative to this study, guiding the reader through (more or less) a chronological representation of the experience of fieldwork. The data and analyses unfold through the chapters largely as the ethnographic encounter unfolded before me. The chapters of this study, while they might be read as stand alone pieces, necessarily build on one another, adding depth and insight to previous analyses.

In Chapter Two, I cover the theoretical and ethnographic literatures from which this study draws and to which this study speaks. Being concerned with the formation and function of knowledges of climate change and development, this study draws from and braids together a diversity of literatures ranging from the anthropology of West Africa, ecological anthropology, and climate change and development in Africa. I find that there is still significant room for anthropological scholarship on Burkina Faso, generally, and the Mossi (the primary ethnic group of this study), specifically, as well as communities' knowledges of and responses to climate change. I then explore the recent literature on climate change in more detail and suggest that while a diversity of knowledges have been well documented, what are needed are more studies that counterpoise and interrelate local knowledge and science. To investigate environmental knowledge, I draw from symbolic and political ecologies, showing there is a productive avenue of investigation in examining the political and social structural implications of knowledge. I place my study here, and show that there is room to examine how individuals use knowledge to affect social stratification and solidarity. I close Chapter Two with a survey of the new ethnographies of development, which take the perspective that employees have sincere motivations for working in development, but are nonetheless constrained by institutions and

budgets. I add to this by suggesting that knowledge can also function as a constraint that must be considered, limiting possible actions within development.

Chapter Three describes the three fieldsites of this study: the joint offices of USAID WA-WASH and Winrock International in the city of Ouagadougou, and the villages of Tama and Ouegoulega. I begin by sketching the socio-historical context for these sites through oral histories and French colonial history. I show that the twin goals of the colonial project were economic and epistemic—extracting natural and financial resources for the capitalist economy, and producing more French-like colonial subjects through French education. USAID WA-WASH and Winrock offices currently benefit from the repercussions of this project and which construct a seemingly dichotomous relationship with the rural communities of Tama and Ouegoulega. I also describe the main projects that USAID WA-WASH has implemented in Ouegoulega: hand-washing stations, potable water pumps, improved garden techniques and technologies, and Conservation Farming.

Residents, moreover, are acutely aware of their political economic relationship to Ouagadougou and to development organizations. Ouegoulega residents, situated near the paved road that leads directly to Ouagadougou are able to cart garden produce to the daily market, some residents have access to electricity branched from the main town of the commune, and many youths seek day labor in the city. Ouegoulega has also profited from frequent attention from external development organizations, which may be the reason that the community's access to groundwater is far more reliable than in Tama. Further into the bush, Tama is a smaller community and somewhat isolated. Residents do not garden to the extent that Ouegoulega residents do and consider this unfortunate. For both communities, however, Ouagadougou orients their gaze as a site of economic potential and development, the site where children go

once they are publically educated and from where the government and organizations come with projects.

Chapter Four addresses the first research question of this study by presenting the cultural models of the environment and climate change held by both USAID WA-WASH employees and Tama and Ouegoulega residents. Using Cultural Model Analysis I show that community residents who have not attended formal, public education beyond the premier cycle hold to one model of climate change, which I call Model 1. This model states that God is changing the climate and rainfall in order to punish global social behaviors that go against religious teachings and tradition. Changing rainfall is at the center of these shifts, which causes cascading effects such as increased temperature, and increased wind and dust. However, there is no consensus if these changes will continue in the future.

Those community residents who attend the secondary cycle of public education as well as the employees of USAID WA-WASH hold to another model of climate change. This second model, Model 2, states that increasing greenhouse gas emissions through deforestation and industry causes climate change. Increased greenhouse gases in the atmosphere trap solar radiation, increasing global temperatures, and causing variability in natural processes such as rainfall. Based in technoscientific information that prioritizes materialist data, this model states that changes will continue to worsen in the future.

Chapter Five addresses the second research question: how are the knowledges of the environment and climate change interconnected with one another and ideas of development. To answer this question I draw from the valuable vocabulary of Science and Technology Studies (STS). I introduce the concept of the knowledge-network to show how the models of the environment are each embedded within wider networks of ideas, values, and objects. I draw on

the concept of translation to show how new information, experiences, and objects are brought into an existing knowledge-network. I also show in Chapter Five, through a socio-historical analysis, that the two knowledge-networks in which Model 1 and Model 2 are embedded are interconnected with one another, yet each model is acquired through fundamentally different social structures. Here I use the term “epistemic threshold” to identify those individuals or groups who position themselves as possessors of particular knowledges. The processes of knowledge acquisition, I show, are such that epistemic thresholds condition hierarchical social structures that mark the entrance to particular epistemic communities, such that certain knowledges are co-produced with certain social structures that are defined by the number and arrangement of epistemic thresholds.

I continue to address the second research question in Chapter Six by discussing the definitions of development to which each group holds. I argue that the models of the environment and climate change correlate with specific definitions of development such that knowledges of the environment and definitions of development might be seen to be in co-production. For those who hold to Model 1 in which rainfall is the will of God and, therefore, uncertain, development is translated as more reliable access to groundwater resources. Groundwater is, however, only a means to increasing personal and household garden production and, thus, capital accumulation. Here, capital accumulation is a buffer against continued climate change as well as the means for inserting oneself into the market economy. Those who hold to Model 2, however, define development technoscientifically as the insertion of “appropriate technologies” and “appropriate knowledge” into the community. Development in this definition is the process of building local capacity wherein the organization delivers technology and technoscientific information that the community uses to generate development. Both definitions

of development, however, point to a larger argument that epistemics constitute an additional constraint on potential actions.

This argument is more fully elaborated in Chapter Seven, which also addresses the final research question: how do the knowledges of the environment, of climate change, of development influence interpersonal and intergroup actions in the development moment? This chapter illustrates the links between types of knowledge and types of action. I argue that the content of the knowledge-networks as well as concomitant social structures of acquisition of community residents and development employees open limited spaces for negotiating their respective positionalities. Community residents, eager to attain the potable water and garden pumps as a means of increasing capital accumulation, acquiesce to, but use hidden transcripts against, certain project details. Development employees, however, confronted with the popularity of projects, translate community actions as signs of acceptance of the technoscientific translations of the projects. I call this unarticulated correlation between the knowledge-networks dumb luck development.

The final chapter, Chapter Eight, offers concluding remarks to this study as well as applications. Being situated at the intersection of climate change and development, as well as being offered a privileged seat to the inner workings of development project design and implementation, I humbly propose development policy recommendations. I outline in Chapter Eight a toolkit developed while in the field and delivered to USAID WA-WASH to better facilitate cross-cultural collaboration. Drawing from the development and education literatures, I call this toolkit Collateral Learning, and operationalize steps development employees can follow to circumvent the hierarchical relationship of the development moment and adapt technoscientific knowledge to local knowledge-networks.

A Note on “Climate Change”

Speaking about climate change, particularly in Tama and Ouegoulega, initially proved a bit difficult. In the USAID WA-WASH office, where people speak in French, we used *le changement climatique*. I could also use this term with some French speaking men and women in the Commune of Tanghin-Dassouri but most residents preferred to speak in Mooré. Unlike “development,” which has been appropriated into Mooré directly from the French, there is not a specific term for “climate change,” nor is there a term specifically used to refer to nature, the environment, or the climate (which immediately speaks to an epistemic difference between French and Mooré). Initially, during my introductions to the community, I used *ziiga témdame*, which translates to “changes in the earth/land/region”. But even this is an approximation because *ziiga* is used to refer to the community, the landscape, the weather, and in some contexts, time. Though using this term initially was fortunate since residents provided broad details about how life, generally, has changed.

The lack of a Mooré term for climate change, however, does not signify a lack of knowledge. Some scholarship has equated the lack of local language terms for climate change with a lack of consciousness of climate change as a natural phenomenon (Wolf and Moser 2011). This logic reifies the Western conceptualization of climate change, codified as it is linguistically, and only tells us that people lack the terms for a scientific comprehension of the phenomenon. The challenge for the anthropologist is to dig beneath the surface to explore what terms are used and how they are interconnected within a constellation of environmental observations and the underlying logic structure through which it is all interpreted and made meaningful.

Conversations about climate change, therefore, were necessarily organic, using specific terms to refer to specific phenomena. My research assistants, Amadou Nikiema in Tama and Fidele Lourgo in Ouegoulega, and I, largely used *wakata toémgo* to refer to environmental change or variability. This phrase is an approximation: *wakat* or *wakata* translates to “this moment” and *toémgo* is the verb, to change. The majority of people spoke of specific phenomena: the insufficiency of rain [*sagan ka sekéte yé* or *sagan ka ni wusgou yé*], drought [*wada*], and increasing temperatures [*ziiga tuluma pasdame*]. We often introduced the topic of the research through *wakata toémgo*, but used these specific phrases in subsequent questions to explore residents underlying knowledges. In the following chapters, therefore, I use “climate change” and “climate variability” interchangeably when discussing residents’ environmental observations, but “climate change” when discussing development workers’ observations. While the two terms have different meanings within the scientific literature, the technique I employ is meant to accurately reflect how individuals speak about changing environmental phenomena through the different knowledge-networks in which they are understood.

A Personal Note

I came to conduct research on USAID WA-WASH activities in Burkina Faso largely by accident. My original project was written to cover the water management activities of a small, American NGO in Mali. However, the Northern Mali Conflict, which erupted in 2012, quickly ended those plans even though the proposal had already been accepted for funding by the United States Department of State Fulbright Student Grant Award. Appreciative of my intent, the Fulbright office allowed me to switch the project to Burkina Faso, which I had last visited in 2005 and which had, since the Northern Mali Conflict, become one of the more stable countries in the

region. My revised application exchanged hands from the Public Affairs Office to the office of USAID/Burkina Faso at the US Embassy in Ouagadougou, eventually being passed to the Regional Director of USAID WA-WASH who welcomed my project.

I was and continue to be immensely grateful to each of the individuals in this chain for seeing the merit in my research, but it would be incorrect to say that I arrived in Burkina Faso in November 2013 without concerns. The first several weeks of my time in Burkina Faso were spent worrying over my association with USAID WA-WASH and how that might influence my research and data collection. The first concern was with my entree into the communities of Tama and Ouegoulega and being seen as a development worker. This, of course, was the case for the first few weeks of research until I spent enough time in the local markets, visiting with households, and occasionally spending the night, signaling to residents that I was unlike development workers (though still fairly strange). By the end of the fieldwork period, residents were eager to share their stories with me. Talk became easier and the data became richer. In fact, many residents expressed surprise that someone, finally, was listening to their concerns.

My second concern was with the close working relationship with USAID WA-WASH. I had generously been given a desk in the shared office with Gabriel, the Climate Change Coordinator, the GIS/Food Security Coordinator, and the occasional student intern. The Regional Director, when I arrived, asked if I would be willing to help with some of the operations from time to time such as proofreading English documents, conducting a professional development session, as well as publishing a scholarship announcement and helping to select graduate students from within the program region to conduct research with USAID WA-WASH. The Regional Director never asked me to engage in the design or implementation of projects and was always sensitive to my personal research objectives. Only one condition was placed on my

research with USAID WA-WASH: that I not discuss management issues. I have honored this request, which does not significantly alter the presentation of data.

One might argue that living in the Commune of Tanghin-Dassouri, in either Tama or Ouegoulega, would have solved the second concern, but I didn't see this as a viable option. First, I wanted to take advantage of the generous access to USAID WA-WASH, which is rare for anthropologists. Second and related to the first, is that I wanted to be able to juxtapose USAID WA-WASH with the communities as the development projects unfolded. Third, and certainly most selfishly, I wanted the luxury of running water and electricity in order to remain as productive as possible. Having weathered the oppressive heat of the dry season in northern Togo without reliable water and electricity while a Peace Corps Volunteer, I knew that both luxuries would facilitate my research.

Instead, I lived on the edge of Ouagadougou and occasionally spent the night in the villages as my social relationships deepened. In the end, I do not believe that my association with USAID WA-WASH compromised my research. Nor do I believe that the data on Tama and Ouegoulega lacks depth because I did not live there. The amount of research conducted—the census, the questionnaires, the interviews, and the countless hours of participant observation—and not least of all, the lasting friendships maintained with long distance phone calls, can attest to that. Of course, particular aspects might be enriched had my situation been different, but I trust that the following chapters of this study will provide detailed answers to the research questions.

CHAPTER TWO

SITUATING KNOWLEDGE

INTRODUCTION

This study braids together diverse scholarship to answer the three research questions that have guided data collection. As mentioned in the introductory chapter these questions are: (1) What are the knowledges of the environment and climate change held by development workers and community residents; how are they similar or different? (2) How are the knowledges interconnected with one another and broader concepts of development? (3) How do the groups, and individuals within them, use these various knowledges within the development context?

Because this research is situated in Burkina Faso, West Africa, I begin, in the section “The Ethnographic Context,” by providing a brief overview of the Francophone (French) and Anglophone (British and America) scholarship that establishes two broad research trajectories. The French have been particularly interested in understanding the symbolic, almost epistemic, dimensions of culture while the British and Americans have tended to focus on social structure and political economy. Contemporary research blurs these delineations and this study follows suit by finding a fruitful avenue in combining elements of both trajectories. I then discuss the small body of scholarship that has focused on Burkina Faso and the Mossi ethnic group, finding

that there is still significant room for more scholarship, but, in particular, scholarship that examines knowledge and climate change.

The following section, “Apprehending Climate Change,” provides an orientation to the first research question. The social science of climate change is a small but growing body of literature that has primarily focused on indigenous communities’ observations and knowledges. I place my study at this intersection, adding to others who have shown that it is important to understand both groups and their knowledges simultaneously. I place the review of recent social science literature on climate change within the wider literatures of symbolic ecology and political ecology anthropology in order to show that there is room for studies that take knowledge as a mediating agent with the world as well as a contested domain of power.

By asking how knowledges of community residents and development agents are interconnected in the second research question, prompts a reading of the Science and Technology Studies (STS) and epistemic communities literature. The former is valuable for theorizing knowledge and the relationships between different types of knowledge such as local environmental knowledge and science. The latter is valuable for the same reason as well as how “experts” are constructed. Here I follow those who have promoted the imagery of the network to understand knowledge but endeavor to read the anthropology of West Africa into the literature by considering how knowledge as network might influence and be influenced by social structures.

The final section, “Apprehending Development,” returns to the second research question—how knowledges of the environment are interconnected with definitions of development. In this section I thoroughly situate this study within the new ethnographies of development that consider the agency of development workers and community residents within

constraining institutional and financial structures of development. I add to this by considering knowledge as an additional variable that constrains and facilitates particular actions. I end by briefly surveying the anthropology of development in West Africa, showing that agriculture and water have been prominent themes but that past approaches have largely emphasized political economic dimensions.

THE ETHNOGRAPHIC CONTEXT

This section sets the ethnographic stage on which I place the current study. I begin by briefly surveying the literatures from Francophone and Anglophone scholarship in West Africa, noting that, during the “classical period” (Hart 1985, Moore 1994), the French have been concerned with the symbolic dimension of culture while the British and Americans have concentrated on social structure and political economy. Rather than siding with one or the other, I note the boundary blurring that has evolved (Geertz 1980) and find a fruitful scholarly direction by combining elements of each. I then move on to note the small body of literature that has looked at Burkina Faso and the Mossi ethnic group, noting that there is ample room for ethnographic work in this region, but, more specifically, ethnographies of knowledge.

The French: Symbols and Solidarity

Two of the most important germs of investigation for the present study come from the French school of anthropology of West Africa and its foundations in the Durkheimian tradition. This study takes from French scholarship Durkehim’s fundamental analysis that religious thought is eminently symbolic and that such abstract thought may lay the blueprint for social behaviors.

The second important germ taken from French scholarship follows from the first: the Durkheimian preoccupation with the construction of social solidarity through symbolic thought.

The most well known French anthropologists to explore religion as a symbolic mediation for social action have done so in Mali. For instance, Marcel Griaule's *Conversations with Ogotemmêli* (1965), as well as his work with his protégé, Germaine Dieterlen, (e.g. Griaule and Dieterlen 1986 [1965]), argue that cosmological thought of the Dogon is a blueprint for social behaviors—that knowledge precedes action. Yet they also argue that a person does not need to be explicitly aware of the causal connection of knowledge and behavior. Their studies reveal that the rules for action can exist under the surface, as it were. As such, Griaule saw knowledge as a mechanism for maintaining social solidarity. This draws from Durkheim (2001) who argued that knowledge of the sacred is collective knowledge, being founded in shared sensory experience and social life. While Griaule argues that there may be individuals with deeper understandings and more specialized knowledge of ritual and cosmological symbols, the shared acceptance of those symbols enhances and maintains social solidarity. Durkheim saw religious worship as the symbolic expression and reaffirmation of social structure, drawing the community in on itself, to know itself, and to perpetuate itself (Durkheim 2001, see also Goody 1972: for an example of British anthropology in West Africa following Durkheim).

Today, French anthropologists have broadened the topical interests but maintain that knowledge can be a shared social experience. For instance, Andras Zempleni (1982) argues that disease and illness in Côte d'Ivoire and Senegal are understood as fundamentally social conditions with nested layers of significance corresponding to the social structure—what Zempleni calls a "*pluralisme profond*." Similarly, Marc Augé (1986) makes use of Lévy-Bruhl's concept of "mystical participation" in order to show that West African nosology (the

classification of disease) is ultimately a social process that includes the realm of ancestors and spirits. Others have shown how ritualized healing practices draw upon the social structure to reaffirm solidarity (Corin, Bibeau, and Uchôa 1993, De Sardan 1994). In all of these works, the knowledge of illness and one's health are considered to be dimensions reflecting social solidarity (or lack thereof).²

In addition to symbols and solidarity, many French scholars of West Africa have also incorporated political economic and post-structuralist approaches. Claude Meillassoux (1975) is an early example of Marxist thought applied to West Africa. Like many Marxist scholars, Meillassoux is concerned with social stratification vis-à-vis the monopolization of resources, a theme shared with British and American scholars of West Africa.

The British and Americans: Hierarchy and Stratification

British and American anthropologists of West Africa depart from the French by focusing on the hierarchical structures that maintain and perpetuate order in society at large.³ Meyer Fortes, an intellectual heir to Malinowski, shows that among the Tallensi, kinship is the structural basis for interlocking social institutions that function on multiple scales (1945, 1948, see also Talbot 1932). Yet it is important to note that hierarchy does not necessarily create antagonism. Melville Herskovits (1938) argues that even while authority structures maintained order in the West African kingdom of Dahomey, agricultural labor was communal, enforced by priests and

² These works likewise compliment Germaine Dieterlen's and Francoise Héritier's studies that reveal the individual in West Africa to be a node in an interconnected social network that extends beyond the here-now; a point that is important for later anthropologists of West Africa (Dieterlen 1971, Héritier 1981).

³ Although the United States never technically colonized any region in West Africa (Liberia being a unique case) I have lumped American and British scholarship together because they both benefited from British colonization and followed very similar theoretical and thematic traditions.

diviners that perpetuated the complementarity of hierarchy and community. The tension of hierarchy and community is a common theme in early structuralist and structural-functionalist approaches throughout Africa (e.g. Evans-Pritchard 1969, 1976, Gluckman 2008, 2009), and it is a pertinent observation for this study.

More contemporary British and American anthropologists of West Africa also revealed hierarchy-community tension. Mary Douglas (1963), for instance, resembles Germain Dieterlene's works by illustrating how religion and myth of the Lele maintain both hierarchy and community in the social structure. Indeed, many British and American anthropologists have examined the role religion and ritual play in the formation of community, but have done so largely through the lens of the historical repercussions of colonialism and contemporary political economy (e.g. Goody 1972, Fernandez 1982, Stoller 1995, Stoller and Olkes 1989).

The impact of colonialism is an important theme in the literature on West Africa. Meyer Fortes (1945, 1948) and Melville Herskovits (1938) are early examples of scholars who incorporated the impacts of colonialism into their work. More recent scholars have continued this trend by examining the diverse ramifications of colonialism on such topics as Muslim identity (Alidou 2005, Kaba 2000), the fluidity of ethnicity (Alidou 2005, Hart 1985, Jike 2004), and constructions of gender (Oyěwùmí 2005). Others have shown how the very construction of personhood is socio-historically contingent with unique expressions in West Africa (Jackson and Karp 1990, Riesman 1990, Gottlieb 1992, Geschiere 2009). Colonialism has also been shown to be absolutely essential to understanding contemporary war (Moran 2006), violence (Jike 2004, Smith 2007, Bay and Donald 2006), and peace (Reticker 2008). For this study, however, I am instructed by those who have shown how colonialism has impacted education and the educational systems of West African nations (Piot 1999, 2010, Smith 2007). Even these works

emphasize political economy and identify formation rather than on the types of knowledge learned and how these may or may not engage knowledges outside of formal public education.

Political economy, however, has been a significant topic in Anglophone scholarship. Polly Hill's (1970) work is seminal in the region, illustrating that different communities express and calculate political economic concerns as situation-specific and contextual, and are not inherently un-capitalistic. Others have examined the political economy of patron-clientism in Nigeria (Smith 2007), and shifting systems of land tenure in northern Nigeria (Pierce 2005). Many scholars note how neoliberalism both destabilizes government sovereignty and facilitates the formation of new types of communities along the coast, such as Côte d'Ivoire, Ghana, Togo, and Nigeria (Chalfin 2010, Piot 2010, Smith 2007). Combining political economy with a treatment of colonialism, some have illustrated the interconnections between neoliberalism, the promise of development, and the coalescing of religious communities (Meyer 1999, 2004, Meyer and Pels 2003, Piot 1999).

This study is unique in that it attempts to combine the French school in West Africa as well as the British and American school. This study points to an overlooked area of study that might investigate how abstract thought or knowledge—as social mediator—not only constructs solidarity and hierarchy, but does so through the social structures that are contingent upon its acquisition and dissemination. In short, combining Francophone and Anglophone scholarship produces a unique question of how knowledge influences and is influenced by social structure.

Burkina Faso and the Mossi

Similar scholarly threads from British and American anthropology are found in the literature on Burkina Faso and the Mossi. I combine these two bodies of scholarship for parsimony, but also

because Burkina Faso is roughly contiguous with the distribution of the Mossi—a rarity in Sub-Saharan Africa. I leave for Chapter Three a more thorough treatment of the history of Burkina Faso and the Mossi, here I note that scholarship has either conformed to standards of description from the classical period or tended to focused on political economy (with an emphasis on economy).

There is a limited body of scholarship on Burkina Faso and the Mossi. Early European accounts of the region that is now Burkina Faso come from French missionaries and military expeditions who aimed to describe the appearances and social structures of the local Djula, Gourmantché, Peuhl, and, in particular, Mossi populations (Mangin 1914, Richard-Molard 1949). However, Elliot Skinner, an American anthropologist, is one of the first to conduct systematic fieldwork among the Mossi, covering such topics as religious conversion (1958), wife exchange (1960b), politics (1963, 1976), as well as history and social structure (1960a, 1974, 1989), but he does so—as one might expect—from a strictly political economic perspective. Other scholars of Burkina Faso and the Mossi do not contradict or challenge Skinner’s conclusions; for all intents and purposes, his scholarship has become the canon for the region and provided a starting point for others to examine history and politics (Englebert 1998, Beucher 2014, Miller and Skinner 1968).⁴ More contemporary scholarship has continued the emphasis on political economy in relation to livelihood strategies such as animal husbandry (Kiema et al. 2012), gender and land use (Gray and Kevane 1999, Kevane and Gray 2010, Friedberg 2001), as well as risk, vulnerability, and adaptation in terms of changing environmental conditions (Carter 1997, Cissé et al. 2010). The last group of scholars is indicative of a larger trend in West African scholarship to examine changing environmental conditions. However the majority of these works has

⁴ Perhaps the biggest debate within the literature on Burkina Faso seems to be whether former president Thomas Sankara, who enacted strict measures during the Cold War to promote self-reliance and sustainability, should be seen as a hero or villain. Elliot Skinner takes a tempered stance in this debate.

emphasized economics, meaning there is ample room for exploring knowledge and the epistemic dimension of culture, and the relation to climate change.

APPREHENDING CLIMATE CHANGE

The first research question asks what are the different knowledges of climate change held by development workers and community residents. In this section I cover the small body of literature on climate change. After surveying the climate change literature I broaden the literary scope, placing the literature within a wider field of ecological anthropology and STS in order to understand how scholars have approached local knowledges and their relationship to science. This leads to a short discussion of “expert” and epistemic communities. Here, I endeavor to show that there is room for a comparative study that examines the interrelations of climate science and local climate knowledge.

Review of Recent Climate Change Literature

The social science literature on climate change is still a budding field. While anthropologists and geographers have, for some time, examined locals’ understandings of the environment, only recently has climate change as such become the focus of such inquiry. Roncoli, Crane, and Orlove (2009) suggest that the recent anthropological focus on climate change is due to the irrevocable impact of its effects on traditional fieldsites, the concern to include the human dimension in scientific analyses, and the ability of anthropologists to speak to interdisciplinary audiences. Indeed, this last characteristic is significant in the literature, for many scholars who situate their work within climate change include applied dimensions of their analyses in order to explain how findings can and should be incorporated into governmental and developmental

strategies of mitigation and adaptation. I follow their lead, but depart from the mainstream by focusing on local knowledge of climate change in relation to scientific knowledge. This is a necessary conversation if there is to be an applied component.

The introductory chapter made reference to the scientific view of climate change in West Africa. The data compiled in IPCC reports and that guide international discourse on climate change adheres to a social valuation of science as rational and objective, wherein data that is easily quantified is prioritized. Tim Forsyth (2003) uses the term “orthodox science” to refer to this view of science, Thomas Kuhn (1996) uses “normal science,” and Alfred North Whitehead (1967) uses the term “materialist science.” I use Donna Haraway’s “technoscience” (1997) to refer to the same view but I note that it is more specific by referring to the fetishization of materiality and the assumed end-goal of scientific investigation: technology.

The recent literature on climate change provides rich analyses of local environmental perceptions to dialogue with technoscientific reports. Recognizing that climate change requires a post-normal perspective (Funtowicz and Ravetz 2003, Saloranta 2001) that incorporates uncertainty, value, and perspectives from all stakeholders, social scientists argue that technoscientific estimations are flat without an adequate understanding of changes as perceived by people, and how such observations are acted upon. For instance, a team working in Burkina Faso makes note of the environmental signals that denote a bountiful rainy season or coming drought (CILSS 2006), yet these observations are simply listed and not contextualized within a wider framework of knowledge. Gray and Morant (2003), also working in Burkina Faso, have attempted to reconcile local observations and scientific observations of soil fertility by exploring how the knowledges differ and why. Fairhead and Scoones (2005), working in Guinea, have argued similarly in order to show the underlying similarities in knowledge content.

Many scholars situate their research between observation and action, highlighting the importance of the “materialist” and “ideational” in climate change research (Jennings 2002). Herman-Mercer et al. (2011), for instance, link native Alaskan observations of climate change with local adaptive strategies. Likewise, Neeraj Vedwan (2006) convincingly demonstrates the power of a “nested model” of climate change observations from northern India that are interlinked with livelihood practices and cultural notions of risk. Indeed, interlinking environmental observations with adaptive strategies and mitigation techniques is a popular project among those researching indigenous knowledge of climate change.

A fruitful approach to linking knowledge and action is illustrated by those who show that adaptive strategies cannot be understood outside of the socio-political contexts in which they arise. Nyong et al. (2007), using scientific evidence for the Sahel as a nonequilibrium ecosystem, argue that local populations have developed cultural and social mitigation and adaptation strategies that are largely devalued and ignored by governments and development organizations. Sperenza et al. (2010), working in Kenya, reveal that while knowledge of drought is salient for local farmers, adaptive strategies are limited due to political economic conditions. Others have argued that increasing globalization (Egeru 2012) and formal education (Crona et al. 2013) limit the social value of local knowledge and, thus, the available adaptive strategies for many rural communities. These works are valuable for situating knowledges within wider social and political economic fields. I situate this study with these scholars by showing how, first, environmental observations are linked with wider systems of knowledge, which themselves are linked with wider fields of political economy. However, I depart from these scholars by noting not only the political economic context of their environment observations, but also their observations of the political economic context itself (i.e. knowledge of development).

There are two works I draw from for inspiration in this pursuit. Anthony Giddens (2011) has explored the logics of climate change espoused by special interest groups and politicians, finding that many political positions on climate change do not coherently match with proposed solutions. Giddens's work reminds us that climate change, for many people, is primarily a political rather than environmental matter. Mike Hulme explores this concept further in his work *Why We Disagree about Climate Change* (2009), which shows that while individuals and groups may speak of climate change, science, adaptation, even economics, politics, and education, these terms conceal a plethora of epistemic variability. Hulme argues that what these terms mean are unique to particular individuals and particular groups at particular times, such that an open dialogue of climate change is actually a dialogue about very fundamental values about how the world works and ought to work. Taken together, Giddens and Hulme caution that claims to widespread, even global communities based on shared knowledge (for example Crona et al. 2013) are likely to gloss over invaluable, specific dimensions of knowledge. It is the work of this study to show that such dimensions include the interconnections of environmental knowledge with other cultural dimensions, as well as the use of different environmental knowledges in different contexts. To explore the role of environmental knowledge in society more thoroughly I turn to the literatures of ecological anthropology and STS.

Ecological Anthropology: Symbolic and Political

My purpose in this section is to outline the field of ecological anthropology⁵ and highlight the productive avenues I see in the combination of symbolic ecology and political ecology. Such a

⁵ Ecological anthropology is concerned with “the relations among the population dynamics, social organization and culture of human populations and the environments in which they live” (Orlove 1980). Early scholars such as Lewis Henry Morgan were interested in the environment insofar as it provided the

combination highlights the epistemic dimension of humans' interactions with natural resources while not overlooking the power dynamics inherently at play. In this section I do not cover behavioral ecology, which limits the role of culture and presumes a universal logic of rational behavior (Cronk 1991, 1995).⁶ Nor do I cover the sub-branches of the ecosystems approach, or complex adaptive systems theory (see for example Holland 1992). However, I here make an aside that the nonequilibrium approach (Biersack 1999, McCabe 2004, Scoones 1999) is an important observation, for the West Africa Sahel, including the Sudano-Sahelian zone of Burkina Faso. This ecosystem is now considered to be a nonequilibrium system, punctuated by periods of extreme drought as well as extreme rainfall that vary in both the short- and long-term (Adams and Mortimore 1997, Breman and Cissé 1977, Olsson 2008). These periods, moreover, are non-cyclical making scientific projections of climate change in the region very difficult (see Niang et al. 2014: 11). The effects of this variability can be particularly devastating to rural agriculturalists and pastoralists (Ellis and Swift 1988, Mortimore and Turner 2005, Sinclair and Fryxell 1985, Turner 1993).

The insights from nonequilibrium ecology ask us to reexamine how rural populations are able to cope with such variability and consequent insecurity. Scholarship shows that communities within the Sahel and in other nonequilibrium ecosystems are not passive victims. Rather, communities diversify subsistence, economic, and social resources in order to rely on

primary constraint to cultural evolution (Moore 2004). Julian Steward exploded this static line of investigation by arguing that culture is essentially a tool humans use to reduce their dependency on their environments. The theory of cultural ecology was made popular by his student, Robert Netting, who worked in northern Nigeria (see, for example, Netting 1968, 1986). But this once dominant strain of scholarship fractured with the development of the science of ecology and the influence of Marxist thought into the four branches of today (McGee and Warms 2008).

⁶ One work of behavioral ecology is Karen Kramer's *Maya Children* (2005), which concludes that children in Mayan communities constitute a net cost to the family even as they play crucial economic and reproductive roles to underwrite the cost of large families.

extensive, multi-scalar, and multifaceted support networks in times of need (Adams and Mortimore 1997, Birkenholtz 2009, Foley et al. 2003, Mortimore 1989, Rain 1999, Turner 1999b). This seems to suggest that perceptions of environmental conditions influence interpersonal relationships and, thus, social organization, but the ecosystems approach does not directly address this.

Symbolic ecology offers one potential means for exploring the effect of indigenous knowledge on interpersonal relationships and the culture-nature relationship. The primary focus of symbolic ecology is the examination of how the environment is conceived and culturally transmitted within and between groups (Descola 1996a, Hviding 1996). Symbolic ecologists ask us to consider the environment as a web of symbolic relations—placeholders for intimate and complex knowledges about the world that are never non-neutral but structural in nature.

As such, for many symbolic ecologists, indigenous knowledge of the environment is situated knowledge. While this perspective has been critiqued as a reification of indigenous knowledge (and the divide with science) (Agrawal 1995), the early works of Phillipe Descola (Descola and Pálsson 1996, Descola 1996b) and, to a degree, Julie Cruikshank (2001, 2005) are nonetheless invaluable. Both scholars reveal how iconic landscapes, such as the Amazon rainforest and Arctic glaciers, are interwoven within a thick tapestry of integrated symbolic meaning. Descola and Cruikshank appreciate that meaning is multidirectional, for the landscape is never static and is more properly understood as agential. Any meaning, therefore, is not constructed by individuals, but co-constructed among humans and non-humans (Ingold 1993, 2000).

Here the main theoretical difference between the early French school and contemporary symbolic ecologists comes into relief: the French school takes knowledge as a symbolic

mediating agent with the social, yet symbolic ecologists take knowledge to be situated manifestations of specific realities. The difference is between a symbolic reflection of social life and a knowledge system with claims to truth-value. I do not find these approaches mutually exclusive, and situate my work at their intersection. I contend that knowledge can be both symbolic mediating agent as well as culturally conditioned truth, such that the epistemic and the social are co-produced and mutually constitutive.

Yet an investigation of knowledge must pay heed to the critiques of symbolic ecology, which draw attention to the relative absence of material ecology and a consideration of power dynamics (Biersack 1999). Some scholars have cited works of environmental science to lend weight to their analyses (for example Alley 2002), using ecological science, in other words, to validate symbolic systems. Rather than having recourse to science as verification for Sahelian communities' observations of climate change, this analysis asks what happens when two systems of knowledge of the environment come into contact, in much the same way Candice Slater (2002) builds directly on Descola's work in the Amazon by considering the power dynamics that are part of competing systems of meaning and knowledge in the competition for the truth-value of natural resources. I place my study in this same vein.

The potential remains within symbolic ecology for studies that explore not only the different types of knowledge related to specific environmental characteristics, but that there may be different types of power associated with those knowledges as well. To this end, I draw from political ecology, which originally focused on empirical biophysical observation and political economic analyses (Rocheleau 2008, see Blaikie and Brookfield 1987), but is now considered to have proliferated beyond succinct coherence (Blaikie 2007). Nonetheless, drawing from Marxian and post-structuralist scholarship, many political ecologists analyze the ways in which nature

becomes the site for the exercise of colonial forms of power and indigenous resistance (Bryant 1998, see also Greenberg and Park 1994, Zimmerer 2000). The majority of works reveal how this continues to be the case for contemporary wildlife conservation and environmentalism (Birch 1990, Borgerhoff-Mulder and Coppolillo 2005, Brockington 2004, Chapin 2004, Clark, Rutherford, and Casey 2005, Igoe 1999, Kosek 2004, Neumann 1998, West 2006). I join a subset that examines how natural resources and knowledge of them are contested sites within international development, though even this literature is not without important differences.

At the heart of the issue is who produces and/or controls knowledge about the environment and natural resources, and therefore controls access to them. For instance, Matthew Turner (1999a, 2004) has shown how the development community prioritizes common property regimes when parsing out farmer-herder conflicts in Mali. For Turner, focusing only on common property ignores the deeply rooted and multidimensional politics between groups as well as the political economic conditions of livelihood strategies. In contrast, Michael Goldman (2005) has illustrated how the political and financial power of the World Bank positions it as *the* authority on diverse populations and ecologies, even without significant social science research. The international network of NGOs is such that this knowledge is filtered to the agents working directly on natural resource management projects (Bebbington and Kothari 2006).

This research perspective establishes an important conversation between the knowledges of rural communities and larger state and international apparatuses, such that the types of knowledge that are produced and circulated may have dramatic consequences for local communities, who are positioned as subordinates to state and international organizations. Arun Agrawal (2005) has written that in addition to governmentality, we must also be aware of projects of environmentality, for knowledge, access and control over natural resources

necessarily has implications for the formations of subjectivities and individuals' relations to the state. Research has shown how projects of environmentality influence indigenous proprietary claims over land and alter gender relations (Schroeder 1997, Schroeder and Suryanata 2004, Nielsen 2010, Nightingale 2006, Sundberg 2004).

Such works show how particular regimes of truth manifest in “out of the way places” (Escobar 1999, 2008, Tsing 2005), illustrating the logic of capital as an overarching theme for much contemporary political ecological scholarship. Early critiques argued that these investigations too easily ignored ecology in favor of the economic (Vayda and McCay 1975, Vayda and Walters 1999). Others have noted that much political ecology begins with divergent knowledge claims rather than beginning with “how these knowledge claims are constructed and travel to places of interest.” This study takes this advise as its starting point, asking, first, what are the knowledges of climate change held by community residents and development workers, and how are they similar or different. I ask second how they are interconnected not only epistemically but also through social relationships.

Scientific and Indigenous Knowledges

The first and second research questions are necessarily interrelated. A basic point of this study is that the knowledge that is produced and disseminated through development is technoscientific. Political ecology is important for guiding an investigation of local knowledge, but it does not provide insight into how to understand such knowledge in relation to science. To do so I pull out two threads of STS that I pull out in this section: First, I highlight the literatures that have shown there are no ontological differences between science and local environmental knowledges.

Second, I highlight the call to orient research towards investigations of the explanatory power of diverse knowledges.

STS is a broad, interdisciplinary field, but at heart, the field of inquiry has deconstructed regimes of truth by situating them within multiscale fields of power. Of particular importance is an examination of the social value of science and its interconnections with transnational flows of capital. This produces an important conversation for understanding the relationship between science and other knowledges of the environment—knowledges that are commonly referred to in the literature as traditional ecological knowledge (TEK), local ecological knowledge (LEK), and indigenous knowledge (IK)—that are always interconnected with transnational political economy. However, some have argued that such labels invariably establish a dichotomy between science as *the* way of knowing in the West (Agrawal 1995) and all other ways of knowing. Such a division implies that any investigation that explores the relationship between the two must necessarily begin from the point of difference. This may be one reason why some studies of West African environmental knowledge, some of which come from Burkina Faso, attempt to “confirm” indigenous knowledge with scientific knowledge or “fit” it into a corpus of scientific knowledge (see Gray and Morant 2003, West, Roncoli, and Ouattara 2008, Krogh and Paarup-Laursen 1997, Lindskog and Tengberg 1994).

Nonetheless, local environmental knowledge has been increasingly included in international development efforts to increase project success. In this context, scholars have shown that organizations view indigenous knowledge as ontologically distinct from science, variously opposing it to science, decontextualizing it, and ignoring power asymmetries (Briggs 2005, Goldman 2007, Ross et al. 2011). Additionally, indigenous knowledge is often romanticized not only in the repetition of the myth of the noble savage living in harmony with

nature, but also living in harmony with one another; too often, writes Arun Agrawal (1995), indigenous knowledge is promoted as communal knowledge, reinforcing social solidarity. While an important caution, I temper Agrawal's position by noting that local environmental knowledges do not *necessarily* promote solidarity, but solidarity may, nevertheless, be an effect however contextual. Moreover, I suggest that while there are no inherent substantive or methodological differences between science and local environmental knowledge, this does not preclude that certain knowledges—say, of God or environmental science—are acquired and used socially in different ways, including the promotion of social solidarity or stratification, which I aim to show in this study.

Additionally, the IK, TEK, and LEK labels carry unnecessary baggage. Because “traditional” is often packaged with connotations of timelessness and changelessness, and because I argue that environmental knowledge in rural communities of Burkina Faso borrow from external or foreign knowledges, in this study I reject the TEK and IK labels. While some scholars have argued that the term “local” ecological knowledge constructs other knowledges as less comprehensive or insignificant relative to science (German, Verma, and Ramisch 2010), I use “local knowledge” to refer to community knowledge in terms of geographic distribution.

STS scholars have been instrumental in deconstructing the narrative that science is objective, rational, and apolitical.⁷ Famously, Bruno Latour argued that science cannot be purely understood as the investigation of objective reality, cannot be seen as a site absent of power dynamics, and cannot be wholly reduced to its “truth effects” vis-à-vis discourse. Rather, science is a “sociotechnical imbroglio” that is “simultaneously real, like nature, narrated, like discourse, and collective, like society” (Latour 1993: 6). Similarly, Michel Callon (1995) has shown that

⁷ *Laboratory Life* (1979) by Bruno Latour and Steve Woolgar has been credited with sparking STS research by demonstrating the social construction of scientific fact in the highly political environment of the laboratory.

researchers and laymen have recourse to four general models of science, constructing it as (1) a domain of pure rationality, (2) a highly political field of competition, (3) a sociocultural practice, and as (4) “extended translation.” Many studies have shown that the narrative of science as a domain of pure rationality, as well as its connection to transnational capital, have proliferated the application of Western environmental practice around the global, often to the economic benefit of the applying agency and to the environmental and economic detriment of the community of application (Lansing 2007, Kirsch 2006, Forsyth 2011).

While studies deconstructing the narrative of the universal applications of specific scientific methods are instructive, I follow Forsyth’s call (2003, 2011) that what are needed are investigations of the explanatory powers of science and other ways of knowing. In other words, this study takes a “political engagement with how environmental cause-and-effect statements are made” (Forsyth 2011: 31). As such, I follow Callon’s fourth model of science as a process of extended translation, functioning socially by linking together technical devices, natural elements, individuals, and sociocultural practices within political fields of relations. Callon refers to these linkages as processes of translation because it is only through the linkages that the objects become known as such.⁸ I borrow from Callon the vocabulary of this model: interconnections, linkages, and processes of translation.

Similarly, the central imagery of this work is the network, which helps visualize the processes of translation in the linkage of diverse elements and the construction of knowledge. I follow Latour (1995) in understanding translation to be possible only through a mediating agent—whether an individual, organization, technology, or some other object—and that the network, as analytic, has the power to imply relations between objects in translation, as well as

⁸ In the case of this study, for example, the knowledge linkages translate and create “beneficiary community,” “agriculturalist,” “development agent,” “potable water pump,” and “responsibility” as such.

the form and structure of those relations. The network is a tool for understanding multiple variables, both physical and social, in dynamic relation to one other. It implies structure and movement without implying a central, unerring kernel of Truth around which knowledge is constructed (Latour 2005, Rocheleau 2007). As such, I use the term “knowledge-network” to refer to the interconnections between nodes of information that individuals and groups use to engage with (and that are influenced by) the world. I make this move to emphasize that knowledge can be *both* the result of processes of translation as well as the mediating agent of translation, a position that rests on the axiom that knowledge and our actions in the world are inextricably coproduced (Fogel 1993). This position orients the focus of the research to the explanatory power of different knowledge-networks.

STS scholars have employed the image of the network to reveal the underlying social forces that influence all knowledges in varying degrees. Some scholars reveal how the same objects—wildlife, for instance—can be understood differently by competing knowledges of the environment, and which may then influence public policy (Nadasdy 2011, Thompson 2002). Others emphasize that knowledge, as a multiscalar network, extends into the physical through economic behaviors. Social behaviors, however, imply power dynamics, which has also been explored by STS scholars who show that the extensiveness and strength of links within a network condition its acceptance within, and help construct, “expert” communities who wield significant social force (Galt 2011). I follow these works by arguing that knowledge is not strictly ideational but that it exists in the material through behavior and social action. I follow the concern for methodological scaling, for, as written above, knowledge within development institutions travels through international channels and rural communities, manipulating and being manipulated by the social structures that precipitate its movement.

Additionally, the network analytic helps to deconstruct the divide between local environmental knowledge and science. While Dianne Rocheleau (2008, 2011) for instance, traces LEKs that are highly situational and geographically contingent, my position is that if knowledge is best conceived as a network then it continuously reaches out into the world, interconnecting with new objects, experiences, and emotions through processes of translation. The prehensions of the knowledge-network preclude it from ever being contained. This is a position that builds on Donna Haraway's (1988) notion of situated knowledge, which recognizes that ways of knowing are historically, socioculturally, and politically contingent (Harding 1993) but avoids the notion of hybridity (Haraway 1991). Although it may not originally have been conceived as such, the linguistic work of hybridity reifies the very divide it is meant to epistemically deconstruct. If one conceives of a hybrid—a combination of two or more entities—then one must first conceive of those entities, however analytically, as ontologically distinct, which can only complicate efforts to build dialogue between scientific and local environmental knowledge (see Mauro and Hardison 2000, Thomas and Twyman 2004). This is why the notion of knowledge-networks is vital to this study, for in the joint analysis of science and local environmental knowledge, I aim to show that these knowledges are not distinct networks, but are socio-historically interconnected. Nonetheless, those who operate within the domain of technoscience, position themselves as an “expert” community with unique explanatory power relative to rural communities. Thus, theoretically, I do not reify the divide between science and local knowledge, but aim to show how those within the particular epistemic communities of development do.

“Experts” and Epistemic Communities

Although the epistemic communities literature is the product of philosophy and international relations, recent scholarship dovetails nicely with STS and, in particular, climate change.

Originally defined by Peter Haas (1992), an epistemic community has four distinctive characteristics:

(1) a shared set of normative or principled beliefs, which provide a value based rationale for the social action of community members; (2) shared causal beliefs, which are derived from their analysis of practices leading or contributing to a central set of problems in their domain and which then serve as the basis for elucidating the multiple linkages between possible policy actions and desired outcomes; (3) shared notions of validity—that is, intersubjective, internally defined criteria for weighing and validating knowledge in the domain of their expertise; and (4) a common policy enterprise—that is, a set of common practices associated with a set of problems to which their professional competence is directed, presumably out of the conviction that human welfare will be enhanced as a consequence. [Haas 1992:3]

Elements (2) and (3) have been considered to be key for identifying an epistemic community (Cross 2012). While some have argued that these criteria establish epistemic communities as necessarily positivistic and scientific, thus denying legitimacy to the knowledges of social groups (Toke 1999), the confusion rests in that the majority of scholarship has only examined epistemic communities of science (Dunlop 2000). For example, some have shown how the “intersubjective” element of epistemic communities has led to a plurality of “expert” voices within the climate change debate ranging from scientists to NGOs (Gough and Shackley 2001). Nonetheless, climate change scientists have emerged as a global epistemic community that is driving international debate due, in larger part, to the community’s apparent cohesiveness and solidarity under scientific fact (Cross 2012, Chilvers 2008).

While I do not support the argument that the definition of an epistemic community is positivistic, it is apparent that the definition reifies the Western episteme. If an epistemic

community must include a “common policy enterprise” then it must be situated within Western forms of governance and State-citizenry relationships. Mai’a Cross (2012) has reworked Haas’s original definition, switching the fourth element—a common policy enterprise—for a broad definition of professionalism. Cross’s intent is to broaden the scope of an epistemic community to include diverse professions, but this too rests within the Western episteme by emphasizing a particular formation of political economy. I demonstrate in this study, that the notion of the epistemic community is a useful term given Haas’s definition only if we amend the fourth element to refer to broad political aims: specifically, the community’s political actions to promote or perpetuate the truth-value of the knowledge by which it is formed. This opens the investigation to apparently non-Western groups based on shared knowledge.

Here, I make the distinction between epistemic communities—grounds of individuals united by shared knowledge and the advancement of its truth-value—and “experts”—individuals or certain epistemic communities who are socially positioned as epistemic authorities. I show in this study that both “experts” and laypeople can be productively analyzed as epistemic communities, but what is important is how those communities structure themselves and their relationships to other epistemic communities. The analysis of expertise is also an important theme from STS because they have highlighted the political nature of knowledge and how it is used to assert control over resources, knowledge, and power. For instance, Rebecca Lave (2011) reveals that the simplification of stream restoration knowledge and operationalization expanded the epistemic community around which it centered to include non-scientists. Roopli Phadke (2011) has shown how social movements in India, to assert themselves politically, have appropriated technological artifacts of colonial oppression (i.e. dams) within local ecological

knowledge—that is, appropriating technoscientific tools to coalesce and cohere an epistemic community around local environmental knowledge.

In both cases epistemic communities are comprised of non-scientists but with clear epistemic and political goals. Similarly, Timothy Mitchell (2002) dissects the notion of the expert by arguing that the various “experts” of late-nineteenth and early-twentieth century Egypt used and transformed the sciences of their various disciplines through social practice. This study makes a similar point by showing that knowledge unfolds through practice in the sense that it must be negotiated with the wider social structure and others with their own knowledges. In other words, the content of knowledge structures internal group and intergroup dynamics, suggesting that in some ways particular types of knowledge influence and are influenced by particular types of social practice. It is here that I find the interstices of the above scholars and early anthropologists of West Africa, for if social groups are continuously held in tension between hierarchy and community, then there must be multiple, overlapping, and potentially conflicting regimes of truth operating on multiple scales. The social functions of knowledge are diverse—being both symbolic mediation and representation of the world—creating and reinforcing social distance and hierarchy but also building solidarity and community.

APPREHENDING DEVELOPMENT

In this section I review the literature that informs my perspective on the second and third research questions: how are the knowledges of climate change interconnected with definitions of development, and how do knowledges of development influence actions in the development moment. While the social science scholarship on development ranges along three primary branches (De Sardan 2001), I draw inspiration from those that deconstruct development as

homogenously oppressive, revealing the intense variability of power dynamics within the meeting of development organization and “beneficiary community.” I follow those who have shown that development agents need to be understood as mediators between institutional constraints and cultural particularities, but extend this argument by suggesting that development agents, as well as community residents, are constrained by the knowledges they take to the implementation of particular projects.

The New Ethnographies of Development

As mentioned in the introductory chapter, international organizations are increasingly framing their projects in terms of global climate change and the importance of building local capacity for mitigation and adaptation (Smit and Wandel 2006). While no one would deny the value of development organizations delivering mitigation and adaptive strategies to those most affected by global climate change, any investigation of development is to rehash the uneasy relationship between development and anthropology—between academic critiques of development and applied anthropological research (Ferguson 1997). Here I note the more salient critiques of development from anthropology but find in the new ethnographies of development a more nuanced appreciation of examining development as a social practice without clear divisions such as “developer” and “recipient.”

Development, as the orienting principle of our time (Cowen and Shenton 1995), rests in an ambiguity of a double meaning. On the one hand, development refers to the uneven and autocatalytic destructive and generative processes of capitalism, on the other, the “multi-scaled projects of intervention in the ‘Third World’” (Hart 2009: 3). The confusion in meaning of development denotes that the two processes are in reality inseparable, but also that the term may

function socially as a realm of free play (Derrida 1978).⁹ Some scholars have argued that this discursive ambiguity is central to the successful transferability of development initiatives to culturally and ecologically diverse contexts (Mosse 2005). This is perhaps the reason for diverse social science critiques of development that range from the political economic, the discursive, the poststructuralist, and the new ethnography critiques.

The changing notions of development are manifest in the West African landscape. Roads and railways were constructed by colonial regimes—through forced labor (Skinner 1960a, 1989)—in order to connect rural areas rich in resources with urban centers where materials could be prepared for shipment. The results are today’s “development islands” (McNulty 1995), or urban centers and their regional spheres of influence. The need for efficient transportation and material processing, insofar as infrastructure is concerned, drove development in the West African colonies, rather than substituting resources for “rational production.” When former colonies were relabeled as *underdeveloped* areas after World War II (Cowen and Shenton 1995), the international community discursively solidified infrastructural and economic variability into an easily mobilized signifier (Escobar 1995). The meanings of “development” proliferated to include such projects as sanitation and hygiene, education and literacy, and natural resource management (Edwards, Hulme, and Wallace 1999, Lewis and Opoku-Mensah 2006, Reimann 2006), yet always couched in terms of alleviating poverty and spurring economic growth. In parallel large international organizations and small NGOs sprang up, occupying key spaces in

⁹ The double meaning of development has its genesis in the Industrial and Scientific Revolutions. Writings of British scholars and colonial officials from the mid to late 19th century specifically refer to “development” (Cowen and Shenton 1995: 29-30), grounding the term in neoclassical economic philosophy. It is defined as “the substitution of one productive resource (labour) for another (capital) in a theory of rational production” (Peet and Hartwick 2009: 49). This early meaning of development was limited to the efficient use of raw materials for the production of industrial capital, reorienting colonial interests, particularly in West Africa, from extracting manual labor in the form of slaves to exploiting raw materials that could feed the growing industries of Europe (Mendonsa 2002).

Africans' social and environmental lives to such an extent that development organizations have been called the new sovereigns (Piot 2010).

I draw much of my inspiration from those who have problematized the homogeneity of development practitioners, and because this is still a growing scholarship there is ample room to braid in theoretical orientations of earlier critiques of development. The new ethnographers of development are “distinctly uncomfortable with monolithic notions of dominance, resistance, hegemonic relations and the implication of false consciousness among the developed (or the developers)” (Mosse 2005: 6). Rejecting ontological categories such as “developer” and “beneficiary community,” these ethnographers are concerned with individual agency across the development divide. Many take seriously the humanitarian concerns of foreign aid workers but place humanitarian ideology within an overarching institutional framework that constrains some actions while facilitating others (de Jong 2011). Other scholars reveal that many individuals engaged in the labor of development have strong moral misgivings about their work precisely because of the strong interpersonal relationships built with those who are being targeted (Yarrow 2011). Overall, this scholarship views development workers as mediating agents between institution and community (Fechter and Hindman 2011).

The institutional constraints of development agents, however, are significant and cannot be ignored given the social science analyses that have revealed the political asymmetries of global capitalism on which development is built. The political economic critiques of development have drawn from Marx and the world systems theorists to show that such formations as “development islands” are conditioned by international asymmetrical political and economic conditions. Here the “historical motive of history”—built as it is with science and the production of knowledge and tied to the capitalist system—is replicated on the global scale

(Marx 1976: 637, Wallerstein 2007). The scholarship from Africa has examined how these asymmetries manifest in certain locales, showing that transnational capitalism appropriates cultural trappings in unique and sometimes devastating ways (Chalfin 2010, Smith 2007, Watts 2001, Comaroff and Comaroff 1999, Ferguson 1999, 2006, Piot 2010, Meyer 1999).

Those who have focused on the discursive operations of development argue that global asymmetries are maintained, and even supported, because development discourse traffics in labels that are easily transferable. Terms such as “the rural poor,” “rural farmers,” and even “women” reduce socio-cultural complexities into easily managed cultural constructs.¹⁰ The implication of these simplifying labels is that development organizations position themselves as the ones to both define and create solutions for problems,¹¹ as has been the case for desertification and famine in the West African Sahel (Mels 2009, Davis 2004, Glenzer 2002, Bassett and Zuéli 2000). The discursively constructed imagined realities of development are a significant reason that many argue development initiatives are doomed to fail (Adams 1993, Franke and Chasin 1980, Mortimore 1989).

¹⁰ Linguistic anthropologists, of course, have detailed how language and the world we see are entwined in “structural coupling” (Hymes 1966 in Foley 1997: 250, see Culler 1986, Duranti 1997, Lakoff and Johnson 1980, Whorf 2001[1949]). Combining this theory with those of Foucault and Bourdieu anthropologists and geographers of development see the perpetuation of colonial systems of knowledge and Orientalist epistemes, the reiteration of Us-Them dichotomies and the construction of social imaginaries with wide ranging real world repercussions. Interestingly, the use of such terms coincides with the rise of the Basic Needs Approach (BNA) in the 1970s that reoriented development from the international to the “grassroots” levels (Farooq 1988, Hoadley 1981, Lisk 1977). The BNA trafficked in the simplification of complexities by proposing universal solutions such as the minimum daily requirement of individual water consumption (see Gleick 1996).

¹¹ In this sense “the rural poor” function much like Giorgio Agamben’s notion of bare life (1995) in which the ultimate subjects of power—those most intensively oppressed, othered, and marginalized by power—are seen to be without the tools for survival, and thus without culture, complexity, and inherent will of their own. Others have shown how organizations perpetuate the moral dimensions of modernity (Brenner 1998, Rofel 1999), replicate Western gender roles (Ferguson 1999, Stoler 2002), and justify the exclusion of foreign populations (Geschiere and Jackson 2006, Geschiere 2009, Rain 1999).

Many have argued that because discourse easily bundles social complexities and is reinforced by political economic dominance, development agents are guilty of perpetuating neocolonial forms of oppression (Escobar 1995), extending state presence in faraway locations (Ferguson 1994), and perpetuating moral ideals according to Western cultural standards (Li 2007). Such scholars incorporate a sensitivity to the political economic underpinnings of development but I follow Leach and Fairhead (2000) that too often scholarship of development rests on an imposed binary of community and organization.

To deconstruct the organization-community binary, I am reminded of Forsyth's (2011) call, mentioned above, for a political ecology that examines the explanatory power of knowledges. To this end, I follow those scholars who have argued that part of development organizations' dominance rests in knowledge production. I have mentioned Michael Goldman's (2005) analysis of the hierarchical flow of knowledge about development and people to smaller NGOs. In some respects, this study follows suit by emphasizing the dissemination and circulation of knowledge about development between organization and community. Such a perspective blurs the boundaries between the two groups particularly in regards to the tactics afforded to each within the epistemic and social structural conditions of development.

If development via transnational capitalism manifestations and discursive formations are culturally contingent, then there are varying spaces of inclusion and exclusion for those targeted by development. Many who have taken this research orientation have tended to focus on conservation initiatives, particularly those guided by conservation-as-development thinking (Clark, Rutherford, and Casey 2005, Escobar 2008, Neumann 1998, West 2006). Exceptionally, others have shown how communities resist State hegemony (Baviskar 1995), and co-opt development for their own ends (Schroeder 1997, Sundberg 2004). Most strikingly, others show

how contestation over development becomes entangled with cultural asymmetries such that women, who are marginalized in the development process, resist both development intervention and patriarchy-development alliances (Nielsen 2010). I contend that this is valuable insight, for a micro-view of power in the development moment is a rich avenue for exploring nuanced means for negotiation and collaboration, as well as subjugation and dominance that may otherwise go unnoticed. However, there is room for the exploration of tactics within development at the micro-level and the new ethnographies.

Development in West Africa

Development interventions in West Africa are exemplary of the short history of development sketched above, but it also represents a unique context for the analysis of development. In this section I briefly cover the literature on development in West Africa, noting that the majority of scholarship covers small-scale agricultural projects and large-scale or international water issues, which is a response to historical and contemporary perceptions of the region.

As mentioned above, the contemporary infrastructural terrain of Africa is condensed into “development islands.” In the colony of Haut Volta (now Burkina Faso) development islands were and are centered on the towns of Ouagadougou and Bobo-Dioulasso. The French colonial administration concentrated infrastructural development on railways linking Ouagadougou and Bobo-Dioulasso with the port of Côte d’Ivoire. These railways, still in operation, transported the relatively meager cotton production to fuel France’s textile industry (Reyna 1986). The majority of the population, however, remained in rural areas, practicing rain fed subsistence agriculture and cash cropping (Skinner 1974). After World War II and the discursive shift from “colony” to

“underdeveloped nation,” international aid turned toward the development of agricultural production as a means of increasing GDP.

However, the way in which agricultural production was framed was due in large part of the devastating drought that affected the Sahelian and Sudano-Sahelian zones of West Africa. The drought influenced a shift in United States government development goals from industrial production to rural economic growth called the “New Directions” (Horowitz and Painter 1986: 2-5). In part, the New Directions built on the “regional discursive formation” (Peet and Watts 1996: 6) of the Sahel as a zone of perpetual drought, famine, and destitution. Moreover, drought was seen to be the result not of cyclical boom and bust, as mentioned above, but exploitative agricultural and pastoral practices; development therefore expanded from regional economic growth to “proper” natural resource management (Fairhead and Leach 1996). Today, the scholarship of development in West Africa has examined the lasting effects of this orientation of development in the context of agricultural project implementation and water resource management.

Agriculture

From the start, anthropologists have noted how agricultural programs in West Africa have significantly misunderstood rural farmers’ practices and strategies. For instance, an agricultural intensification project in Guinea, initiated by USAID in 1975, was initially designed to be a top-down insertion of industrialized farming techniques and machinery. This project only later incorporated modifications based on rural socio-economic practices and land ownership after an anthropologist lobbied against the initial project design (Hecht 1986). More recent scholarship trends have reflected a shift in development practice to directly engage individual and household

agriculturalists in terms of intensification (West 2009), increasing soil fertility (Gray and Morant 2003, Fairhead and Scoones 2005), bush fires (Laris and Wardell 2006), social stratification (Koenig 1986), and agriculturalist-pastoralist conflict (Turner 2004). Those working in Burkina Faso have examined dry season migrant labor (Skinner 1960a), land tenure (Gray and Kevane 1999), and gender relations in relation to horticultural production (Kevane and Gray 2010, Friedberg 2001, Nielsen 2010). The vast majority of these scholars emphasize the political economic dimension of agriculture and horticulture. I depart from these scholars by examining how the practices of agriculture and horticulture are known within a larger epistemic framework of climate change and development in order to better understand individuals and groups relations to those practices.

Water

Particularly with the discursive formation of Sahel drought and desertification, water has been the focus of intensive investigation because, as Orlove and Caton (2010) have written, anthropologists are able to see water as a resource and as a substance that connects different realms of social life. Many social scientists of West Africa who have looked at water have examined the gender stratification of water collection (Nyong and Kanaroglou 2001), rural wetland management (Adams 1986, 1993), and water availability for agricultural production (Agnew 1982, 1989). Those interested in the development side of water management, however, have tended to focus on international relations and transboundary water resources, either debunking or fanning the flame of future water conflicts (see Seckler, Moldern, and Barker 1999, Ashton 2002, Pimentel et al. 2004). I depart from this latter scholarship by focusing on the design and implementation of two types of water pumps for rural household usage but follow

Orlove and Caton by revealing how water becomes a multifaceted resource according to different knowledge-networks.

CONCLUSION

The following chapters will solidify the ethnographic and theoretical perspectives outlined above. Chapter Three provides a description of the fieldsites—the geographical and social contexts—in which research was conducted. I take a historical perspective in order to place the contemporary activities of USAID WA-WASH in relation with colonial projects. I show that the historical repercussions of colonialism can be seen and felt today in the relationship the rural communities, Ouegoulega and Tama, have with Ouagadougou. Chapter Four engages the knowledges of the environment and climate change held by both community residents and Program employees, and the rest of the work explores how these knowledges are social structured and how groups use them in the development context. The concluding chapter reiterates the importance of this research by showing how a detailed ethnography of knowledges can be applied to facilitate cross-cultural collaboration and potentially augment communities' adaptive strategies to climate change.

CHAPTER THREE

FIELDSITES

The day begins with the sun. I wake with the early light, to the sounds of my neighbors already prepping their morning meals—often leftovers of boiled corn meal or rice with sauce, and tea with lots of sugar. I sate myself with strong coffee and begin my day with the rest of the city. I ride my motorcycle to the Commune of Tanghin-Dassouri about 30km outside of Ouagadougou, through some of the busiest *quartiers* [districts, neighborhoods] in the city. I make this trek two to three times a week, through rush hour, there and back, an hour each way. I head to the village of Ouegoulega—the site of USAID WA-WASH’s potable water and garden pump projects, being developed by Winrock International—and their “brother village,” Tama, further into the bush.

After getting my motorcycle onto the paved road, I cautiously roll through the congestion of the East Bus Station. Buses, taxis, cars, motorcycles, mopeds, bikes, and donkey carts all vie for space on the two-lane roads. Traffic continues to creep along on the Avenue of President Thomas Sankara that runs through the protected forest where I’m treated to a rare breath of fresh air and cool wind. I never ride without my helmet, or without my bandana pulled over my nose and mouth. Beat up cars and mopeds spew exhaust along the roads, their tires kick up clouds of sand and dust. At the height of the dry season, when the dust is at its worst, it’s impossible to

keep the grit out of one's teeth and a layer of red powder off one's clothes. The concrete and asphalt of Ouagadougou seem to concentrate the exhaust and dust within the city.

From the forest, the road continues to the Center University Hospital Yalgado Ouédraogo, the main hospital of the city where pedestrians mingle with the cars and crowd along the street to buy household items and medical supplies for relatives inside. Traffic slows to a crawl here and doesn't let up as one enters the gauntlet of Avenue Kadiogo that runs parallel to the *Grande Marché* [large market], the economic center of Ouagadougou. It's a frenzy of activity as boys and girls carrying small items for sale walk parallel to the flow of traffic, often stepping into the road to avoid other pedestrians, merchants, and cars entering the street. Mopeds take their chances, weaving between cars, trying to get to the market before an oncoming car or a traffic signal.

Once I pass the Grande Marché however, things begin to calm down. The road widens to four lanes with newly painted medians and pedestrian crossings. On either side of me I can see open land with trees punctuating the horizon. Some land is used for farming, marked by ridges and furrows; others are dusty plains where young Peuhl boys, dressed in flowing boubous and the Islamic cap, or *taqiyah*, herd cows. On this road I need to watch for giant, and often dangerously lopsided, semis barreling down the open road. Sometimes a goat, dog, or child will begin to stroll across the road, adding another hazard. But out here, the air is a bit fresher, and other drivers are in less of a rush.

Thirty kilometers outside of Ouagadougou I pull off the pavement and head into the rural community of Ouegoulega in the Commune of Tangin-Dassouri, my first stop of the day. The village center is a collection of wood and tin shacks where unmarried young men, often dressed in pants and Burkinabè football jerseys, and older men in boubous, their hands strong but gnarled,

gather in small groups to swap stories, gossip, complain about the heat, and speculate about this year's crops. From the clamor of the city, the quiet is a welcomed reprieve; almost like entering another world. Life seems to slow down here. Only when Dassouri, the larger town back on the paved road has its market day every third day—the time it takes to make a fresh batch of *tchakpalou*, the local millet beer—does the social energy seem to mount. In the rainy season, everyone is active in the fields: clearing, sowing, weeding. In the dry season, when there is little work in this agricultural community, men and women sit in the shade of the shacks or under trees in their courtyards, commenting on the heat and watching the passersby.

INTRODUCTION

Burkina Faso first struck me as a landscape of contrasts: Ouagadougou and Tangin-Dassouri, the urban and the rural, the pavement and the fields, the intellectual laborers and the manual laborers. But these are false divisions, part of a simplified narrative that obfuscates the complexity and syncretism inherent in the construction of rural communities and urban centers, as well as the relations between them.

Burkina Faso, and the specific sites that became my ethnographic homes, do not easily fit the meta-narrative of modernity, of intensive capitalist penetration and concomitant modalities of being corresponding to labor and education (Mbembe 2008). Rather, Burkina Faso is a nation of uneven landscapes of capitalism, politics, and epistemes that implode a simplistic urban-rural binary (Appadurai 1996, Ferguson 2006). To move from the urban to rural and back, as I did throughout my fieldwork, is to traverse the manifestations of deep historical and contemporary social dynamics. Many scholars entreat us to consider the urban-rural divide in West Africa as a

socio-historical product from the Colonial Era (Mendonsa 2002) and as interdependent and interconnected political economic sites (Hill 1970, Marguerat 1994, Piot 1999).

In this chapter, I take a historical approach to outline the environmental, economic, and epistemic dimensions of the three fieldsites that feature in this study. I begin by covering in brief the colonial history of what is now Burkina Faso, focusing on the establishment of Ouagadougou as a *siège de force* [seat of power]. The two primary tools employed by the French colonial administration to accomplish this were economic and epistemic; the colonial authority had to make the colony economically productive and to produce colonial subjects willing to perpetuate the colonial project. This discussion of the colonial project sets the stage for a discussion of the first fieldsite: the regional offices of USAID WA-WASH and implementing partner, Winrock International—institutional networks that capitalize on the economic and epistemic effects of the Colonial Era. I pause here to provide a brief overview of the four projects that Winrock International implemented in the community of Ouegoulega during the fieldwork period.

The villages of Ouegoulega and Tama are the two additional fieldsites of this study. Both are situated within the Commune of Tanghin-Dassouri close to Ouagadougou but their political economy is quite different. I reveal how the political structure is shifting from the chief to a greater orientation toward the offices of the local mayor and national government. Being rural and primarily agricultural communities, I discuss the environmental resources that residents exploit for subsistence and economic production. While the political economies of the urban and rural differ, they are interconnected through the historical influences that have concentrated political economic power in Ouagadougou.

FROM PRINCESS NYENNEGA TO THE LAND OF UPRIGHT PEOPLE

I begin by offering a brief historical overview of the Mossi and Burkina Faso's history. I draw heavily from the work of Elliot Skinner who, like his contemporaries, was largely occupied with cataloging and describing social structures, believing that Mossi society had, through colonialism, retained "much of its ancient structure" (Skinner 1989: 1). By the start of his work in the 1950s, however, the Mossi had been heavily impacted by forced labor and were known as the "workhorses" of the region (Skinner 1960a). The intention is not to reconstruct an essentialized other. What I present here is an attempt to read "across the grain" of Skinner's and others' works (Stoler 2002).

The start of the Mossi Empire recognizes the original heterogeneity of its ethnic composition and validates complimentary authority structures. The tale begins with Princess Nyennega, the daughter of a ruler from Gambaga in present day Ghana. She was known as a fierce warrior and her father would not permit her to marry. One day, disguised as a man, she fled the kingdom on a stallion, riding north, where she met a man who sheltered and fed her. After having revealed her true identity and having stayed with this man for some time they married, and together they had a son whom they named Ouedraogo, meaning stallion, honoring her flight from her father. When the boy was old enough, Nyennega sent Ouedraogo back to her father's kingdom to give him news of her marriage and family. Pleased to have a grandson, the king cared for the boy and sent him back with four horses and fifty cows. Horsemen who wanted to leave their crowded homeland accompanied him, effectively giving Ouedraogo a small army. Instead of returning to his father and mother, Ouedraogo invaded the present day city of Tenkodogo where he and the horsemen intermarried with the indigenous Busansi. The growing number of descendants of these unions called themselves the Mossi. They grew in size and

strength, eventually expanding into other regions, intermarrying with the indigenous populations and establishing royal lineages traced from Ouedraogo in Tenkodogo (Skinner 1989: 7-8).

After Ouedraogo's death, the Ouagadougou kingdom ascended in importance and eclipsed all other Mossi kingdoms. The king established himself as the first *Mogho Naaba*, ruler of all Mossi country, coalescing the kingdoms into an empire—a move he legitimized by claiming powerful amulets said to possess the *naam* [the force of God] that allows one man to rule another (Skinner 1989: 15). Chiefs, or *nanamsé* (sing. *naaba*), are arranged hierarchically from the Mogho Naaba, each ruling successively smaller regions. Each possesses varying degrees of *naam* embodied in sacred objects that are secreted away from commoners (ibid. 1989: 130). Thus, possession of the *naam* signifies the combination of specialized knowledge and an innate ability to wield that knowledge. The result is symbolic and social power that structures hierarchy among *nanamsé* and stratifies society between *nanamsé* and commoners.

Naam does not bestow power to influence spirits or divine beings, the most important of which is *Tenga*, the Earth Goddess. Only earth priests, known as *tengsoabadamba* [masters of the earth/land; sing. *tengsoaba*], are capable of communicating with the goddess and earth spirits, and are the only ones capable of properly ensuring the fertility of women, the soil and livestock; call in the rains; and influence the bounty of hunts (Skinner 1989: 135). *Nanamsé* are able to possess the *naam* by virtue of their ancestry to Ouedraogo. *Tengsoabadamba*, in contrast, are chosen from family lineages of those who were originally conquered by the Mossi—the autochthons of Mossi country. The *tengsoabadamba* constitute a separate, albeit minor, hierarchical order complimentary to the hierarchy of the chiefs, by whom they are still ruled. Yet *tengsoabadamba* possess specialized knowledge of the land, by virtue of being autochthons, that is integral to the functioning of the social structure.

Mossi identity lies along vertical and horizontal axes. Similar to what Meyer Fortes (1945) wrote about Tellensi kinship, ancestor worship, and cults of the earth, Mossi identity is structured by hierarchy and solidarity. First, commoners find themselves dependent on both hierarchies since they maintain order and provide protection in the social and spiritual realms. Without the chiefs and earth priests, the territory would be opened up to war, crime, drought, famine, and disease. Second, whether autochthon or descendant of Ouedraogo, those who share the Mossi identity share the same origin story. The veracity of the tale is unimportant; it is a “historical artifact” used to promote community and social solidarity (Anderson 2006). Both social dimensions are based on knowledge that is shared among the general population—communal knowledge—and which permits actions that both reaffirm subject positions and dissolve them.¹²

The French took control of Mossi country in 1897, joining it with the rest of their territorial holdings in Haut-Senegal-Niger. Although present day Burkina Faso had a relatively late colonization (Englebert 1998), French rule effectively reduced the Mogho Naaba to a ceremonial role, divorcing him from any real social power. The French permitted the Mogho Naaba and regional nanamsé to remain as long as they acquiesced to French rule and enforced colonial laws. The transition was brutal, being accompanied by merciless military action against chiefs who resisted or attempted to fight the colonial regime (Englebert 1998, Skinner 1989). By physically and epistemically repressing the hierarchy of the nanamsé, the French were able to ensure sympathetic rulers who helped keep colonized populations in check. Yet increasing civil

¹² One incident I witnessed well illustrates the tension of hierarchy and community. A new hire for USAID WA-WASH was being introduced to the staff. While most greeted the man politely, one employee joked about the man’s family name: “Ouedraogo? So you’ve come to colonize us, then!” The witnesses laughed, reinforcing community through recognition of Mossi history and the intense colonial history of the region in similar fashion to Radcliffe-Brown’s (2008) analysis of jokes used to release tension and construct community.

unrest forced the French to divide the territory for more direct French administrative control. Present day Burkina Faso was formally made into the colony of Haut Volta in 1919 with Ouagadougou the seat of French power.

The political dimension of the colony was anything but stable. There were several minor political adjustments both in the colony and the metropole that gradually separated the colony from French control (Englebert 1998). When independence did arrive on 5 August 1960, the idealistic, multiparty system that was modeled from the French government, quickly collapsed into authoritarianism (Englebert 1998, Skinner 1989). Haut Volta passed through several regimes, the most notable of which is that of Thomas Sankara, whose term as prime minister (1983 to 1987) is referred to as the Revolution. Sankara changed the name of country to Burkina Faso,¹³ instituted government policies meant to promote the self-sustainability of the country and undermine what many saw as neo-colonial European connections. Sankara was assassinated in 1987 and Blaise Compaoré came to power, reestablishing European and American political and economic relations.¹⁴

Ouagadougou: Siège de Force

Throughout its long and often tumultuous history Ouagadougou has grown in size and importance. In large part, the growth of Ouagadougou reflects the development of African cities since the Colonial Era. Colonizing Europeans transformed their geographical seats of power to

¹³ This is widely seen as a move toward greater solidarity, for it unites linguistic elements from three of the country's most populous groups. *Burkina* means "upright" or "honest people" in Mooré; *Faso* means "country" or "land" in Djoula; and those from the land of upright people are referred to as Burkinabè, the suffix *-nabè* coming from the Peuhl.

¹⁴ It is widely rumored that Compaoré, with the aid of the French, orchestrated Sankara's assassination because of the policies that undermined European interests during the Cold War.

accommodate resident administrators by paving roads, ensuring reliable water, and often enforcing building codes that effectively forced poor Africans into rural zones (Skinner 1976). Infrastructure was additionally driven by the need for efficient transportation of resources to sites of processing and export. Roads and railways were constructed in order to connect rural areas rich in resources with coastal ports where materials could be prepared for shipment. These projects have influenced the creation of “development islands”—social and economic centers with their regional spheres of influence—that constitute the highly uneven infrastructural landscape in contemporary Africa (McNulty 1995).

In the early period of the Mossi Empire, Ouagadougou was an important political and economic center. The geographic location of the city has been one of the main factors for the concentration of political and economic power. Early European explorers to the region recounted rumors that Ouagadougou was situated at the crossroads of five major caravan routes (Skinner 1974, 1989). These routes connected the scholarly, religious, and economic hub of West Africa, Timbuktu, with the coastal empires such as the Ashanti and Dahomey. Ouagadougou was an integral link in the network of regional trans-Saharan trade that moved gold, salt, and slaves around West African and into the Middle East, and that brought in textiles, spices, ironworks, and other goods from North Africa and as far away as China (DeLancey 2007, McIntosh 2005). Ouagadougou was uniquely positioned to benefit from this zone of economic opportunity before it inevitably shifted south with the rise of European maritime authority.

Economic Accumulation and Epistemic Acculturation

Ouagadougou was conquered by the French on 5 September 1896 (Skinner 1974) and soon became the seat for French political economic exploitation. At the time of colonization

Ouagadougou comprised only 12 square kilometers and was linked by footpaths from homesteads to the market and surrounding environs. The French paved roads to facilitate travel and by 1911 bicycles and motorcycles were rolling along the new city streets. Trucks rumbled along the major roads that radiated out from Ouagadougou to Mali, Côte d'Ivoire, Togo, and the Niger River bend like spokes from a wheel hub. Location and infrastructure induced the migration of many Sahelians into the city as well as much of the surrounding rural populations because in the city employers paid salaries with the French franc.

The colonial project was at heart an economic project. Driven by the Industrial Revolution and the shift from mercantilist capitalism to industrial capitalism (Lovejoy 2000), imperialistic economics through colonialism concentrated wealth into monopolies such as timber harvesting, and cotton and groundnut production (Englebert 1998). Resources were exported to the metropole and a financial oligarchy maintained the reigns of global economic activities (Cardosa 2007, Lenin 1939). While the French colonial authority hindered industrial competition, interpersonal economic relations tended toward increasing capitalist practice due, in large part, to pay the increasingly exorbitant taxes levied on the colonial subjects.¹⁵

Haut Volta did not provide the French with the economic productivity they gained from cash crops in other colonies, precipitating the rise of colonial taxation and the consolidation of economic power. The historian of Burkina Faso, Pierre Englebert, writes, “the French tax burden destroyed the foundations of the economic system in which it operated while simultaneously providing the colonial administration with the means to establish a new economy” (1998: 79). The new economy, based on exploitive taxation, forced individuals into new forms of labor for the accumulation of French francs to pay their taxes.

¹⁵ I follow several notable scholars in recognizing the slipperiness of the term “capitalism” but define the basic feature of capitalist economic systems to be the maximization of profit and the accumulation of wealth (Harvey 2006, Hill 1970, Marx 1978).

To create colonial subjects who are productive under a new economic regime, however, involved acculturating colonial subjects who are—at least partially—willing to participate in the colonial project. The colonial project was also a “civilizing project.” In 1901, Catholic missionaries established the first school in Ouagadougou and the first secular public school was built in 1905 by the colonial administration with the express purpose of creating French-like colonial subjects. The administration viewed colonization as a decisive military victory. What remained was to conquer the population intellectually and morally by drawing them into the cities and permanently vanquishing the “traditional spirit” (Skinner 1974: 220). Schools were built to spread European civilization by instilling enrolled students with, as one colonial administrator wrote, “the splendors of philosophy, science and history, and to lead all to respect and to love our beautiful French homeland” (quoted in *ibid*, 220): a clear example of governmentality (Foucault 1977, 1990) whereby the educational system disciplined colonial subjects not only to learn knowledge of “science and history,” among others, but to become acculturated with the culture of colonization as it were; a system that many have referred to as “mental colonization” (see Ferguson 2006).

The governmentality of education, and the oppressive power of acculturation, does not suggest that education had to be forcibly imposed on the Mossi population of Ouagadougou and the colony of Haut-Volta. The project of bringing colonial subjects into a formalized education system had the multifarious effects of instilling in students an acceptance of the colonial operation, thereby creating subjects desirous and capable of continuing the regimes of truth and power.¹⁶ It also undermined existing or “traditional” knowledge-networks, establishing significant epistemic and cultural divisions between those communities close to Ouagadougou

¹⁶ This is an important point given the French method of indirect rule by which a single officer or handful of colonial officers ruled over a vast region. Skinner notes that in 1914 there were only 12 Europeans living in Ouagadougou, compared with 19,332 Africans (Skinner 1974: 27).

and able to enroll their children, and those in further environs, that would eventually constitute the urban and rural in today's Burkina Faso.

Nonetheless, colonial subjects actively sought out colonial education, vying for coveted spots of enrollment. The reason for this is two-fold: one political, the other economic. First, the schools were never meant to be strictly for the children of the elite. All sons were welcome to attend the first public schools. This placed the sons of chiefs, commoners, serfs, and former slaves within the same classroom, leveling the social distinctions and barriers between lineages, cracking indigenous social structures. The second reason for the popularity of colonial education was economic. By 1905, formal education was seen by the Mossi as the key to success within the colonial regime. Students of the mission and public schools were given diplomas that proved to be tickets to employment in high-paying clerical positions in the colonial administration. More importantly, employees were paid in French francs, which had become *the* money commodity of colonial West Africa and the only means by which subjects could pay the often-exorbitant colonial taxes.

Through education and lucrative employment, the allure of Ouagadougou as a place of wealth and progress grew. Unfortunately, schools could not keep up with the demand of parents eager to enroll their children and gain access to the exclusive world of intellectual labor. Skinner recounts the following scene:

Those parents who had the foresight to get letters of recommendation for their children from employers or supervisors showed these to the school authorities and had little difficulty getting their children enrolled. One man who was able to get his boss, the Director of the Labor Exchange, to accompany him and his child to the school had the boy enrolled. Those parents who had no influence with the authorities were less fortunate. They complained that the school was 'like a *douane* [customs house]; those who have money pass.'" [1974, 224]

From the initial equalizing effect of mixing the different social strata in the same classroom, education began to evolve into a quasi-plutocratic system where those with money and connections were granted access. But once access was gained, pupils, and by proxy their families, were more strongly embedded within the political economic relationships that the colonial regime had constructed—relationships that allowed individuals to personally tap into transnational capitalism (Ferguson 2006).

This emphasis on education, however, does not signify colonizer-subject parity. The colonial endeavor was oxymoronic, for while the presentation of education was to create French citizens, the French were unable and unwilling to accept acculturated Africans as their equals. Education posed a dangerous leveling mechanism between colonizer and subject, for it disrupted and unsettled the act of othering inherent in the colonial project, and forced the colonizer to reconsider the distinct binaries of racism and oppression (Stoler 2002). This meant that the accumulation of specialized knowledge via colonial structures of education was seen as both a tool to defeat the barbarism of tradition and a way for subjects to enter into the colonial regime.

Nonetheless, since the Colonial Era, the three threads of education, political economy, and social structure have continued to be intertwined. On the eve of independence, Ouagadougou (and to a lesser degree Bobo-Dialouso) was the only development island in the colony of Haut Volta. Increasingly, the political economy of the city had been transferred to local elites who, having been educated through the formal colonial system, had acculturated themselves to the Western episteme. By controlling the reigns of the colony—and then the independent nation—elites structured their power through specialized knowledge and capital accumulation, undermining the indigenous hierarchies of nanamsé and tengsoabadamba, and coalescing new social classes around education and capital.

The allure of the political and economic benefits of urban life has continuously drawn populations to it. According to a census conducted by the National Institute of Statistics and Demography in 2006, Ouagadougou has a population just shy of 1.5 million people, which has increased from 750,398 people in 1996, and 465,959 people in 1985 (INSD 2006a, Skinner 1974). Skinner notes that the population of the city was 59,126 in 1961-62, up from 19,344 in 1914 when the French administration began keeping records (1974: 27). The growth of Ouagadougou and other urban sectors in Burkina Faso is nearly four times the rate of rural sectors (INSD 2006b).¹⁷

The city now stretches over 219 square kilometers and continues to sprawl outward, claiming a greater and greater metropolitan area. Maps for sale by tourist agents and street sellers, only a few years old, do not represent the newest and still growing quarters such as Ouaga 2000 where Compaoré's new presidential palace, United States Embassy, and USAID WA-WASH regional office are located. Ouagadougou allows organizations such as USAID WA-WASH to capitalize on the ripple effects of the city's history, by expanding and strengthening their political, economic, and epistemic networks. Similarly, as I show below, Ouagadougou holds an allure over residents of nearby rural communities, such as Ouegoulega and Tama, who see it as a source of development and economic potential.

¹⁷ Calculating growth rates between 1985 and 2006 reveals that rural zones have grown at a rate of 56.75% while urban zones have grown at a rate of 202.37%. These percentages were calculated using the formula $PR = ((V_{\text{Present}} - V_{\text{Past}}) / V_{\text{Past}}) \times 100$ where PR is the percent rate of growth, V_{Present} is present population size, and V_{Past} is past population size.

THE PROGRAM: USAID WA-WASH AND WINROCK INTERNATIONAL

USAID WA-WASH is a complex legal construction and institutional network that warrants some explanation. USAID WA-WASH (hereafter the Program) is not an NGO¹⁸ but rather a “consortium of NGOs” that should be seen as a condensation of legal structures and development goals, as well as particular cultural values and epistemes. The Program is oriented by four primary goals, each with their own sub-goals and activities that are provided in figure 3.1. Here, I begin by outlining the legal and institutional framework that is USAID WA-WASH, touching on its genesis and ascendants, before focusing on the individuals who operate within the Program and who, in Winrock International, practice the labor of development.

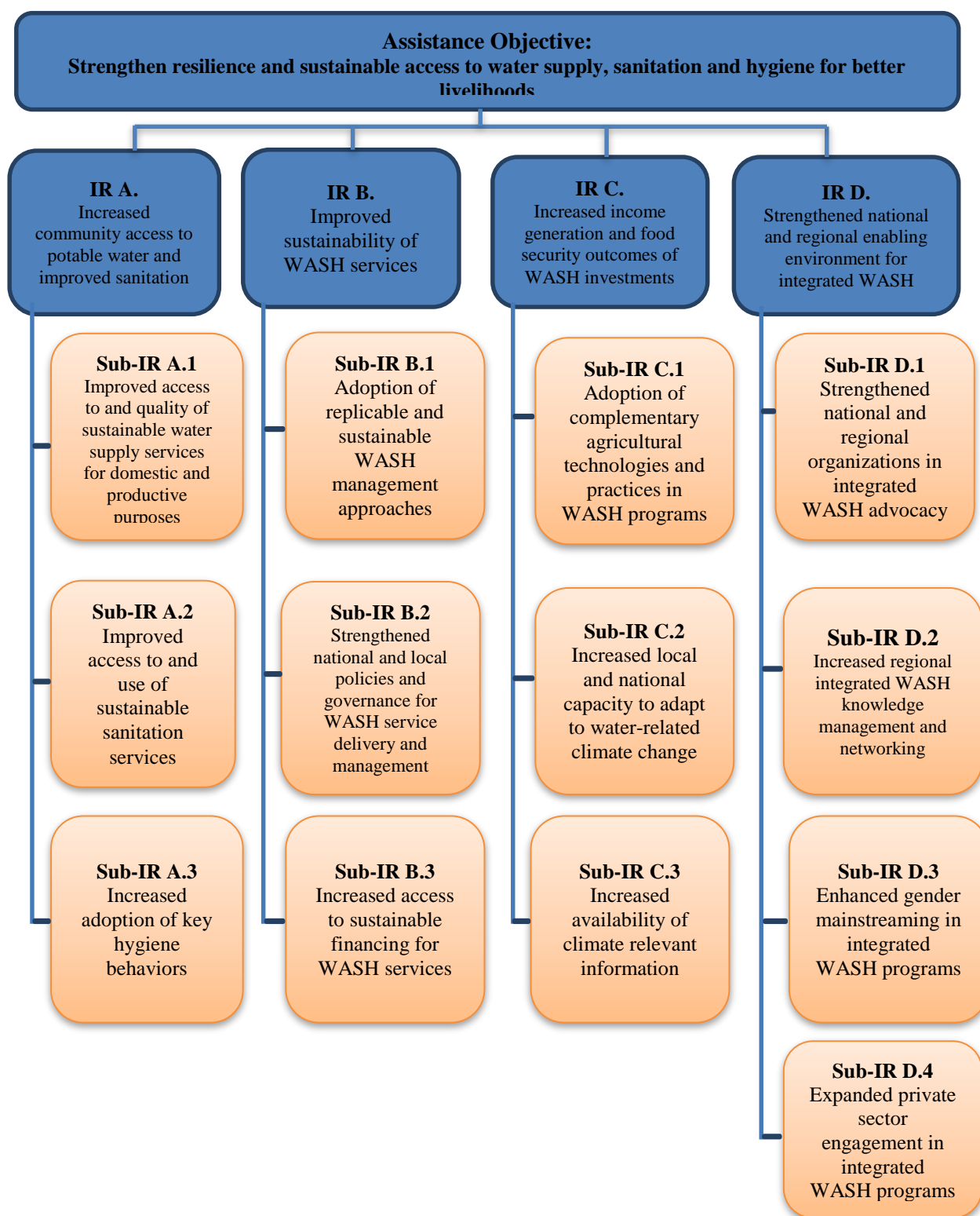
Institutional Interconnections

USAID WA-WASH is the result of a “cooperative agreement” between USAID and Florida International University (FIU), wherein, simply put, USAID provides financial resources and FIU conducts the labor of development. The cooperative agreement is a contract between the parties in which FIU agrees to follow USAID guidelines and regulations in exchange for significant financial resources to address water, sanitation, and hygiene (WASH) issues in West Africa. While FIU manages and runs the Program within the legal parameters set forth within the contract, USAID is legally separated from day-to-day operations.¹⁹

¹⁸ This is actually a sore spot for some USAID employees. In 2013 the USAID mission in Burkina Faso received a new Mission Director, who joked, “If I hear one more person refer to USAID as an NGO my head is going to explode.”

¹⁹ I was assured by USAID employees (whose offices are located in the US Embassy several kilometers from the Program office) that while the Program or USAID may change the conditions of the contract, doing so requires the consent of managing offices at FIU and several offices within USAID, but this is a lengthy and complicated process.

Figure 3.1: USAID WA-WASH Hierarchy of Objectives (Sources: USAID WA-WASH)



USAID WA-WASH is an extension of contemporary FIU development activities. FIU is home to the Global Water for Sustainability Program (GLOWS), which is a network of FIU research faculty and NGOs including Winrock International and CARE. GLOWS, itself, has been supported with USAID funds since its formation in 2006. Since then GLOWS has initiated nine projects from Georgia to Rwanda. However, an FIU administrator who visited Ouagadougou in September 2013 to assess the Program's activities, said that USAID WA-WASH constitutes FIU's largest contract with USAID and a significant expansion of its activities in terms of geographic coverage. Another FIU administrator added that USAID WA-WASH is an example of where FIU would like to focus its development activities in the future: water resources management in West Africa.

USAID WA-WASH is also an extension of past USAID efforts. The cooperative agreement between USAID and FIU was signed on 11 August 2011 and formalized in September. It is a three-year contract—running from 16 July 2012 to 15 July 2015—that builds on USAID's West Africa Water Initiative (WAWI). WAWI was formed in 2002 and ran for six years with projects in Mali, Niger, and Ghana. The Regional Program Director for USAID WA-WASH attempted to gather information about WAWI after the signing of the cooperative agreement but found that USAID records are sparse, poorly kept, or simply absent. Although WAWI constituted a significant financial investment by USAID, the Regional Director determined that the program's efforts were not concentrated and suffered from long-term direction. He later noted that USAID WA-WASH's efforts should be, in part, to compensate for this by consistently and thoroughly recording and publicizing activities and successes.

The Regional Director's concerns reflect FIU's academic interests generally. FIU faculty are engaged in GLOWS programs largely through developmental or humanitarian concerns that

have grown out of on-the-ground research. GLOWS considers this a strength of their approach, writing on the organization's website:

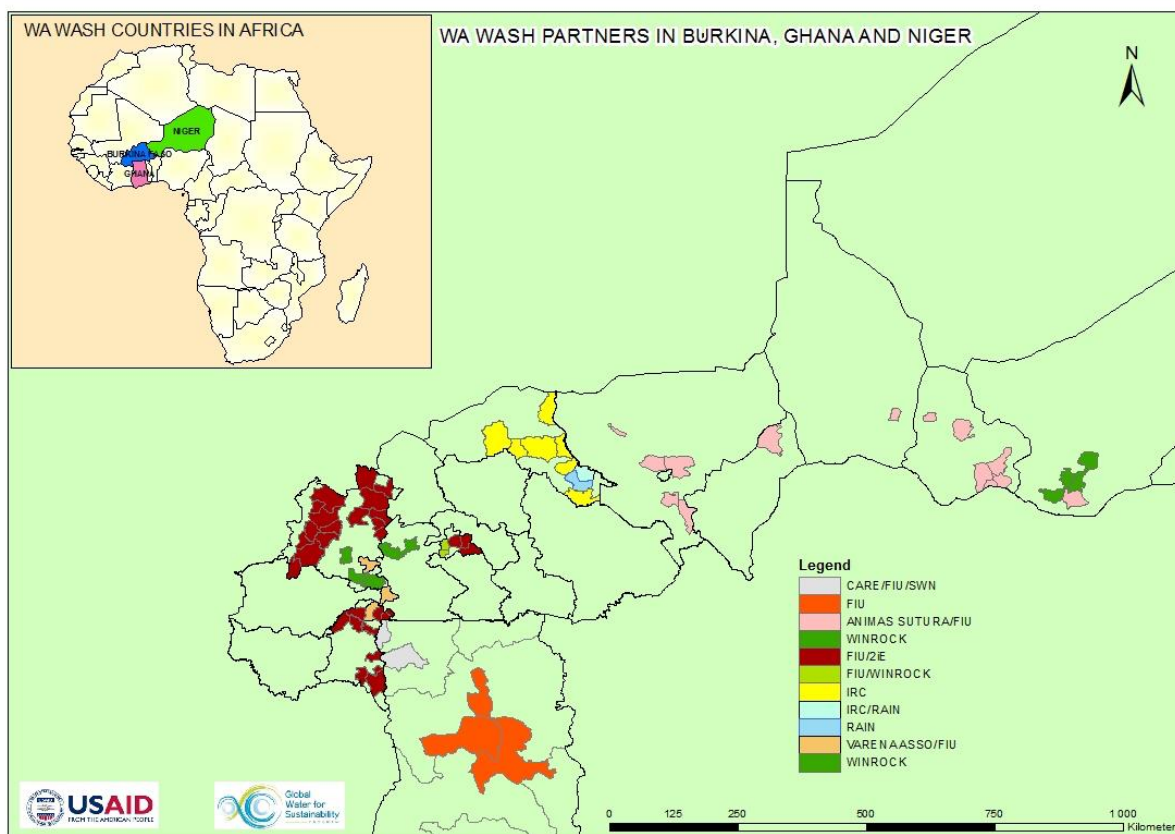
FIU offers the physical and administrative infrastructure to manage the consortium and the intellectual capital to advance its tools and strategies to the very edge of current knowledge. The university offers advanced laboratories and computing facilities for the analysis of environmental data, interpretation of satellite imagery, and development of computer models. It also offers graduate programs to train nationals from USAID Mission countries to become future leaders in water management in their home countries. [GLOWS 2014]

In short, GLOWS's efforts, which are reflected in the Regional Director's concerns for USAID WA-WASH, is to function as a knowledge producer and knowledge disseminator related to water resource management.

USAID WA-WASH has operations in three West African nations. Initially, efforts were made to establish offices in Burkina Faso, Niger, Ghana, and Mali. Operations in Mali had to be abandoned due to the Northern Mali Conflict that began in January 2012, engulfed more than half the country, and precipitated a military coup d'état in the capital of Bamako. The areas within Burkina Faso, Niger, and Ghana where the Program established projects during the fieldwork period are highlighted in figure 3.2. Unfortunately, even those operations in southwestern Niger were terminated in late 2013 due to the increasing violence initiated by the Islamist group Boko Haram in northern Nigeria. As of this writing, USAID WA-WASH activities are in Burkina Faso and Ghana with some operations nearer the capital of Niger.

USAID WA-WASH is, like the central imagery of this study, a network. First, the network extends hierarchically, linking FIU with the bureaucracy of the United States government with the eleven implementing partners conducting the labor of development. But the network also extends horizontally. As part of the ambition to publicize activities, the Program creates collaborative connections with local governmental structures, independent research

Figure 3.2: Map of USAID WA-WASH Activities. Sites are color-coded according to implementing partner (Source: USAID WA-WASH)



organizations and universities, and private sector entities throughout the Program region.

Although the agreement between the Program and the government of Burkina Faso is, legally, enough to ensure operations within the country,²⁰ the Program has established intimate connections with such organizations and institutions as the national meteorological institutes within the Program region, the Permanent Inter-State Committee for the Fight Against Desertification in the Sahel (CILSS), the International Institute for Water and Environmental Engineering (2iE), as well as the University of Aube Nouvelle and the University of Ouagadougou in Burkina Faso, and the University of Development Studies in Ghana. These connections represent an expansion of epistemic resources for USAID WA-WASH, for the

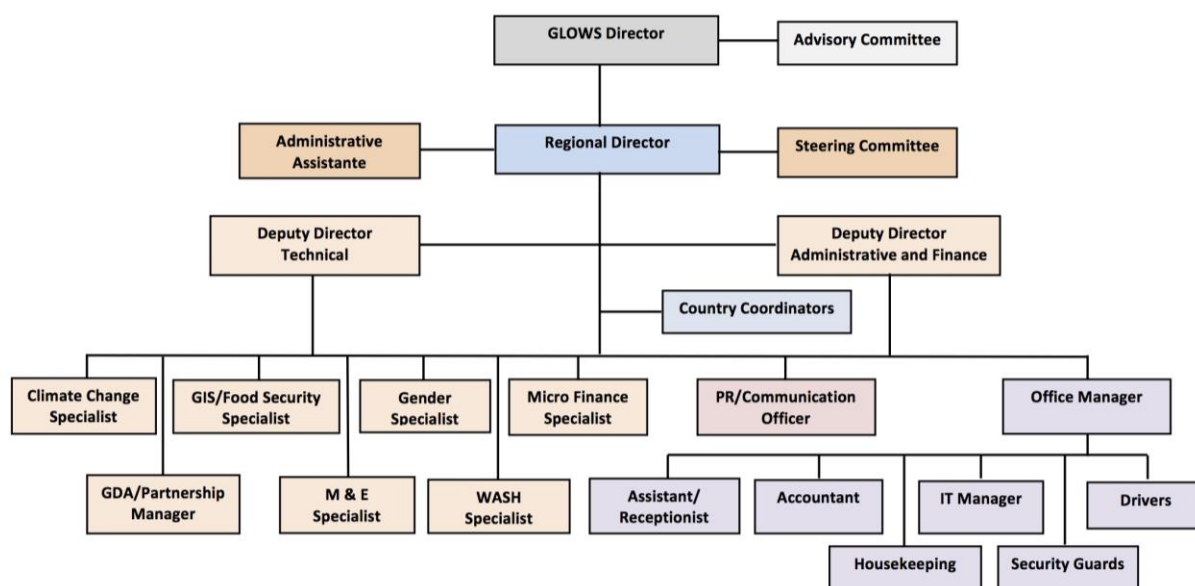
²⁰ Signed 16 March 2012.

relationships signify an exchange of data, collaboration, and even manual and intellectual labor in the form of graduate student interns in the Program.

Additionally, the Program has established connections with the private sector. For instance, a highly publicized relationship has solidified between USAID WA-WASH and the National Lottery of Burkina Faso (LONAB). In March 2013, USAID WA-WASH and LONAB signed an agreement that would provide US\$700,000 from LONAB to the Program—monies that are supplemental to the Program’s USAID-allocated operating budget. In return, LONAB has stipulated that the funds will be allocated for (1) food security and water supply improvement projects, (2) household water treatment projects, and (3) graduate student training programs. The third activity expands the Program’s existing graduate student internship program into scholarship awards for advanced study. In this program, students working on Masters or Doctoral degrees conduct research that advances their degrees while adding to USAID WA-WASH’s knowledge production.

Although many staff positions altered during the fieldwork period, by the end of research in November 2013, the Program consisted of roughly 20 individuals who are full-time staff. This number doesn’t include the graduate student interns and scholarship recipients of whom there are roughly 30. An organizational chart for Program employees is provided in figure 3.3. Full-time staff include the Regional Program Director; Deputy Regional Program Director; Program Specialists such as Gabriel for Climate Change; as well as those employed to handle logistical aspects such as accounting, IT and communications, and secretarial duties. Except for the Regional and Deputy Regional Directors who are American, all other full-time staff are local hires from the Program region. All staff hold advanced degrees or specialized certifications beyond a Bachelors degree. For instance, all Program Specialists hold Masters of Science

Figure 3.3: Organizational Chart of USAID WA-WASH (Source: USAID WA-WASH)



degrees with concentrations in agriculture, water and the environment, and development planning and management. The Regional Program Director is the only full-time staff to hold a doctoral degree.

Technically speaking, the Regional Program Director and Program Specialists, such as the Climate Change Specialist and GIS/Food Security Specialist, are direct hires for FIU. Those working for Winrock International or CARE, for instance, are direct hires for their respective organizations. In this study I specifically use “Program administrators” to refer to FIU hires, such as the Regional Director and Program Specialists, and “Winrock employees” or “CARE employees” or staff to refer to those working directly for particular implementing partners. When it must be noted, I use the term “Program” and “Program employees” in order to refer to those within the immediate institutional network of USAID WA-WASH in Burkina Faso, including direct FIU hires managing and evaluating project activities, as well as those working for implementing partners such as Winrock and CARE.

Both CARE and, to a much more significant extent, Winrock employees, are present throughout this study. Not only does this study follow three projects implemented by Winrock in the Commune of Tanghin-Dassouri, but also the offices of CARE and Winrock are housed with Program administrators in the regional office in Ouagadougou. Winrock and CARE employees divide offices on the ground floor while Program administrators and local graduate student interns are housed on the second and third floors.

Winrock International

Here I describe the organizational structure and projects Winrock implemented in the village of Ouegoulega. During the fieldwork period, Winrock implemented the following projects: potable water pump installation, improved gardening techniques that includes the installation of a garden pump, improved agricultural techniques called Conservation Farming, and hand-washing stations. Winrock also attempted to initiate a small animal husbandry vaccination project that was ultimately delayed due to logistical issues. The majority of ethnographic focus was concentrated on the implementation of the potable water and garden pumps and to a lesser extent on the improved agricultural techniques.

Winrock international is a U.S.-based international NGO. The expressed mission statement of Winrock, whose official slogan is “Putting Ideas to Work,” is to “empower the disadvantaged, increase economic opportunity, and sustain natural resources” (Winrock 2014). The underlying development philosophy that guides project design combines the delivery of knowledge and technology; the Mission Statement explains, “By linking local individuals and communities with new ideas and technology, Winrock is increasing long-term productivity,

equity and responsible resource management to benefit the poor and disadvantaged of the world” (Winrock 2014).

Winrock International employees in Burkina Faso combine the emphasis on technology and knowledge within project design and implementation. Similar to the educational background of Program administration, Winrock employees hold degrees or certificates beyond the Bachelors level, which are, by and large from physical science disciplines. The Country Directory, Phillipe, is French, while the ten additional staff are Burkinabè. Of these staff Issaka is the Technical Director; two others deal strictly with finances and official reporting; one other is the GIS specialist; and Constance and Alphonse are thematic specialists for WASH/Gender and agriculture respectively. Three other employees—Catherine and two others—are community mobilizers. Each mobilizer lives in or near the “beneficiary communities” that receive USAID WA-WASH intervention. Catherine, the mobilizer for the Commune of Tanghin-Dassouri, for instance, lives in Dassouri from where she would travel to Ouegoulega, Koudieri, and other villages in the commune. Catherine became a link between communities and Program, facilitating the design and implementation of all projects implemented in Ouegoulega to varying degrees.

The fieldwork period overlapped with the design and implementation of four projects in Ouegoulega. All projects generally follow similar implementation methods. First, a demonstration project is installed, free of charge, to publicize the project and to garner public interest. Winrock then advocates for the project and begins community outreach, compiling a list of interested individuals and households. Third, project implementation begins with community residents contributing to the labor and/or cost of project labor, supplies, or equipment. Finally Winrock reinforces the knowledge component of the project by holding *sensibilizations*

[awareness raising or information sessions; lit. bringing sense] to reiterate why the project is necessary and good. Here I provide a short description of each of the projects and the timeline of their implementation.

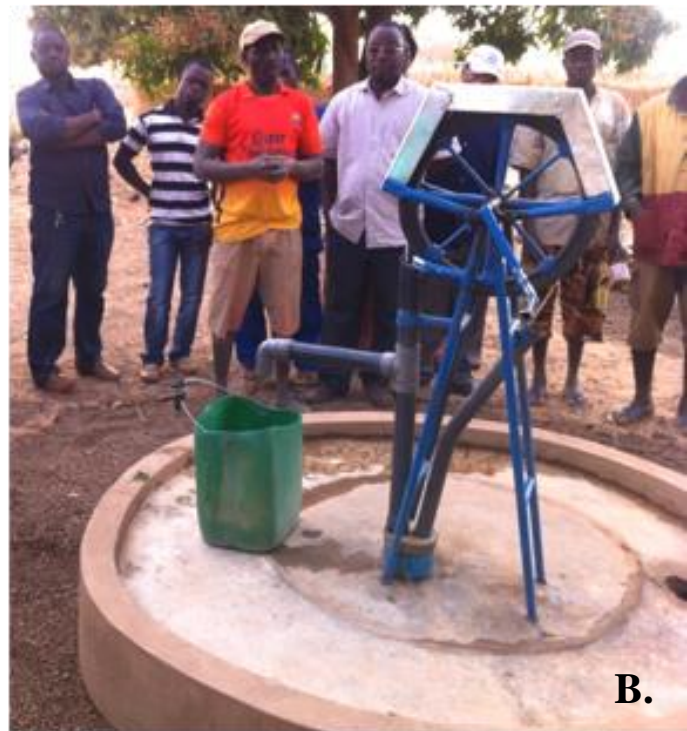
Hand-Washing Stations

The first project to be implemented in Ouegoulega, hand-washing stations, or *laves-mains*, are part of USAID WA-WASH’s Multiple Use Services (MUS) Provision. It is included within “Subactivity 1.1.3: improve health for poor rural households” (see figure 3.1, above). As such, the hand-washing stations are considered to be economical, consisting of a small water jug, suspended from a wood brace, and modified so that water flows through the spout by stepping on a foot pedal. A reused plastic soda bottle filled with liquid soap is also attached to the wood brace (figure 3.4 A). The entire station costs 1,250cfa, or US\$2.50, to install by community volunteers who are trained by Winrock. Winrock plans to promote the knowledge component of this project—sanitation and hygiene—through community theatre and community leaders (Imams, pastors, and naaba, for example). While I gathered some data related to this project a thorough exploration of it was impractical due to time constraints.

Potable Water Pump

The potable water pump project represents a significant effort of the Program’s WASH activities. Such activities are prioritized and given the most resources within the hierarchy of Program objectives (see Sub-IR A.1 in figure 3.1), constituting the primary activity in the Program’s MUS Provision. The demonstration potable water pump was installed in a centrally located compound

Figure 3.4: USAID WA-WASH Projects Implemented by Winrock in Ouegoulega. Left to right: A. Hand-Washing Station; B. Potable Water Pump; C. Garden Pump; D. Improved Gardening Techniques (shown: drip irrigation system and plastic mulch)



of Ouegoulega in October 2012. The pump consists of what Winrock calls a *puit-forage* [well-borehole] in which an existing well is “rehabilitated” with internal concrete rings and depth is added with a borehole. The potable water pump is capped with a cement top and the pump itself is a hand-crank, or manual, *pompe-en-corde* [hand crank, rope pump] (figure 3.4 B). The water is treated every six months with chloramine tablets that are available in Ouagadougou.

Within the nine months following the installation of the demonstration potable water pump, the Program had rehabilitated six wells. By the end of the fieldwork period the Program had installed a total of 31 potable water pumps throughout the Program Region. Winrock plans to install 24 potable water pumps in Ouegoulega and 135 in the entire program region by the end of USAID WA-WASH project date in July 2015.

Garden Project

The garden project technically consists of two separate projects: a garden pump and improved gardening techniques. By November 2013 only the demonstration phase of the project had been implemented. The garden pump is, like the potable water pump, a *puit-forage*. Since the water does not have to meet purification standards, the well is either closed or left open according to the proprietor’s discretion and topped with a *pompe-en-vélo* [bicycle crank, rope pump] (figure 3.4 C). The improved garden techniques consist of a drip irrigation system, plastic mulch, and imported seeds (figure 3.4 D). Together, these projects are aimed at improving household food security by allowing households to produce their own vegetables used in sauces, and increasing economic capacity since surplus produce can be sold in local markets. Additionally, these projects are also billed as increasing households’ capacity to adapt to climate change since the project provides a reliable source of water for household food production. As such, the gardening

project is part of Subactivity 3.1.2 that links WASH with MUS (see Sub-IR C.1 in figure 3.1), which is also the target area for Conservation Farming.

Conservation Farming

Conservation Farming (CF) is billed as “climate-smart agriculture” and is one of the few projects meant to directly increase communities’ capacity to adapt to continued climate change. CF is therefore a means for linking water conservation, food security, and climate change adaptation (part of Sub-IRC.1 in figure 3.1). The introduction of CF to Ouegoulega residents began in January 2013 with a weeklong information and training session for volunteer participants. During this training, farmers were informed that CF includes improved agricultural techniques such as reduced soil tilling, composting, micro-dosing manure and fertilizer, and improving seed strains at specified times throughout the year. The techniques were originally developed in Senegal under another USAID program and have since been transported throughout the region. In total, 20 Ouegoulega farmers—all male—volunteered to participate in the project

Like USAID WA-WASH generally, Winrock profits from the political economic history of the city where one finds a labor pool with advanced certificates and degrees and commercial enterprises flourish. Specifically, Winrock International forges connections with private sector entities. In the case of the potable water and garden pump projects, Winrock has contracted with two commercial enterprises: a metalwork atelier and borehole drill team. Both of these connections are meant to strengthen the durability or sustainability of the project, for, as Winrock employees suggest, local businesses are being trained to be able to market a new product or service. Although metalwork atelier and borehole drill team are based in Ouagadougou, Winrock

employees note that after the duration of the Program, individuals will be able to seek out these businesses on their own.

Ouagadougou, of course, presents one with significantly more economic opportunities than the surrounding rural environs. But what does this mean for the communities in those environs? I turn now to a description of Ouegoulega and Tama, two communities geographically close to Ouagadougou but politically and economically distant. Both communities also became my ethnographic homes because they represented a possible comparative analysis; Ouegoulega received significant attention from Winrock activities and later from visiting U.S. government officials, while Tama, similar to Ouegoulega, was all but ignored.²¹ As I argue in the following section, the asphalt bias that the Program replicates by concentrating the administration and planning of development intervention in Ouagadougou, creates for community residents a clear image that development is an external force.

OUEGOULEGA AND TAMA: BROTHER VILLAGES

As the opening vignette is meant to illustrate, the rural environs of Ouagadougou seem to present one with stark contrasts. But this perception leads to incomplete knowledge, for villages' proximities to Ouagadougou can greatly influence, though not determine, the socio-cultural patterns that are emergent there (Friedberg 2001). This section provides a detailed picture of the villages of Ouegoulega and Tama in the Commune of Tanghin-Dassouri. Ouegoulega received intensive attention from USAID WA-WASH projects while Tama did not. The two villages were

²¹ However, PROMACO implemented a point-of-use water purification project in Tama close to the completion of field research. The project consisted of Aquatabs that were sold at the local market at a subsidized price. Individuals buy the tablets and allow the required number dissolve in household water jugs. Due to the relative lateness of PROMACO's activities in Tama the project was not closely followed but are mentioned where appropriate in the following chapters.

initially chosen because they offered the possibility for a comparative analysis of how environmental and climate change knowledges are influenced by external development intervention. I cover environmental knowledge in Chapter Four and its relation to development in Chapter Six. Here, I cover the similarities and differences between Ouegoulega and Tama in order to make the results of these chapters more readable.

The villages are not notably far from Ouagadougou. The Commune of Tanghin-Dassouri lays 30km outside of Ougadougou city limits along one of the major paved roads that connects Ouagadougou to the west of the country. The commune is named after its largest town to which the locals simply refer as Dassouri to avoid confusion. Dassouri is situated directly on the paved road and is the only town in the commune to have electricity and running water, but these services can be unreliable. Because of its infrastructure and direct access to Ouagadougou, Dassouri is the seat of the commune, housing a mayor and deputy mayors in a sprawling complex on the eastern edge of town. In total, the commune is comprised of 31 villages with 55,172 residents in 8,692 households (INSD 2006 in WA-WASH 2012a).

Ouegoulega is perhaps the largest village in the commune and only about one kilometer from the paved road. It butts up against the north side of Dassouri on a dirt road that continues to the villages of Bazoulé and Tama. The vast majority of the village households are without running water or electricity, though a few households on the border of Dassouri have branched electrical cables to their houses. I was told when visiting some of these households that they used to be part of Dassouri but are now in Ouegoulega due to the fission-fusion of governmental decentralization and deconcentration. The majority of parents send their children to the local primary school, but for secondary education (i.e. *lycée*, or high school) Ouegoulega children attend the school in Dassouri. Parents also benefit from Dassouri's market held every three days,

which is the largest market in the commune and attracts residents from many commune villages. Today the population of Ouegoulega is 2,663 in 464 households (INSD 2006 in WA-WASH 2012c), and, as I draw out below, the proximity to Dassouri (as well as the ease of access to Ouagadougou) conditions a higher level of socioeconomic status in Ouegoulega relative to Tama.

Tama is much smaller than Ouegoulega and further from the paved road. Tama is roughly five kilometers past Ouegoulega on a winding dirt road and this distance from Dassouri and Ouagadougou greatly affects its demographics. The village is home to 907 residents in 143 households (INSD 2006 in WA-WASH 2012b). Most parents send their children to the local primary school and will only continue their education if the child shows promise and there is enough money in the household for school fees. Due to the distance from Dassouri, Tama has its own market (on days before Dassouri's market) that draws in residents from immediately surrounding villages as well as a few entrepreneurs from Ouagadougou. While many Tama residents will attend the major Dassouri market, Ouegoulega residents rarely visit Tama. Conversely to Ouegoulega, Tama's distance from Dassouri and Ouagadougou negatively influence households' capacity for capital accumulation. Interestingly, the contrasting relationships Tama and Ouegoulega have with economic opportunity belie a shared history.

Oral Histories

There are no official records documenting the founding of either Ouegoulega or Tama and many residents have only vague knowledge of their communities' histories. The majority of residents in both communities, however, know that Ouegoulega and Tama are "nearly the same family," as one man in Tama put it. Yet, there are several elder men in both villages who hold knowledge of the particulars of the histories though there are slight variations in the retelling. My intention

in recounting these narratives is to highlight their underlying homogeneity. Following Julie Cruikshank (2005) I do not contend that these histories reflect straightforward facts about the world, but rather inhabit the vivid gray space that exists between material and ideational interpretive extremes.

The tengsoaba of Tama is one of the eldest members of the community. He recounted that Tama was founded about 920 years ago. A man named Navoug Nikiema—one of two brothers—who came from a village called *Gela*²² [egg] in the present day Commune of Souloubila established the village. When the father of the two brothers passed away, the eldest brother received the entirety of inheritance. The younger brother, upset at receiving nothing, left Gela to avoid quarrelling with this brother and to preserve the family peace. He came to present day Tama, a land thick with forests and plentiful water. He founded the village, which means “don’t blame me,” and lived comfortably. With time, others—*petits frères* [little brothers]—from Gela heard of the new village and the bounty of the new region. Families from the lineage of Yalpougdou followed Navoug Nikiema and founded the community of Ouegoulega nearby. The tengsoaba said that this is why residents of Tama have Nikiema as their last name, and the majority of people in Ouegoulega have Yalpougdou. It is also why, he added, that when people from Tama visit Ouegoulega they are treated with respect as elder brothers, but if they return to Gela they much show respect to the descendants of those who stayed behind.

A variation was later recounted to me, which maintains the structure of family tension and migration but states that the younger brother left to found Tama because he was accused of stealing and eating his elder brother’s chicken. The younger brother denied this, they quarreled, and the younger brother left Gela. After his departure, the elder brother found the body of the

²² Another elder corroborated this version of the oral history but pronounced the natal community as Djela.

chicken in the bush. The elder brother followed his younger brother, apologized and pleaded with him to return home. The younger brother refused, having established himself in Tama. While this variation doesn't account for the founding of Ouegoulega this version and the one recounted by the tengsoaba both ennoble the migration of the younger brother as an act to preserve the family peace. More importantly, both versions include age hierarchy as a significant dimension of social structure (Skinner 1989). In both versions the elder brother wields enough social power to (in the first version) disenfranchise his younger brother or (in the second) marginalize him.

Political Structures

Being closely related, the two communities share the same basic social organizations and stratification. The members of households are usually immediate and extended cognates, and are headed by the senior male. Polygyny is a common practice regardless of religious affiliation.²³ The members live in an enclosed collection of structures called a compound. My key informant Moussa in Ouegoulega lived in a compound with his two wives and several children; he also cared for his elderly father and mother. This compound is located adjacent to his two brothers' compounds, the entire collection of which is called a concession.²⁴

²³ This was, at times, a point of contention among community members. While self-categorized Muslims and animists had no qualms about polygyny, some Christian men—Catholic and Protestant—complained of other Christians who take multiple wives, and in one interview a Protestant woman complained about “Christian men” generally who do this. I later found out that her husband had taken a second wife. But both Christian men and women also concede that many elders who are not Christian will pressure their Christian sons to take multiple wives. “One cannot refuse the father,” was a statement I heard from several people justifying Christian polygyny.

²⁴ Official USAID WA-WASH reports sometimes confused the two terms, which isn't necessarily incorrect. I follow residents' distinction between the *ménage* [house or compound] and concession [cluster of compounds of closely related kin].

Ouegoulega and Tama are also interconnected through a shared authority structure. Nanamsé and tengsoabadamba share complimentary and overlapping authority but this does not mean that each village contains both a naaba and tengsoaba. Rather certain villages contain one or the other (sometimes neither) but a naaba and tengsoaba have influence over several neighboring villages. For instance, the naaba of Ouegoulega has influence over the village of Tama as well as several other communities. The tengsoaba of Tama, likewise, has influence over several communities but this territory is not contiguous with the naaba of Ouegoulega. The tengsoaba of Tama, in fact, does not have influence over Ouegoulega; instead, Ouegoulega is under the influence of another tengsoaba to the east.

Increasingly, however, residents are side stepping the authority of the naaba in favor of the local government situated in Dassouri. One of the sub-chiefs or ministers of the naaba admitted that people are “turning towards” the mayor more often, though the naaba still handles some local land and marital disputes. This is a trend that was identified in the 1970s and seems to have continued with increasing governmental decentralization (Beucher 2014)²⁵. This also explains why residents are turning towards their local *conseil* [council member], which is an elected position. The role of the conseil is to liaise between the two, bringing information from the mayor to residents and passing along requests and concerns to the mayor’s office. Each community has a conseil, and while men usually fill this role, the conseil of Tama is a woman. The conseil of Tama, Fati, admitted that it is rare for women to hold such an office, but noted that the community had seen her work and service with other village groups and had confidence in her.

²⁵ Benoit Beucher notes that decentralization, though initiated shortly after independence in a move to subvert the traditional authority of the nanamsé, accelerated after, then, Haut Volta entered into a Structural Adjustment Program with the International Monetary Fund in the late 1960s.

Indeed there are several groups that often operate within each community, though their size and activities may vary widely. At the minimum there is the *Comité Villageoise du Développement* [Village Committee of Development, or CVD], which is composed of both men and women. CVDs are in many ways meant to direct the progress of the community by defining needs, proposing solutions, and motivating collective action (they are the offshoot of a program initiated by Sankara in order to promote self-reliance and collective action). CVDs offer an important opportunity for external organizations, such as USAID WA-WASH, to enter into communities and establish projects. Often times there are *groupements des femmes* [women's groups] that operate in parallel to the CVD, and whose purview is smaller scale projects specifically for women such as micro-finance. In Ouegoulega and Tama, the conseil, CVD, and groupement des femmes were the three most active groups, though I was told there were other religious-based and youth organizations.

The Economics of Land

The primary livelihood in both communities is rain-fed agriculture. Residents primarily grow sorghum and millet with some land devoted to maize. Small quantities of rice are cultivated in small depressions in the terrain where water collects during the rainy season. The harvested grain is stored in thatch granaries just outside household compounds. There are specific granaries for each household and often there are separate granaries for the men and women of the household. While men usually own the land that the entire family cultivates, women may receive permission to cultivate an additional small field from their husbands, relatives, or neighbors. Men become the owners of the family farm grain while women own the grain from fields they personally cultivate. Cultivation, or labor, rather than land ownership is the condition of ownership over

produce. If household finances are difficult however, women may sell a small quantity of their personal grain but are forbidden from doing so with their husbands' stock. Likewise, husbands are forbidden from selling their wives' stocks but I did hear rumors of men doing so without permission.

Land and grain ownership signifies severe gender asymmetry within both communities. Custom dictates that if a wife has a personal farm, she is only permitted to work in the fields in the mornings before the family begins work in the husbands' field. Or she may do so late in the evening when the "primary" work is finished. Many women I spoke with said they wake around 4 o'clock or earlier during the rainy season in order to have enough time to do some work in their fields as well as gather water for the day before the family leaves for the "family field." This is a common trend throughout sub-Saharan Africa (Gray and Kevane 1999) and many women with whom I spoke did not specifically perceive a gender division in field ownership, though they did speak frankly about the amount of labor they perform. The field of the male household head is often referred to as the "family field" even though women do not have ownership of the land or grain.

There are severe gender asymmetries in the practice of animal husbandry as well. While animal husbandry stores and enhances wealth within the household, residents claim that women are forbidden from owning most animals, which is in marked contrast shifting ownership along gender lines noted by Matthew Turner in Mali (1999b). The men of the households are permitted to raise any type and number of animals given their economic resources. Chickens are by far the cheapest and most numerous animals in which to invest, but men will also raise some guinea fowl, goats, sheep, pigs, and cattle if they have the resources to buy and feed the animals. Most families own, in addition to chickens, a small stock of goats and sheep, and sometimes one or

two cows. The wealthiest man in Tama is a shrewd buyer and seller of cattle, careful to calculate that the investment of feeding, vaccinating, and caring for the animals does not exceed the potential profits. During the year of fieldwork he cycled out his stock of cattle—about 7 to 10 head—about three times, using the profits to invest in an electrical generator. In stark contrast, women are only allowed to own pigs, and several own one or two. However, this means that women are restricted from significantly investing and safeguarding personal finances in livestock.

To compensate for such restrictions women often gather and sell “forest products” throughout the year. These products include *karité* nuts [*Vitellaria paradoxa*—used to make Shea butter—the seeds of the *nééré* tree [*Parkia biglobosa*—used as an addition to sauces and to make small treats usually sold to children coming to and from school—as well as herbs and leaves used to flavor sauces. The forest products that women sell, however, are termed by residents as *petit travail* [small labor]. Most people—men and women—do not consider it a significant source of capital accumulation.

Wealth, I was repeatedly told, comes from cultivating the land. “*Nous sommes cultivateurs*” [We are cultivators] is a phrase I heard throughout the fieldwork period. Men often expressed an ideal of manual agricultural labor in the family farms and personal gardens, saying that it is the labor of their ancestors and therefore the most natural labor for Mossi. There is a strong attachment to agriculture as the only proper labor afforded the Mossi, which stands in contrast to the few Peuhl families in the communities who, while settled and with family farms, identify as pastoralists. Therefore the ideal is to generate economic production through horticultural activity.

Unlike farming, gardening is primarily done during the dry season, beginning after the final harvest, when time and labor are liberated from rain-fed agriculture. Only a few intrepid

families with reliable access to groundwater sources maintained gardens year-round. In marked contrast to the gender division of gardening that Susanne Friedberg (2001) has identified in western Burkina Faso, women are allowed to maintain their own plots (figure 3.5) but must prioritize the work in their husbands' gardens (similar to the structure of agricultural labor). Unlike farming, however, garden produce is destined for local and regional markets rather than home storage and consumption. Similar to the rules of ownership over the agricultural harvest, individuals who garden are the owners of the produce and the money gained from selling it. Thus, women as well as men are able to generate personal income through gardening, though, here again, there are gender asymmetries in the quantity of that income.

Figure 3.5: Alimata of Ouegoulega and her dry season garden



More so than farming, gardening incurs a far greater financial investment from the household in terms of tools, equipment, and chemical inputs. While agricultural labor requires a sturdy *daba* [hand-held hoe], or perhaps a plow and draft animals to facilitate the work, gardening additionally requires watering cans or buckets, tools and materials to erect fences (to

block herds of roaming hungry animals during the dry season), and chemical fertilizers²⁶ and pesticides not to mention proximity and access to reliable groundwater resources such as a lake, well, or pump. For gardening success water and fertilizer are considered to be the two essential requirements. While many gardeners said that they knew of people who had enough money to buy and apply chemical fertilizer to their family farms I didn't witness anyone actually doing this. Most people simply appropriate their dry season garden plots into their rainy season fields so that the millet and sorghum benefit from residual fertilizer. The difference this appropriation makes can be striking (figure 3.6).

The groundwater that facilitates gardening is accessed through various means. The most common access point is the “traditional” or hand-dug well. These are considered to be temporary since they are prone to collapse after a few seasons, however, given enough financial resources, they may be fortified with rocks or cement. The individual or household that directly dug, or that paid for the professional team to dig, privately owns the well. In some cases, as in the household compound of my key informant, Moussa (figure 3.7), he currently owns the well that his father dug. Even though the wells are privately owned, individuals said that they would never refuse a request to draw water from it. Water, they repeatedly said, is for anyone who asks. Conversely, there are wells that are communally owned and some restrictions may be placed on these by consensus, such as not drawing water after a certain point in the year, or not using a community well prone to drying for non-consumptive purposes (such as watering one's garden).

²⁶ In Mooré, chemical fertilizer is *nasaara-ponsgo* from *nasaara*: white people/foreigner; and *ponsgo*: manure.

Figure 3.6: Family Farm in Ouegoulega. Land in background has been appropriated from a dry season garden with residual chemical fertilizer



Figure 3.7: Moussa and Family. Rokia, Moussa's second wife, faces away from the camera.



Additionally, there are several community-owned, manually operated pumps installed by the government and various development organizations on the edge of Ouegoulega close to Dassouri. Neither Ouegoulega nor Tama has a community lake.²⁷

Nearly all gardeners produce the same crops. Tomato, onion, chili pepper, and parsley are the main staple crops, though a gardener might include cucumber, carrot, and cabbage. The majority of gardeners emphasize the value of tomatoes, onions, peppers, and parsley because they are ubiquitous ingredients in sauces. Many foreign development workers complained that this homogeneity meant that gardeners don't understand market forces. Yet gardeners value these crops precisely because they are so ubiquitous; gardeners are assured that they will sell, unless the crop is spoiled, because they are ingredients in all staple sauces and dishes meaning that there is always a demand. In order to increase the crops' values, gardeners take their produce to larger markets such as Dassouri and Ouagadougou. Produce will fetch higher prices in urban centers where many residents don't cultivate or garden. If a gardener sells in Ouagadougou, he or she sells the produce to a middleman—often on credit—who will then transport and sell the produce to another merchant who then sells the produce to market customers. Generally, prices are higher at the end of the harvest season or out of season but without adequate storing, gardeners must sell their produce once harvested. They therefore plan and anticipate the season, timing their work and techniques so that they might potentially harvest and sell when prices are high.

Economic production in Tama via horticulture is more limited than in Ouegoulega due to the number of functioning water resources. Tama used to have a community lake constructed by a French organization but the retaining wall collapsed many years ago. Many Tama residents

²⁷ Community lakes dot the Burkinbè landscape; part of a government initiative begun in the late 20th century to provide more economic opportunities to rural, primarily agricultural communities.

complained about the lack of investment by the organization, how they have not come to repair or even check up on their project. Others sadly recounted other organizations who have come, surveyed the damage, and made promises of beginning a project to repair the wall, but who have ultimately failed to deliver. The fewer water resources of Tama leads to economic asymmetries between the villages as families have less disposable income to buy supplemental food, buy and maintain a moped or bike, pay for adequate healthcare, and send their children to school.

In contrast, Ouegoulega residents are productive gardeners. They are situated closer to Dassouri and Ouagadougou in comparison to Tama, benefiting from increased economic *as well as* development activity. Ouegoulega residents are able to more easily access markets that increase their capital accumulation from gardening than those in Tama. Additionally, Ouegoulega is the site of four development projects (mentioned above), two of which are specifically intended to improve existing wells by added depth and increasing water reliability. Ouegoulega, in short, can be seen as an example of the asphalt bias in development, which is the concentration of intervention activities in areas that are more accessible to operating organizations (Farooq 1988).

Observations of Change

The bias is exacerbated by the similarity of environmental problems Tama and Ouegoulega residents feel hinder their livelihood activities. As discussed in the introduction, residents note the same environmental changes as well as social changes. Initial interviews asked residents to recount what sort of changes, if any, they had noticed during their lifetimes. Often, residents intermingled social and environmental changes that directly affect their agricultural and horticultural labor. Table 3.1 lists the social, agricultural, and environmental changes—that have

been categorized—noted by residents of Ouegoulega and Tama. Generally speaking, residents responded that life has and is changing with new forms of work, social behaviors, and new forms of technology.²⁸ “Change is inevitable,” noted the Imam of Tama, “the world changes like people change.”

Table 3.1: Changes Observed by Tanghin-Dassouri Residents. Changes have been analytically categorized.

Social	
Fathers are less likely to pressure sons to marry	Fathers are less likely to pressure sons to have a certain number of children
Greater peace between Muslims and non-Muslims	More migrant labor
Less work available for youths	More public education
Greater ease of transportation (bicycles, mopeds, and cars)	More children/ Population increase
Less knowledge of traditions	Children’s behaviors (generally)
Greater gender equality	New sauce ingredients and foodstuffs
More choice (generally)	More commerce
New technologies	
Agricultural	
Draft animals and plows	New types of seeds
More chemical inputs	Wheelbarrow and jugs to transport water
Environmental	
Decreased quantity of rains	Decreased quality of rains
More variability of timing of rains	More wind during Harmattan
More dust during Harmattan	Increased temperatures/ intensity of sun
Reduced soil fertility	Fewer trees

The most important observations for this study are the changes listed in the environmental category. Residents were consistent in recounting these observations. There is evidence to suggest that it is a common narrative within the community, for youth (those under the age of 18 and still in lycée also recounted many of these changes, though it is unlikely that

²⁸ Mobile phones have become ubiquitous throughout West Africa. Many people own two or three phones that are connected to different service networks due to the very spotty cellular coverage. Additionally, many households own radios to which they listen to local news and music programs broadcast in Mooré in the evenings. I only met one resident who owned a television that he powered by hooking up to a car battery in order to watch movies while entertaining guests; the vast majority of residents do not own televisions.

they have longitudinally observed the environment. Nonetheless, the narrative is important because it runs parallel to the international narrative of the West African Sahel as exceptionally arid and on the verge of ecological collapse (Fairhead and Leach 1996, Leach and Mearns 1996, Leach and Fairhead 2000, Mortimore 1989). The narrative is also important because residents use it to frame their livelihood practice.

Residents are well aware that continued or increased rainfall variability can have dire consequences for their agricultural, horticultural, and animal husbandry activities. When asked what he might do if the rains continue to diminish or even dry completely, one resident of Tama chuckled and said, “It would be the end of the world!” Others are more hopefully, saying that the rains will eventually improve, that God would not abandon His children. While there is no consensus whether or not the rains will improve in the future, residents nonetheless correlated the environmental changes with their lack of financial resources. One man told me, “There is no money here. The soil is tired.”

USAID WA-WASH, at the start of the program period, also collected a similar list of residents’ observations from Tanghin-Dassouri. The list, on the surface, seems to validate the Program’s efforts in the region. For Program employees, this validation is strengthened when combined with local environmental data from the National Meteorological Institute that seems to corroborate residents’ observations. Figures 3.8 and 3.9 show rainfall and temperature data respectively from the Station of Ouagadougou, which includes the Commune of Tanghin-Dassouri, from 1961 to 2011. While the Program was galvanized by the data from the Meteorological Institute, seeing it as scientific support for residents’ observations, I make no such claim. Instead, I argue that the parallels between residents’ observations and scientific data opens important questions: Do those who use scientific data for support of a

changing climate understand the environment, natural processes, and natural resources in the same way as those who use experiential data for support? Do the similarities in data sets belie radically different knowledges of how the world works and our place in it?

Figure 3.8: Average Annual Rainfall, Station of Ouagadougou (Source: Direction Générale de la Météorologie du Burkina Faso)

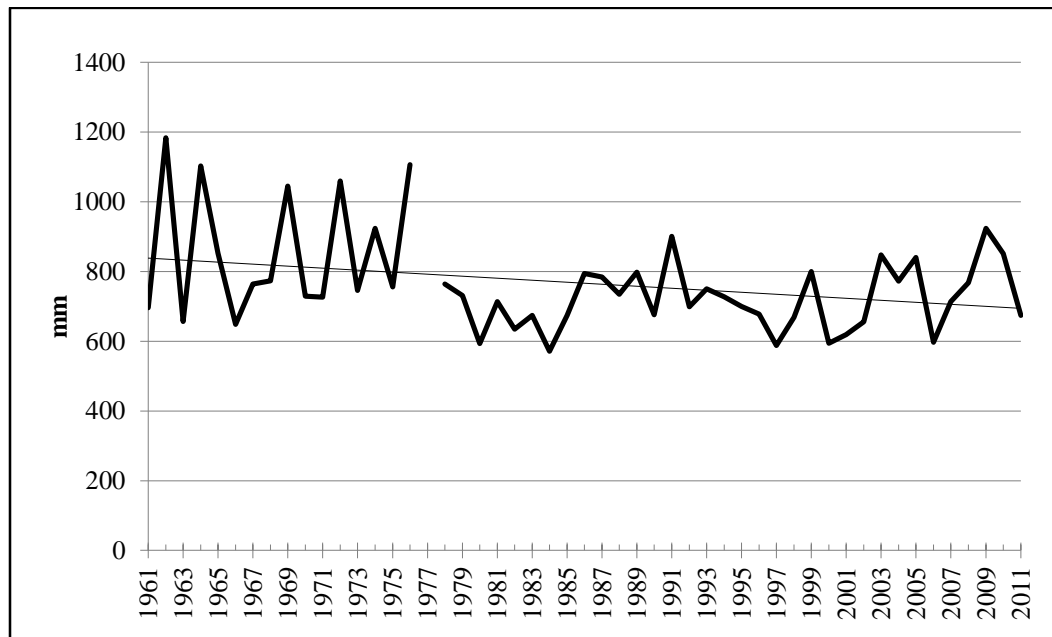
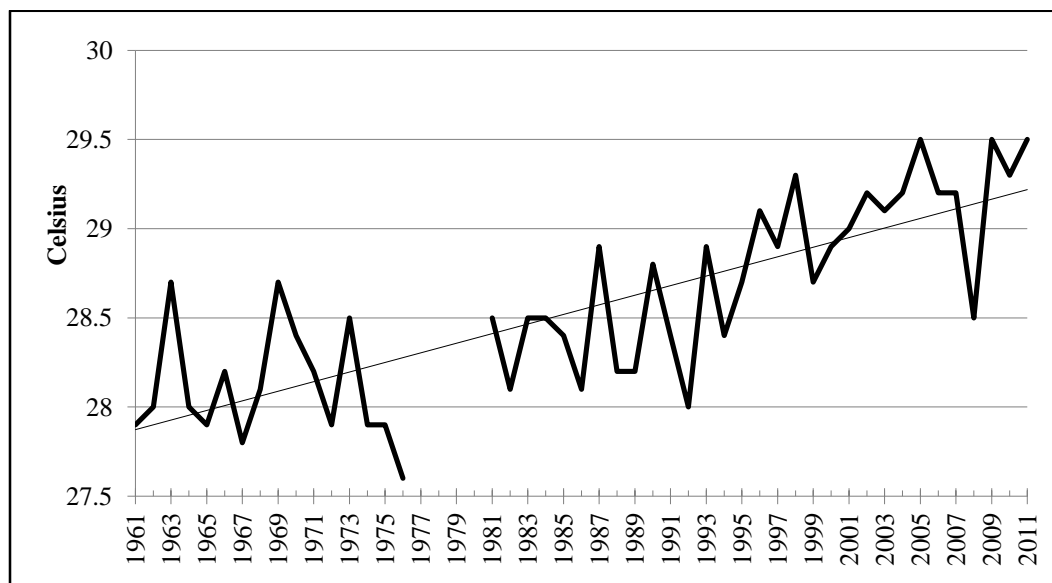


Figure 3.9: Average Annual Temperatures, Station of Ouagadougou (Source: Direction Générale de la Météorologie du Burkina Faso)



CONCLUSION

In this chapter I have taken a historical approach to outline the field sites of research: the offices of USAID WA-WASH and Winrock International in Ouagadougou and Ouegoulega and Tama in the Commune of Tanghin-Dassouri. These sites seem to present one with stark multidimensional divisions—urban and rural, developed and underdeveloped, intellectual labor and manual labor—but to accept and perpetuate such divisions is to reify simplistic constructions of the social and geographical landscapes. Many scholars have shown that the urban and rural are better understood as nodes with interconnected and ever-shifting prehensions of political economy (Hill 1970, Marguerat 1994, Piot 1999). As such, Ouagadougou and Tanghin-Dassouri are not independent, isolated spheres. The centralization and condensation of political economy during the Colonial Era turned Ouagadougou into a development island with a regional sphere of influence. Rural environs oriented toward the city allowing those in greater proximity and infrastructural access to draw advantage from it. These advantages continue today as the residents of Ouegoulega, closer to Ouagadougou than those in Tama, benefit from the access to markets, public schools, and the infrastructures these services denote.

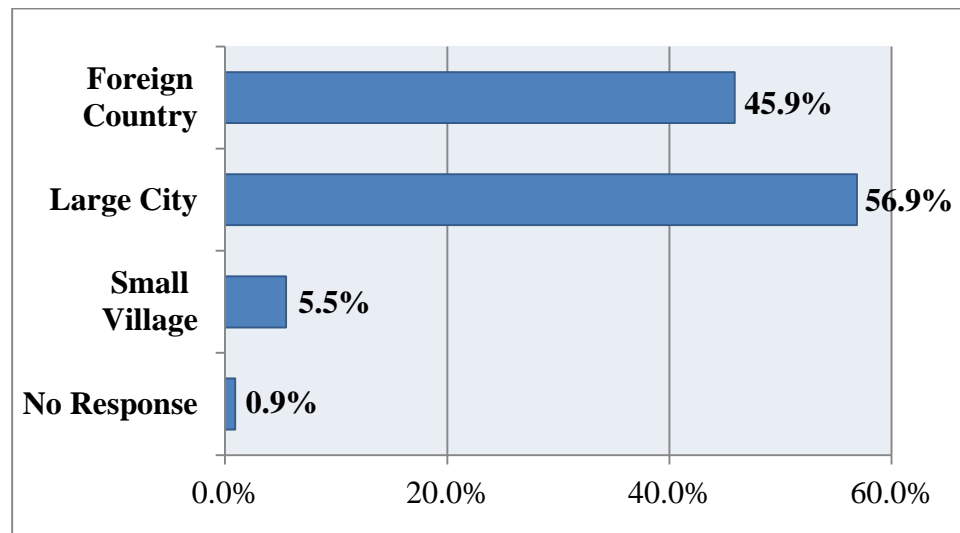
The institutional networks of development, as well as its epistemic components, also map onto this uneven geography. USAID WA-WASH is a node in an international network of institutional, political economic, and epistemic interconnections. Their location in Ouagadougou conditions infrastructural and economic benefits. The location also conditions who is enwrapped within the network as development laborers. As illustrated by their hiring practices, the Program seeks out those employees with advanced formal education in science and development management. Such hiring practices are not unique among the nearly 600 other development organizations in Burkina Faso—the majority of which are based in Ouagadougou. But it also

signals that development labor is intellectual labor, for those hired must have advanced scientific degrees.

Evidence shows that men and women, youth and elders, those in public school and those without, are influenced by the concentration of development in the urban sectors. Because development has become the orienting principle of our time (Peet and Hartwick 2009) and because development organizations increasingly compete with host States for political economic resources (Ferguson 2006), the concentration of development organizations in Ouagadougou construct the city as the generator of development. *Il y a l'argent là-bas* [There is money there], Issa, a middle-aged man of Ouegoulega told me about Ouagadougou.

Similar to Issa, many youth of both Ouegoulega and Tama see the city as a site of economic opportunity. The city is still the site of development generation but those youths who are in secondary school in Tanghin-Dassouri are beginning to see themselves as capable of getting hired and securing a position with a development organization—a relatively stable and lucrative employment. In a survey conducted with two classes of students in their final year of lycée and a third of a second to last year class (109 students in total), the overwhelming majority noted that their ideal place of residence would be a large city in Burkina Faso and/or abroad (figure 3.10). The reason for this hoped-for “brain drain” is that students see habitation in the city as a means to access capital, for in the city one gains access to employment. Students stated that their ideal professions are lawyer, doctor, teacher, and even development worker, but not, like many of their parents, agriculturalist.

Figure 3.10: Lycée Students' Ideal Place of Residence



The educational acculturation begun in the Colonial Era continues today in new guise. While formal, public education is no longer the explicit process of social engineering—of creating obedient colonial subjects—it does appear to carry with it a significant degree of acculturation. Children in public school learn more than knowledge; “They are different,” is a response I received from many parents of children in secondary public school in Tanghin-Dassouri. What different knowledge, then, is offered through formal public education and how is this different from one’s natal community? What, if any, of this new knowledge and culture is carried over into the professional world in development labor? The following chapter discusses the first of these questions through an explication of the cultural models of the environment and climate change held by residents of Tanghin-Dassouri and USAID WA-WASH employees.

CHAPTER FOUR

GOD AND TECHNOSCIENCE: CULTURAL MODELS OF THE ENVIRONMENT AND CLIMATE CHANGE

Excerpt from my field notebook, 24 January 2014

Adama, one of the first men I met in Tama, has invited me to visit with him during the *fête de Mouloude*.²⁹ I join his friends and relatives who have come to visit in his house. Adama is perhaps the wealthiest resident of Tama. His large, cement house has three rooms and a tin roof in a community of houses constructed with mud bricks, many of which are in the traditional circular style with thatched roofs. Most houses in Tama have little furniture: perhaps a few small stools and a bench, and mats or maybe a raised platform for sleeping. In contrast, the main room in Adama's house is filled with large sofas and overstuffed chairs carted in from Dassouri and Ouagadougou. The furniture surrounds a large entertainment unit for a television that's hooked up to a DVD player. After our first interview I commented on the electrical equipment and light fixtures. He laughed and proudly showed me a contraption that will eventually process cow manure, making the methane useable to power a large electrical generator. It's a gift from an NGO and when it's done he will be the first in the village with fairly consistent, reliable

²⁹ In Arabic this celebration is known as Mawlid al-Nabi or simply Mawlid. I use here the phonetic spelling used by Tama residents when referring to the celebration. Others in the commune of Tanghin-Dassouri and the city of Ouagadougou also used this pronunciation. The celebration marks the Prophet Mohammad's birthday and is a time for reflecting on his life and teachings.

electricity. Until then Adama, like several other community residents, hooks his electrical equipment to a car battery. This is how he entertains his guests during Mouloude.

One light bulb is hooked up to the battery, casting a harsh light in the night on me and the relatives and friends from nearby villages. We sit on the furniture in a circle, bending low to scoop rice out of a communal bowl. Adama puts in a DVD—a pirated disc with a few kung fu movies—to entertain us. The chitchat dies down as our attentions turn to the television. The scene opens with a politician driving an expensive car, his wife in the passenger seat and a nanny with two infants in the back. Out of nowhere another car begins to pursue the family, herding their car into a field where others are already waiting, their headlights spotlighting the politician, locking him in their sights. Men with automatic rifles step out of the cars and open fire on the politician’s family. Glass shatters, sparks fly, the wife and nanny scream. The politician steps out of the car and returns fire from a small revolver. He’s quickly cut down as blood splatters over the hood and windshield. His wife runs out of the car to him. The force of the bullets knock her back against the door, blood smears over the back window under which the nanny huddles trying to protect the infants. The surrounding men continue to fire on the car but the nanny gathers up one of the infants, leaving the other in the backseat, and tries to escape into the field. She’s shot in the back only feet from the car. A man walks up to where she lies in the grass, still trying to protect the child, and shoots the crying baby.

“How violent!” exclaims one of the visitors breaking the spell. Others in the room click their tongues in agreement and I click with them. We’re all shocked by the violence. Adama gets up, ejects the disc, and begins searching for another. He turns to me, the blue screen of the television throwing stark light onto his grinning face. “This is why we don’t have rain,” he says as others chuckle and click. “*Yaa sida*,” several people murmur, “it’s true.”

INTRODUCTION

By the time I had this experience at Adama's house I had already been able to conduct many interviews in Tama and Ouegoulega. I had catalogued residents' observations of environmental change (see table 3.1 in Chapter Three) and I had a vague idea that community residents did not subscribe to the stark division between nature and society that has been one of the fundamental dichotomies in cultures born in the Enlightenment (Ingold 2000). The experience at Adama's house struck me and remained with me. Interviews from this point took a profound turn. I knew what questions to ask and what terms to use. What is more is that I felt as axiomatic that the way we understand the world has profound implications for how we engage with it.

This chapter explores the knowledges of climate change and the environment held by residents of Tanghin-Dassouri and employees of USAID WA-WASH. I used Cultural Model Analysis (CMA) to uncover the two cultural models of the environment that play indirect yet important roles in the development moment. The first model is held by Tama and Ouegoulega residents who have either had no formal education or who have attended public school through the first cycle; simply called Model 1. This model defines climate change as a divine punishment from God for poor social behaviors such as war, rape, and terrorism. In contrast, lycée students still residing in Tama and Ouegoulega as well as USAID WA-WASH employees hold Model 2, which defines climate change as a consequence of excessive carbon emissions.

After presenting a description of the CMA methodology, I explore the elements of each cultural model. On the surface the two cultural models present a stark division between religious knowledge and scientific knowledge. Model 1 places the environment and humans within the domain of God who regulates natural processes according to human behaviors that follow

traditions and divine law. In contrast, Model 2 envisions the environment to be a mechanistic system governed by objective, natural laws. Modification of any part in that system exposes complex cause-effect relationships. Model 1 defines climate change as divine punishment for behaviors that transgress God's law, while Model 2 defines climate change as the consequence of increasing carbon emissions, deforestation and large-scale industry.

The discussion within this chapter is largely descriptive. I aim to present the two cultural models to build a foundation for subsequent chapters. The lack of analysis is not meant to leave the models as a contrasting relationship between religion and science. To do so would be to reify culturally constructed Western epistemological categories. Chapter Five explores the complex socio-historical relationships and interactions between the models, arguing that epistemically, the knowledges are not strictly divided. Yet the social functions and social structures that are co-produced with these knowledges, nonetheless, result in a strict division between the knowledges when they are acted upon (Chapter Six). This analysis is brought into full articulation in an exploration of the power dynamics that are interwoven through the social function of two knowledges in Chapter Seven. These chapters will show that how we understand the world influences how we interact with it.

It is important to clarify that the data presented here do not constitute the entire knowledge-networks mobilized during the development process by USAID WA-WASH staff, Winrock employees, or residents of Tama and Ouegoulega. The cultural models presented below must be seen as nodes embedded within larger networks of knowledge. The initial exploration of climate change in the development moment necessarily led to broader discussions of humans' roles within the environment, economics and prospects for the future, attitudes toward education, and, as we will see in subsequent chapters, desires for and aversions to external development

intervention. These linkages and the social structures with which they are co-produced are traced through the rest of the chapters.

Cultural Model Analysis

Cultural Model Analysis (CMA) forms the central methodology of the data presented in this chapter. The fundamental axiom of CMA is that people cannot directly engage the world in all of its complexity. Instead, individuals create models, or mental representations, to simplify the complexity and to inform action (Paolisso 2002). Due to similar socio-historical influences communities of individuals hold the same model that allows individuals and the group to understand, interpret, and explain the world (Quinn and Holland 1987). For example, this method has been used to explore moral consciousness among the Newar (Parish 1991), navigation among Pacific islanders (Gladwin 1970), Congolese and Ugandan logics of Ebola epidemics (Hewlett and Hewlett 2008), and environmental attitudes among Americans (Kempton, Boster, and Hartley 1996). By reconstructing the implicit models that individuals share as members of a community, we are given valuable insight into shared attitudes, opinions, and beliefs. This perspective, of course, is similar to the French scholars of West Africa, but extending the theoretical implications of the methodology further suggests that a cultural model can be understood as a rough blueprint—though certainly not ahistorical and static—for how communities respond to events and act in the world; if we might describe how a particular topic is understood, then we might explain certain behaviors related to that topic. This chapter discusses the models but the following chapters show how these models influence actions and interactions.

While CMA aims to uncover underlying similarities within a model it does not deny the existence of variability in personal life experiences, or the importance of diversity in different knowledges within a single community. Kempton et al. (1996), for example, have shown that even while there is important demographic variability Americans have similar and overlapping environmental values. Similarly, differences in individual knowledge within a group can shed valuable insight into social functions of knowledge and the underlying power dynamics by which they are conditioned. Differences within group knowledge may have implications for how we understand larger globalized fields of power such as (neo-) colonialism, development and the relationship between science and other ways of knowing (Paolisso 2002).

With such variability in mind, CMA does not presuppose the character of the models or relationships that comprise it. CMA does not assume that models, much less the knowledge-networks in which they are interlinked, are fundamentally cohesive or contradictory, relatively stable or in violent flux. CMA does, however, recognize that models are relatively tacit and unexamined by individuals. Thus, our views of the world—the unarticulated knowledges that we hold to be true and that motivate our behaviors—are active constructions and must be understood within wider fields of significance. The tacit stability of cultural models is held in dynamic tension with their emergent nature.

There are of course limitations to CMA. If we understand knowledges to be emergent then CMA can only provide us with a snapshot of knowledge in time. CMA would need to be carried out longitudinally in order to provide us with a synchronic analysis of how a particular model and its knowledge-network change over time. Additionally, a snapshot cannot reveal the origins or history of a model; though this is not necessary in this stage of the analysis. Chapter Five explores the possible historical influences of the contemporary formations of the cultural

models in operation, and while a thorough historical treatment proved difficult due to the lack of historical records on this topic, the present analysis is still robust. Additionally, the linkages between these models and additional domains of knowledge within their respective knowledge-networks, as I show in subsequent chapters, are vital for understanding individuals' actions and groups' interactive behaviors. Finally, even though origins are not readily evident through CMA the possibility of identifying important historical influences is not precluded. When coupled with an historical perspective CMA can produce a rich analysis of a model within a knowledge-network that is neither static nor bounded, but one that is socio-historically situated and contingent.

Methodology

What, then, constitutes Cultural Model Analysis? Roy D'Andrade (2005) has laid out a systematic methodology for CMA. Although in truth the steps overlap and build upon one another, the advised starting point is to have some indication that the model one hopes to uncover does indeed exist. The second step is to use demographic information to construct a sampling system to guide interviews and aid the identification of epistemic variability within the communities. Third, in-depth interviews are conducted and then, fourth, analyzed in order to identify common themes and verbally expressed cognitive connections. Analysis is an inductive process that isolates then categorizes propositions into themes, which are arranged hierarchically—in causal or consequential order—and horizontally—in order of kind or degree. This arrangement is driven by the contexts of the proposition themes within interviews, linking them into a logical ordering expressed by interviewees. The fifth step is to conduct a verification survey with residents who were not interviewed. The survey consists of the basic propositions of

the draft cultural model whose validity residents either confirm or deny. Confirmation at or above a predetermined percentage validates a given proposition that is then included in the final cultural model.

As illustrated in the opening vignette, Tanghin-Dassouri residents intimated a particular model for understanding the world. Conversations early in fieldwork with Tanghin-Dassouri residents revealed that everyone experiences climatic shifts that, many claim, did not befall their parents or older generations. Many place these climatic changes within larger changes in the world and attribute them to the will of God. From these conversations, I could reliably assume that individuals understand climate change according to a larger logic structure that extends beyond decontextualized observations.

The second step was to draw from available demographic information to begin constructing an appropriate sample size. In Burkina Faso the most recent government census data for the villages of Ouegoulega and Tama dates to 2006. This information includes total population and number of households, gender percentages, religious affiliation, and principle labor. Unfortunately, this information was too limited for a proper sampling technique.

In an effort to follow stratified random sampling in at least one of the two communities in Tanghin-Dassouri, I conducted a census in Tama with the help of two research assistants, Amadou Nikema and Ali Nikiema. This census gathered information on gender, age, type and level of education, religious affiliation, principle labor, personal identifiers in order to be able to locate the individual if necessary, and whether or not they would be willing to engage in interviews. This census is not exhaustive of all residents. Before gathering information individuals were first asked to consent to participate. It is estimated that nearly 100 individuals

refused to participate in the census.³⁰ Some individuals cited a distrust of formal data collection and linked it with large-scale government initiatives. The census also did not include individuals under 18 years old. In total 162 adult residents of Tama participated in the census.

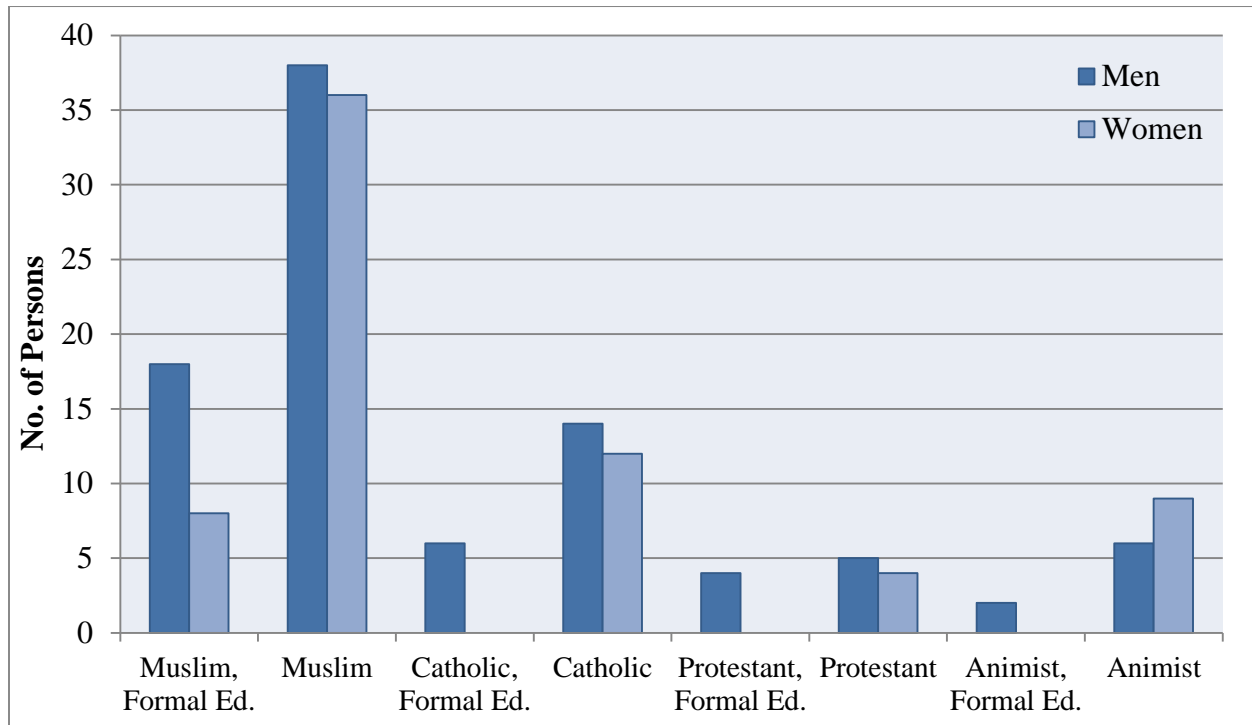
Due to time constraints a census of Ouegoulega was impractical. With the help of my research assistant in Ouegoulega, Fidele Lourgo, we conducted in-depth interviews with residents according to the demographic strata of the 2006 government census and personal census of Tama. This was justified given the shared history, close proximity, and similar government census data available. At least two individuals from each stratum were interviewed in Ouegoulega before concentrating on individuals directly and indirectly involved in USAID WA-WASH project implementation. Information from interviews was not significantly different from Tama interviews suggesting that the cultural models of the two communities were similar if not that same. Such modification of the methods was further justified with the use of the verification survey; if the cultural models between the two communities were significantly different the percentage confirmation for each proposition would not be congruent. As discussed below, residents of Ouegoulega and Tama hold the same cultural model.

Using random sampling in Tama, however, entailed stratifying the community according to gender, religious affiliation, and formal education. The results of this stratification are shown in figure 4.1 in which there are 16 categories, three of them with zero individuals. Age was not included in the final strata due to the infrequency with which people knew their birth dates.

Principle labor was also dropped from the stratification because everyone claimed to be an

³⁰ There is the potential that this refusal rate initially skewed the original interview sample. At the time, I hoped that any alteration of the data would either be brought to the fore or nullified through the final verification survey. While there are certain propositions on which Tama and Ouegoulega residents significantly disagreed, possibly indicating effects of the refusal rate, the majority of respondents agreed and confirmed the same propositions. It is my opinion that the refusal rate did not significantly skew the formation of Model 1, but there is likely additional information that might, through future research, add depth and detail to it.

Figure 4.1: Tama Census Participants Stratified by Gender, Religious Affiliation and Formal Education



agriculturalist. Some women in Tama identified their principle labor as “housekeeper,” although they affirmed that they worked on the family farms that are owned by their husbands or fathers.

Once the community strata were compiled, the fourth step was to select individuals from each category for in-depth interviews. Both systematic and stratified random sampling was attempted but both methods were complicated due to the low numbers of individuals in the strata. Additionally, several individuals within some strata noted that they would not be willing to participate in interviews. This further reduced the sample population size. Sampling accuracy and precision were further confounded during the interview process. Several individuals were uncertain of my work and reticent to answer questions. Although every effort was made to put respondents at ease by speaking Mooré, beginning interviews with basic information, putting away the field notebook, and, where appropriate, joking, some individuals were not forthcoming. Others volunteered to be interviewed and I never denied a request. The end goal was to interview

four individuals from each group—largely due to the limited size of each stratum—but if the group included fewer than four, all individuals were contacted but not pressured to participate.

Approximately 30 interviews were initially conducted in Tama. This is an approximation because as the research period progressed—as my social relationships strengthened—interviews blended into informal conversations. In such instances informal conversations were recorded from memory in my field notebook as soon as possible. In all other cases interviews were audio recorded with the interviewees' permission. Interviews and conversations were semi-structured (Bernard 2006). Specific questions and thematic topics were developed ahead of the interview and used to begin the conversation. Subsequent questions were adapted from the interviewee's responses allowing the interviewee to direct the conversation by focusing on those topics, examples, and recollections he or she deemed pertinent.

All recorded interviews were then transcribed and examined for propositions. Propositions are commonly expressed sentiments, themes, and patterns that recover the gist of the information conveyed (D'Andrade 2005). For example, from the statement, "At this precise moment [during the season of heat], trees give new leaves. It's the new leaves that call in the rain," we can identify two propositions: 1) Trees give new leaves in the season of heat; and 2) New leaves on trees call in the rain. Once all interviews and conversations were examined for propositions, the next and most important analytical step is to group together similar propositions. This is done using inductive reasoning to arrange groups of propositions according to the logic embedded within them. The hierarchical and horizontal arrangement of propositions, linking information together into a coherent structure, constitutes a cultural model.

After having ordered the propositions hierarchically and horizontally, the last step is to verify the model. This step lends a level of certitude to the models and permits refinement. The

survey consists of the logical ordering of propositions and survey respondents are asked to agree or disagree with the statement.³¹ For example, participants were asked to agree or disagree with the following statement: God changes the rain because of bad behaviors people commit against one another. We administered the same verification survey to individuals in Tama and Ouegoulega. In total, 55 individuals in Tama and 59 in Ouegoulega from all demographic strata were given the verification survey. D'Andrade (2005) states that survey verification is still a relatively new and evolving process but has settled on 92% agreement as a threshold for accepting a proposition. Due to a relatively small sample size I used 80% as my confirmation threshold and included in the verification survey an opportunity for respondents to qualify or modify a proposition if they only slightly disagreed with it. Modifying data were applied to propositions that were confirmed between 70% and 80%. In nearly all cases respondents in both Tama and Ouegoulega modified the proposition in similar ways leading to the conclusion that the proposition was either incorrectly defined or mistranslated from French to Mooré. These modified propositions were refined and remained within the final model. Those propositions below 70% acceptance were rejected from the final model.

KNOWLEDGES OF CLIMATE CHANGE: MODEL 1 AND MODEL 2

The understanding of what social axes are most salient to residents of Tama and Ouegoulega was a gradual process. I held two community meetings to introduce myself and to gain consent to conduct my research with the residents. The spatial arrangement of the attendees confirmed that

³¹ D'Andrade (2005) and Quinn (1978) have shown how the facts collected in the process of discovery can also be used to verify the conclusion. They derive this argument from work conducted in linguistics and psychology, stating that verification is fundamentally a process of eliminating alternative hypotheses. With a high enough degree of confirmation from survey respondents one can be reasonably assured that the cultural model is the only probable model.

gender is a strict social axis. It was only later in conversation that someone pointed out that the Muslims of the groups did not want to sit close to the animists because they consider them unclean. Subsequent conversations revealed that Catholics and Protestants are fairly sensitive to their respective denominational affiliations. Both Catholics and Protestants with whom I spoke explicitly avoided the umbrella term “Christian,” specifying their sect and emphasizing that one is not like the other. From these experiences it is clear that gender and religion are fundamental social axes of the communities.

Many anthropologists have illustrated how formal, public education has a significant impact on social structure, being tied as it is to particularly Western knowledge-networks (Ferguson 2006, Skinner 1974, Stoler 2002). But public, state-funded education is not the only type of formal education available to community residents. Other forms include adult literacy education (often administered in Mooré), French language training, and Koranic education. Many older informants said they received “traditional” or “familial” education in contradistinction to the public education received by the majority of contemporary youth.³² Even with the multiplicity of different types of education informants did not identify literacy, French, familial, or Koranic educations as fundamentally distinct from one another. The most salient difference is between these types of education and public education. Repeatedly, informants claimed that the children who receive public education are “just different.” For this reason I took the level of public education as a potentially more salient independent variable and did not differentiate between literacy, French, familial, and Koranic educations.

Additionally, wealth is another potential independent variable. However, wealth in West Africa is an extremely sensitive topic of discussion. People often speak about market prices and

³² Education information is provided in Appendix A.

the potential gains from selling produce but do not specify how much wealth they currently possess or how much profit is made from a transaction. The specifics of household finances are often reserved for close social relationships that include kinship as well as strong gift-giving relationships. The use of wealth proxies—such as means of transportation or functioning electronics—was considered but dropped due to time constraints and, at the time of the census in Tama and initial interviews, my unfamiliar and weak position within the communities. In the end age, gender, religion, and level of public education were the independent variables chosen, though there remains the potential that wealth is a significant independent variable.

The plurality of these variables, although they contributed to the construction of several demographic strata with few or no individuals, were maintained in order to combat the narrative of homogeneity within African communities and potentially identify sub-groups with similar cultural models of climate change. All interviews began with the same set of questions designed to set the interviewee at ease and gradually acquire more in-depth information. To further safeguard confidentiality and avoid biased or lead-in questions, interviewees were not told how others already interviewed responded. All were asked variations on such questions as: Have you experienced low rainfall in your lifetime? Did your parents? Why have the rains diminished? Subsequent questions were adapted to the particular responses given by different interviewees, and intended to explore variability of responses.

Surprisingly, among community residents there is a remarkable degree of homogeneity among responses. There are no significant differences in responses along age, gender, or religion axes. Men and women, of all ages, and all religions had the same cultural model of the environment and climate change. Nor do results indicate any significant differences between Tama and Ouegoulega residents. The majority of those with some public education also hold the

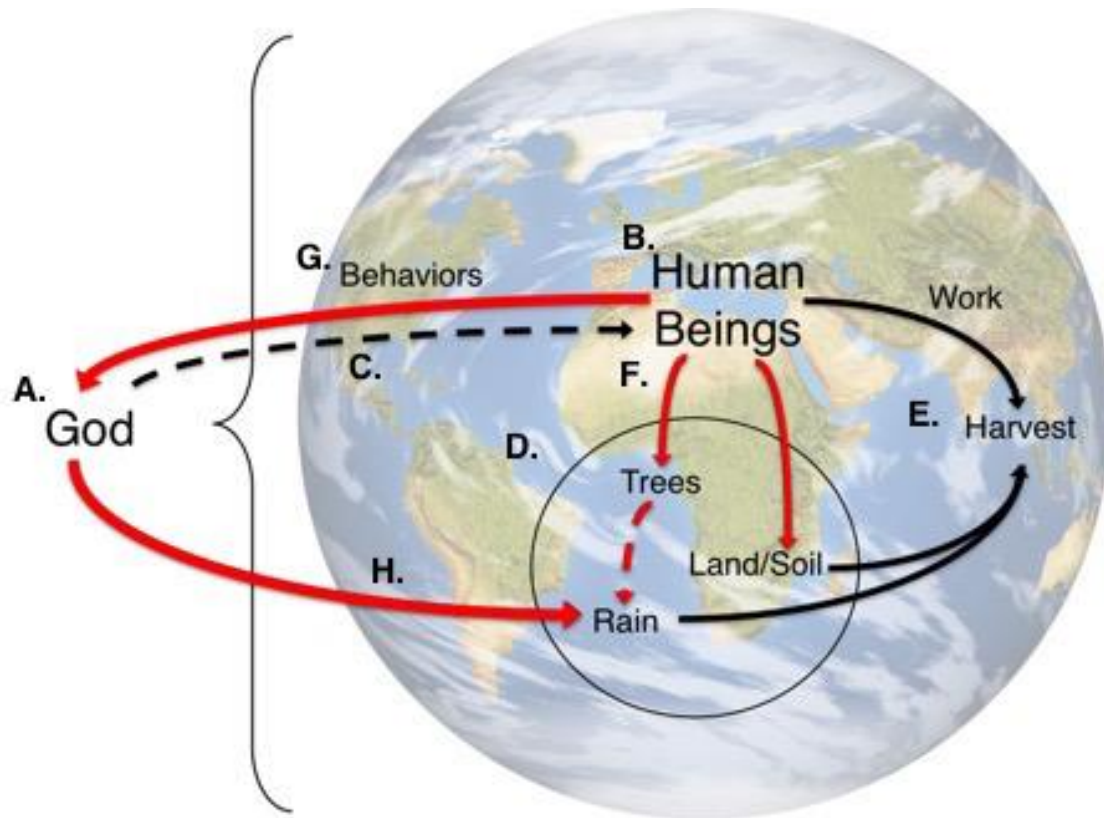
same cultural model. Importantly, however, these individuals—young and old adults—had attended public school only through the primary cycle. The education system in Burkina Faso is modeled on the French system that divides the tiers into primary cycle—the first six grades: CP1, CP2, CE1, CE2, CM1 and CM2—and secondary cycle: 6th, 5th, 4th, 3rd, 2nd, 1st, and Terminale. Those who had attended public school between CP1 and CM2 hold the same cultural model of the environment as those who had not attended public school. Those who had attended the secondary cycle are the only demographic strata to hold a radically different cultural model, which, as I show below, is the same model held by USAID WA-WASH employees. I label these Model 1 and Model 2 respectively.

Model 1: God

Figure 4.2 represents Model 1. God (A.) occupies a key position in this model for He is positioned above and within all things, interwoven within the fabric of the world, yet distant and only passively involved. This starting point implicates the relationship between the divine and human beings that constructs humans—us—as children left to our own devices (B.). God created the world for our use and exploitation, leaving instruction in traditions and religions about proper action toward one another and the wider world. While God only rarely acts on human lives directly (C.), He provides us with the necessities for prosperity such as the sun, rain, and natural resources (D.). We transform the sun and rain through intense manual labor into agricultural produce (E.). God, when pleased with His children, blesses us with enough sunshine and rainfall to produce bountiful harvests that, ideally, last until the next harvest. While humans may influence natural resources through direct behavior (F.), these actions are insignificant compared with God's influence. When displeased with us, God withholds or shifts these necessities making

agricultural production more unreliable. God is displeased by global social behavior divergent from the instruction of tradition and religion (G.). God is punishing us for war, rape, theft, and terrorism among other behaviors and consequently shifting rainfall patterns (H.). I explain each of these elements in succession.³³

Figure 4.2: Model 1 of Climate Change³⁴



³³ Propositions and verification rates are listed in Appendix B.

³⁴ It is difficult to determine if Tanghin-Dassouri residents also visualize the world from this “spaceship earth” image. However, at one point several resident men collaborated on a representation of the community I had asked them to draw. The resulting map is very similar to governmental maps that take the “God-eye,” suggesting that either the view from above is how the residents thought I wanted the map or how they also visualize the community. If the latter, then this may indicate a globalized component to spatial visualization.

God and Humans; The Sacred and Profane

Model 1, by defining human social expression vis-à-vis the divinity of God, is structured along one of the most fundamental divisions in cultures: the sacred and the profane (Douglas 2007, Durkheim 2001). Those who hold to Model 1—whether self-categorized as Muslim, Catholic, Protestant, or animist—recount how God created the world in all of its complexity. Everything exists within the domain of God and is defined in relation to the teachings conveyed through traditions, the Bible, and Koran. All informants spoke of traditions and religious teachings in the same manner, characterizing them as sacred teachings to live according to divine law. It is our task, the task of humans, to abide by these divine laws and avoid slipping into the realm of the profane. Explicitly informants constructed God as a parent with a hierarchical relationship between God and us. But implicit within the God-human hierarchy are material and epistemic dimensions of the sacred.

The plurality of the sacred is expressed within the dual nature of God's role in the world. God is both within—driving the processes of the world—and apart from—watching and judging—creation. The first role, of God within creation, is predicated in the act of creation as an act of divine manifestation. Residents said that God is within all things; the world—the sun and rain, the trees and soil, and all animals—comes from and has qualities of God. God, in this sense, is the foundation upon which human existence is possible. Without the sun and rain, without animals and food, humans would perish. “God carries us,” one middle-aged man told me. Many individuals noted that the rains ultimately come from God; that He is the source of such natural processes. “How do we know it is God,” one man rhetorically questioned me on a violently windy day, “because it is all like this wind. The wind blows and blows but who knows where it comes from? Only God knows where it comes from.” Here, the double meaning of “creation”—

as noun and verb—is illustrated. On the one hand God created the earth. On the other, God is the driving force—the kinetic energy—that continues the eternal processes of life, of creation. Both definitions nonetheless reference the materiality of the world and pragmatics of the sacred as manifest in natural processes.

Even while informants expressed the sentiment that rain, wind, and sun are expressions of *and* given by God they are fundamentally unknowable processes. They come and go to unknown places. But God, the creator of all, knows these things. This suggests that the unknowability³⁵ of certain knowledges signifies and cites the power inherent in that knowledge. Unlike other studies that have catalogued the complex epistemic methods used in northern Burkinabè communities for predicting the arrival and strength of rainy seasons (Inera and Dpahrh 2006), the majority of individuals I spoke with had no such knowledge.³⁶ Instead, they noted that it is God’s will if the season is beneficial for a good harvest. One woman said, “One can’t foresee how the next season will be, if the rainy season will be enough to have a good harvest. Only God can foresee that change. God plans all.” Those who hold to Model 1 explicitly define the limits of their knowledge of environmental processes, while God, the divine creator of knowledge, innately encapsulates all such knowledge. Those who hold to Model 1, therefore, deemed sacred that specialized knowledge that is (1) presumed to exist but (2) is elusive (e.g. the knowledge of the timing and quality of the rains).

Even while God is manifest throughout the world through environmental processes, God stands apart from and above humanity. The second role of God as separate from the world is

³⁵ I employ the term, “unknowability,” to refer to knowledge that is restricted from some or all individuals for social—including religious—reasons.

³⁶ Two elder men I spoke with did note that when the direction of the wind, which blows from east to west during the Harmattan, changes from west to east, that is God’s signal for the approach of the rainy season. Others I spoke with did not know this.

logically inherent in the hierarchical relationship between God and humans. Humans are a creation of God and therefore subject to Him; a hierarchy further augmented by the asymmetry of knowledge of natural processes. Thus, the God-human division is both material and epistemic. While humans are firmly fixed as subordinates, God is able to surmount this division when He sees fit, occasionally interfering directly in human affairs. When He does, interference takes the form of miracles and what individuals refer to as inexplicable guidance. Such interference is always for the benefit of humanity, informants said—all guidance is for positive action. Informants explained that certain individuals might receive divine intervention because we are a privileged creation—though flawed. God bestows us with the gift of choice and free will and to use and exploit the world for our benefit. Humans are left to choose whether to follow the sacred instruction of tradition and religious teachings and be rewarded by God for correct action, or to fall into the profane and risk punishment. Humans are flawed because one may not always “orient oneself to God” or “follow the path” as I was told. The dual nature of God, then, positions the sacred vis-à-vis humanity as both fundamental quality of existence and ideal for correct living.

All informants were clear that while God does provide the rain and sun—essential ingredients for agricultural production—God does not give the harvest. Agriculture is a product of the mundane world of humans. The logic is that the harvest is the result of human labor, which transforms raw materials provided by God. In transforming raw materials into agricultural produce humans shift them from the sacred to the mundane, and thus take ownership of the new product. Agricultural laborers own the fruits of the labor, a logical conclusion replicated and expressed in gender relations and farm ownership as discussed in Chapter Three.

Human ownership of agricultural labor is an integral key to the God-human hierarchy. Humans are recipients of the divine gifts of rain and sun. As Mauss (2002) has shown, the act of gift giving produces a hierarchical relationship solidified in social obligations of reciprocity. Humans, in their relationship to God, are as children indebted to their father. Such indebtedness demands (1) occasional gifts of gratitude *as well as* (2) obedience to the rules and laws established for correct action.

Gifts of gratitude come in different forms depending on individuals' religious affiliations and practices. Self-categorized animists I spoke with said that they still offer sacrifices—white roosters, specifically—to their ancestors at the beginning of the rainy season. Similar to the structural hierarchies of divine beings found by other scholars (Mendonsa 2002, Skinner 1989), animists of Tanghin-Dassouri claimed that ancestors carry the sacrifices to God, who then divides them among the ancestors. But the animists were clear to state that sacrifices are not payment, they do not ensure a good rainy season and bountiful harvest. Sacrifices are only the means for expressing gratitude. One elderly man I spoke with said, “A sacrifice is a way of giving thanks. When one gives a sacrifice everyone benefits: God, our ancestors, my family, even the animals and insects benefit.” When asked, animists often claimed that many of the elders in the community, whether Muslim or Christian, still offer sacrifices, and when asked directly, many Muslims and Christians agreed with this statement, but denied that they, themselves, offer sacrifices. Prayers, they said, are their way of thanking God.

Proper gratitude is also expressed in proper obedience to divine law. Instructions for proper behavior are found in the rules established in tradition and the laws laid out in religious teachings. Such traditions include proper respect for one's parents and community elders, dedication to one's family, honest actions, a fierce work ethic, and humility towards God. All

informants agreed with the centrality of these traditions, though animists additionally included proper respect towards one's ancestors in the form of sacrifices and offerings. While, of course, all traditions are in some sense invented (Hobsbawm and Ranger 2013), Mossi tradition and religious teachings are presented as ahistorical, static, and sacred. Indeed, "tradition" in Mooré, *rog n miki*, which many informants used to refer to both Mossi tradition and religious teachings, translates literally to "born to find." Individuals, in this meaning, are born into well-established rules and regulations for proper behavior—rules and regulations established by the very first individuals who founded a community and perhaps even humanity itself. It is incumbent on children to follow the rules of their parents and grandparents.

The durability of humanity is an implicit testament to the value of these traditions. Informants again and again expressed an anxiety that younger generations are not following the traditions of their parents. Traditions such as abstaining from premarital sex and thievery, respecting one's parents and elders, and speaking and behaving honestly are considered correct. These actions honor God through thought and behavior, demonstrating that one is truly humbled and thankful to God. The presumed timelessness of traditions and religious teachings signifies that countless generations have followed the same rules and have survived. The ahistorical nature of tradition, then, implies their sacredness and reiterates the necessity of humanity to follow them to express proper gratitude and to live properly. Informants stated that God is pleased with proper living and, as such, is more willing to continue to bestow His children with gifts for sustaining life. Poor action risks His displeasure.

A thorough discussion of the complex role of God is beyond the scope of this study, but I wish to note that in Tama and Ouegoulega, there seems to be an overlapping conceptualization of God across religious affiliations. Throughout interviews with self-affiliated Muslims, Catholics,

Protestants, and animists, it became apparent that the conceptualization of and role for God in the world is strikingly similar. In many cases individuals intimated to varying degrees that God is both transcendent and immanent. The development of this complex conceptualization of God has been explored in relation to Christianity by well-known scholars (see Weber 1964, Whitehead 1920), but it is a curious discovery in terms of Islam and animism.

Throughout the fieldwork period I did not encounter any overt forms of fundamentalist or conservative Islamic thought. Many Muslims I interviewed in Tama and Ouegoulega regarded God as both apart from and integral to the functioning of the world. The imminence of God is antithetical to much fundamentalist thought and although there are groups that adhere to such theology, the Muslims of Burkina Faso are widely considered to be similar to those throughout West Africa as quite moderate (Kaba 2000, Mendonsa 2002). During the fieldwork period I did not encounter any overt forms of Islamic fundamentalism that might categorically disagree with the conceptualization of God as immanent.³⁷

That self-affiliated animists also conceive of God as transcendent and immanent is also surprising. Those who identified as animists used the Mooré expression *pvgé tondo ba-ramba* [to follow our fathers] or even the French, *l'animisme*, to describe their religious affiliation, recounting the role of God resembled that of Christians and Muslims. Early descriptions of Mossi animism are similar to other accounts throughout West Africa wherein *Wendnam*, God, is transcendent and distant from human affairs while ancestors and the Earth Goddess, *Tenga*, are directly involved in human affairs (Skinner 1989). During interviews, however, residents did not

³⁷ West Africa, of course, is not without its fundamentalist elements. For example, Al Qaeda in the Islamic Maghreb joined forces with militarized Tuareg groups to launch the Northern Mali Conflict that occurred during the fieldwork period. Likewise, the activities of Boko Haram in northern Nigeria were well known to residents of Tama and Ouegoulega (internationally, Boko Haram is known for the kidnapping of some fifty school girls, which sparked the #BringBackOurGirls campaign). But many residents recounted the activities of these groups as examples of terrorism that displeases God (see below).

claim that ancestors and Tenga are particularly important, instead noting that God is often directly involved in both human affairs and the functioning of the world. Indeed, whereas Tenga’s original role was in the functioning and fertility of the soil and environment (generally conceived), this no longer seems to be the case. These shifting roles for God and the ancestors suggest the colonial influences of Christianity, and possibly the more long-term influences of Islam, have had profound impacts on animist thought to the point where three diverse religious conceptualize God and His role in climate change in similar ways.

Climate Change as Punishment

Informants consistently identified improper actions as the cause of inadequate rainfall. Improper behaviors—behaviors that do not follow the divine rules and regulations established by ahistorical traditions and religious teachings—invoke God’s displeasure. Notably, informants consistently provided the same list of behaviors that displease God (table 4.1), though variability exists in which behaviors particular individuals chose to emphasize. Because God only rarely

Table 4.1: Behaviors that Anger God in Model 1

Social – Global <ul style="list-style-type: none"> • Bad behavior (generally or without qualification) • War • Murder • Terrorism • Decapitation • Massacre • Theft • Violence • Rape • Carjacking • Human sacrifice • Prostitution/Pre-marital Sex 	Social – Local <ul style="list-style-type: none"> • Jealousy • Greed • Disobedience of children and women Environmental – Global and Local <ul style="list-style-type: none"> • Deforestation/ Abusive cutting of trees • Bush fires • Burning gas • Pollution: plastic bag litter, oil leaks, generally
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intervenes directly in individual lives and primarily works in and through the world via natural processes, variable rainfall is God's punishment for actions that are outside of traditional and religious proscriptions. Climate change in Model 1 is a punishment meant to correct the behavior of His children.

Informants, when asked to name some of the behaviors that angered God, often began by recounting significant events in the news. The violence reported during evening broadcasts contributed to a discourse of the world as an increasingly violent place. The first half of my fieldwork period (from November 2012 to February 2013) overlapped with aggressive French military operations to quell the civil war in neighboring Mali. Additional reports were made of rape in the Democratic Republic of the Congo, roadside bombs in Afghanistan, suicide bombings in Iraq, rebellion in South Sudan, and kidnappings in Nigeria to name a few. Global and regional events are seen as evidence of a more violent world than in the past. Elder informants, those approximately 50 years of age and older, said these changes began during their lifetimes; younger informants said that these changes began during the lives of their parents; youth, those under 20 for example, said that these changes began with their grandparents. "Before," informants noted, "life was better; the rains were better." "Before, people followed the traditions." "Before, youth respected their parents." "Before, there wasn't so much war." "Before, harvests were better." This is to say that violence and God's punishment for violence are temporally located.

Violence is also spatially located. Informants attributed improper behaviors to "*des autres*," other people, a label often accompanied with a sweeping hand gesture indicating a far off place beyond the communities. Because all humans are God's children, I was told, all have to bear the punishment regardless of the degree to which they may have transgressed His divine law.

Only infrequently did individuals blame poor behaviors on their neighbors; these behaviors are listed in the Social – Local category in table 4.1. The few informants who suggested that their own community might be to blame for the inadequacy of rainfall were individuals of significant social and political power: the Imams of both Tama and Ouegoulega, sub-chiefs of Ouegoulega, the tengsoaba of Tama, and elder men of both communities, for example.

Disobedience by women and children from the patriarchal authority and traditional leadership, importantly, is the only explicit behavior in the Social – Local category. The Imam of Ouegoulega, for instance, noted that he often doubted whether some of the residents who came to mosque to pray truly had God in their hearts when doing so because he sees so much disobedience in the household. Jealousy and greed, he and others stated, are the root causes of these behaviors. But other residents without express social power, such as women and unmarried men, avoided giving explicit examples of disobedience, and instead identified only jealousy and greed as behaviors that anger God. These informants identified germinal emotions that lead to bad behaviors rather than the behaviors, themselves. By avoiding specific behaviors that might be identified with particular individuals within the community informants were able to discipline without jeopardizing social relationships and hierarchical authority. Acts of transgression, therefore, occur at the local and global levels and the primary punishment is God's alteration of rainfall as corrective punishment.

The variability in rainfall, moreover, is the key factor that precipitates additional environmental changes that make life more difficult. The reduction of rainfall diminishes the cool air of evenings, increases temperatures throughout the year, and shortens the duration of the Harmattan and increases the wind. Rainfall reduction also increases dust since the soils are

unable to retain as much moisture. All effects constitute environmental conditions that make agricultural production exceedingly difficult and tenuous.

The uncertainty of rainfall rests in contrast to how residents understand groundwater. While interview responses did not establish a clear consensus many residents understand it to be somehow different from precipitation. “There will always be groundwater,” one Ouegoulega resident told me, “God will not abandon us.” Others echoed this response suggesting that groundwater is a form of divine insurance against catastrophic climate change. Of course, Ouegoulega and Tama residents are aware that groundwater in wells increases with sustained rainfall but interview responses suggest that groundwater is not dependent on rainfall. There is a sense that there will always be water underground as long as one has the means to access it by digging or drilling deeper.

In addition to improper social behaviors, residents also note that human actions in the environment provoke God’s anger (table 4.1). These behaviors have been labeled Environmental and were often listed by residents mixed in with the social behaviors. Both men and women included environmental behaviors, such as deforestation and bush fires, as behaviors that displease God—who then changes the rain as punishment—rather than suggesting that environmental actions directly influence the rain. The fact that residents often listed “social” and “environmental” behaviors suggests that the episteme of residents does not differentiate between social and environmental categories. I have done so here only for analytical purposes. But I stress that for the residents of Tama and Ouegoulega there is no fundamental epistemic separation between society/culture and nature as there exists in societies that are heir to Enlightenment philosophies (Ingold 2000). Yet, the question remains: What causes these offending behaviors?

The Money Paradox

For those who hold to Model 1 the main cause of bad behaviors that anger God is the relationship some individuals have to money. Importantly, the amount of money is not a significant factor; residents stated that even those without much money can still behave badly. Rather, informants referred to a vague quality of money that has the potential to infect an individual, to seduce him or her with greed and jealousy. The individual must guard him or herself against this quality in order to live correctly.

I was told repeatedly that money is both easier *and* harder to acquire today. Times have changed, informants said, and there is more money. Many people are able to find the sources of money, tap into it, and accumulate it, yet it remains elusive for many others. One reason why money is more difficult to acquire is because of the particular sort of labor in which one engages. Informants spatialized capital accumulation by repeating that life in villages—the agricultural life—is more difficult than life in the cities where there is more commerce, more activity, and more money. A middle-aged woman told me, “It’s difficult to get money [in the village] because of drought, because the soil is tired. It’s difficult to get money without work.” Others, referring to life in Ouagadougou, said, “There is money there.”

However, informants did not suggest a strict division of labor between the rural and urban sectors. Informants explicitly stated that while everyone farms in the villages, many people farm on small plots in the cities. People in the villages also engage in other economic activities like commerce and becoming involved in local government and organizations. In this view the cities are simply where more economic activity happens. Thus, residents who hold to Model 1 did not construct rural-urban/manual labor-intellectual labor dichotomies—an important point I make now because, as I show below, those who hold to Model 2 contradict it.

The means for easy capital accumulation do not lie in the type of labor but in the assets one incorporates into the labor. In particular, informants stated that capital accumulation is facilitated with the specialized knowledge necessary for the labor. They suggested that those with money might be hard workers who have found the “secret” to their labor. Mustafa, a young, unmarried man told me that all work has secrets—things one does not know before beginning to work. Only after learning these secrets is one able to succeed at the work and earn money. Other workers, however, are never able to discover these secrets and remain poor. Hard work, then, is not sufficient for success; knowledge is needed: “Some people work hard and never earn much money. Others are able to gain lots of money with very little effort. Money is bizarre,” I was told, “it is *unknowable*” (my emphasis). These informants have linked the power of money with specialized knowledge that is discovered by some individuals while eluding others. This logic runs parallel to the unknowability and power of God’s knowledge of the rains. Secret knowledge of labor, therefore, conditions capital accumulation.

The other side of this viewpoint is that there are those in the world with significant amounts of money accumulated through dishonest labor or nefarious means. Wealth is acquired through hard labor and specialized knowledge; those who are not observed to work hard are suspect of dishonest labor. Significantly, residents singled out government officials as prime examples. “Many people in government are very rich,” one young man told me, “but we don’t know why.” Another young man followed this by saying, “It is corruption. On the road there are big signs for projects, for ‘The Fight Against this’ and ‘The Fight Against that’ but where does the money go? Burkina is still poor. We are still poor. The government keeps all this money for itself.” If one were to leave the analysis here and suggest that the amount of money is the contributing factor to bad behaviors residents of Tama and Ouegoulega would be exempt from

accusation. But as I showed in the preceding section, some informants, in addition to blaming “other people” for bad behaviors, also accused other community members. One elderly informant did not discriminate saying that all people’s behaviors are “changing because of money.” Another said that people “have become mean because they want more money.”

The factor that influences bad behaviors is not the quantity of money but the relationship between money and people. Informants in Tama and Ouegoulega described a corrupting influence money has on people if they do not guard themselves against it. Moussa in Ouegoulega said, “The problem is that some people...still want more than their amount [budget] provides. It’s greed.” In a joint interview with two women of Tama I was told that greed is caused by one’s “manner of life. One must be prudent and vigilant to guard oneself against these ideas and to keep a good check on oneself.” Such comments refer to a mystical quality in the relationship between money and people—seduction in money and a weakness of individual character. These forces combine, precipitating bad behaviors for the express purpose of acquiring more money.³⁸

This presents one with a paradox as capital accumulation becomes increasingly important for the daily needs of Tama and Ouegoulega residents. All informants noted that nothing can be done in this life without money; “everything is money,” I was told. It is necessary to continuously search for more money, residents of Tama and Ouegoulega said. Supplemental foodstuffs, canned goods, sauce ingredients, clothes, medicine and healthcare, school tuition, transportation, and countless household items; daily requirements for money quickly compound. Residents often paint their economic capacity in terms of “suffering” and the “need for more,” to

³⁸ Even as I wrote this paragraph, I was alerted to a news report of a young man in Ghana who was arrested for sacrificing and beheading a boy. The young man confessed that he murdered the child for *gris-gris*, or magic, in order to amass wealth. Such stories, however, are not uncommon, and reference the mystical nature of capital accumulation identified by Comaroff and Comaroff (1999), but my analysis places the emphasis, in contrast, on the relationship between the mystical nature of money and one’s personal character.

“always search” for more money.³⁹ The need for money is ever present. Thus, the risk of an individual succumbing to the allure of money is ever present. As money becomes a more significant component of daily life, residents of Tama and Ouegoulega perceive a brink in the world where individuals increasingly reject tradition and proper action for the potential greed and jealousy in money. One can only guard oneself against the temptations of capital and keep “one’s face to God.”

This conceptualization of climate change as punishment of the corrupting influences of money is strikingly similar to Max Weber’s analysis of the theodicy of misfortune. Weber (1964) showed that one way in which religions reconcile the divinity of God’s creation with apparent misfortune (bad things happening to good people) is through dualism, wherein the purity of the sacred is always potentially corrupted “through contact with the opposite autonomous powers of darkness, which are identified with impure matter” (Weber 1964: 144). Weber notes that humans’ spiritual association with the sacred and the association of the material or corporeal with impurity and darkness is unavoidable. In the theodicy of misfortunate, corrupting influences are present in this life but one is rewarded in the hereafter by guarding oneself against them. Conversely, signs of material wealth may be taken as symptoms of material corruption (Weber 1958). In the case of Tama and Ouegoulega residents, money represents the possibility of corruption.

³⁹ These comments seem to indicate a conceptualization of development in terms of continuous economic growth, a conceptualization that is interrelated with projects of intervention in underdeveloped or developing countries (Hart 2009). This is explored further in Chapter Five.

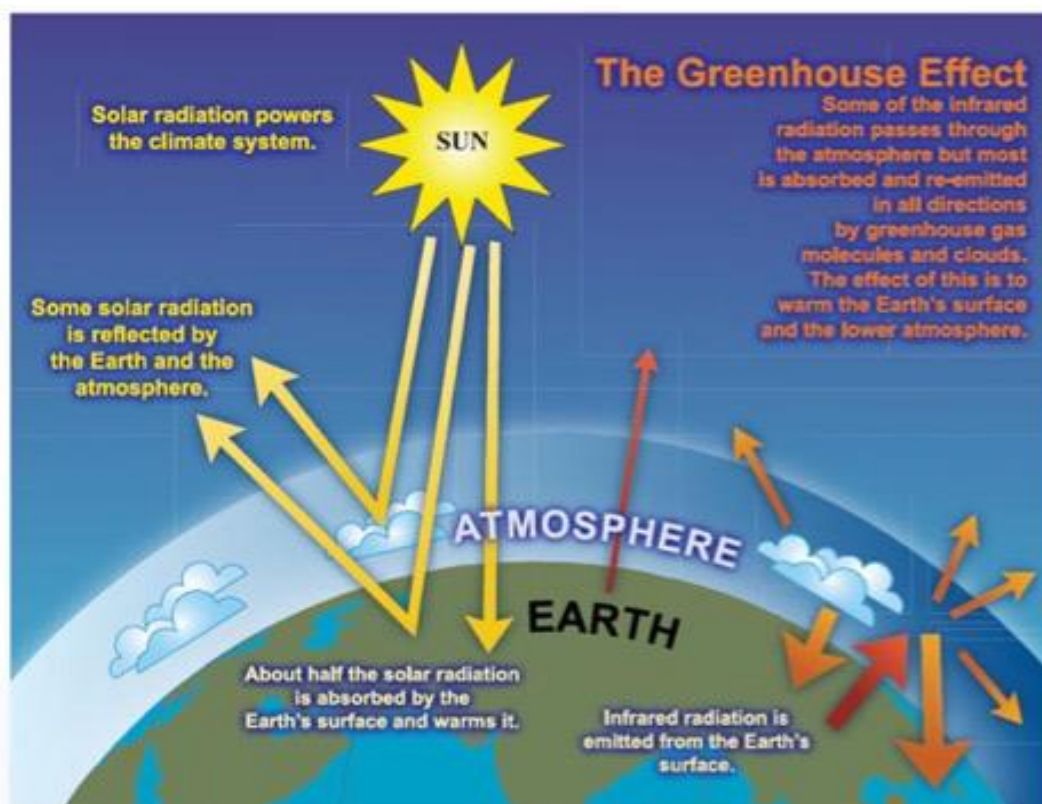
The Outlier

While no significant variation was observed across genders or religions, one interviewee in Tama departed radically from the majority. One married, middle-aged man, who had attended public school through primary education provided different knowledge during our interviews. This man said increasing quantities of gases in the atmosphere that are released by human actions and industries cause the variations in rainfall and temperature. When asked where he learned this, the man claimed to have remembered it from primary school. Unfortunately, teachers and schools often don't keep records that would indicate if a particular subject matter was taught in a particular grade in a particular year. This man would have attended primary school in the late 1980's when global environmental discourse centered on ozone depletion. It is entirely possible that this resident retained specific environmental knowledge learned in public school and at significant odds with the knowledge of his community neighbors. Due to his responses, however, the investigation into alternative knowledges within the communities broadened to include current secondary cycle students who were found, like USAID WA-WASH employees, to hold to Model 2 of the environment and climate change.

Model 2: Technoscience

Lycée students in Tama and Ouegoulega and employees of USAID WA-WASH and Winrock International hold model 2. This model is constructed from technoscientific knowledge and corresponds to individuals' educational histories (figure 4.3). Model 2 states that climate change is due to increasing carbon and carbon equivalent gases in the atmosphere due to human

Figure 4.3: Model 2 of Climate Change (Source: USAID WA-WASH Climate Change Workshop for Decision Makers)



activities. These gases contribute to the ozone layer, trapping solar radiation, and increasing global temperatures and rainfall variability.⁴⁰

Data for this section come from many formal interviews and casual conversations with ten USAID WA-WASH staff and interns, eight Winrock International employees, and seven young men and women of Tama and Ouegoulega who currently attend the final grades of the secondary cycle. Interviews were supplemented with data from two questionnaires distributed to each grade level at the secondary school in Dassouri and to Program employees. The questionnaires were crafted after conducting interviews and designed to elicit added depth to the

⁴⁰ Propositions and the rate of agreement are listed in Appendix C. Results to the questionnaire given to Program employees confirming Model 2 are given in Appendix E.

cultural model of climate change, identify variability, and commence an investigation into attitudes toward development.

The Earth System

Model 2 holds that the earth is interconnected in complex ways. Informants repeatedly mentioned that changes in one area of the world precipitate unforeseen changes on other areas. Often these effects are unforeseen because of the complex interactions between different areas of the world. Yet informants agree, change is an inevitable part of life; change cannot be stopped and many changes are beneficial. Other changes, however, cause difficulties in life, disrupt the pattern of life, and shift priorities and activities such that current generations do not live as their forbearers once lived.

Some informants referred to change with a hint of nostalgia. Eric, a self-assertive young Catholic of Tama once said in an uncharacteristically quiet and reserved tone, “We don’t live like our grandparents. Life has changed. We don’t have the same traditions.” While this may recall the loss of traditions lamented by informants who hold to Model 1, informants of Model 2 have and continue to welcome the changes that have shifted customs, moving generations increasingly towards a modernist ideal of development that prioritizes continuous infrastructural development, more education, and economic production. Eric, in the same instance, perked up saying, “But we have economy now. We have medicine.” Change, for these informants, replaces older values with new ones, older inefficient activities with newer efficient ones.

Informants explicitly link changes precipitated by human action to the innate superiority of humans relative to animals and plants. Humans have dominion over the world I was told; they are able to shape and modify it according to their desires and plans. Only a few informants used

religious terminology to describe this. One USAID WA-WASH employee said humans have dominion over all things according to “divine law.” The majority of informants, however, equivocated on or even ignored the religious connotations of this linkage, agreeing that humans are unique among all other creatures but that this is simply “the way things are.” The innate superiority of humans conditions the ability of humans to interact with one another in complex ways and with the environment with significant effect. Climate change is the result of such complex interactions.

Deforestation and Industry; The Local and Global

In particular, informants pinpointed anthropogenic deforestation and industrial pollution as the primary drivers of climate change. Within the category of deforestation informants combined abusive tree cutting and felling as well as bush fires for clearing fields and hunting. These actions are deemed destructive because they directly and negatively impact the number of trees in the local environment. This link prioritizes the role of trees in the environment, positioning them as intermediary between humans and adequate rainfall.

The centrality of trees within Model 2 is composed of two important qualities. First, trees directly maintain the functioning of the environment by ensuring adequate and reliable rainfall. Informants described rain as being a natural process that benefits the world and is not purely for human exploitation. One young man told me, “It rains because of the trees... It doesn’t rain purely for humans. We just profit from it.” Trees ensure that rain continues to fall for the benefit of all humans, animals, and plants, an explicit link that cannot be overstated. Informants explained the importance of rain in the same terms as those who hold to Model 1, saying that crops can only be grown with reliable rainfall: the plants and herbs of the terrain are maintained

because of rain, and the livestock that one keeps can only live with enough water and herbs.

Adequate rainfall is the reason that those in the villages are able to survive, grow the crops, and maintain the livestock that feed and support their families. Additionally, rainfall is the foundation for reliable wells. For those who hold to Model 2, the water table is recharged through rainfall and is not a distinct *type* of water as found in Model 1. This means that all subsistence activities in the village and nearly all economically productive behaviors—agriculture, animal husbandry, and dry-season gardening—are directly dependent on the reliability of rainfall and, therefore, susceptible to climate change.

The second quality of the centrality of trees indicates that climate change operates at the local scale. Informants specified that while deforestation is a global issue it is a significant problem at the local level and rural communities. Students often implicated their neighbors and Program staff accused entire communities of abusive tree cutting and bush fires that have precipitate serious deforestation. Of course, transgressing individuals were never named—to do so would have been a serious breach of social etiquette—but informants often listed the behaviors that contribute to deforestation. For example, cooking requires large quantities of wood fuel; men and women pick up dead wood when they can find it, otherwise they cut the limbs from the larger trees and dry the wood. The latter is deemed a far more common and environmentally damaging activity. Similarly, one student in Tama described a method he called “traditional hunting,” where a person enters into the bush and looks for trees that have become nests for different sorts of animals, indicated by holes in the trunks or clumps of sticks and leaves in the branches. He then sets fire to the tree to smoke out the animal. Because hunting often happens during the dry season, a bush fire is often ignited and left to burn, destroying more trees and saplings.

Importantly, secondary cycle students of Tama and Ouegoulega did not consider bush fires to release greenhouse gases into the atmosphere. Bush fires are considered destructive insofar as they inhibit the growth and spread of trees. Bush fires ignited to clear fields in the initial preparation for the agricultural season were also understood according to this logic. By implicating their neighbors in these activities informants are accusing them of climate change and indicating that climate change is a local process operating on the micro scale. In contradistinction, USAID WA-WASH and Winrock employees understand deforestation on both the local and global levels to be a significant contributor of carbon emissions. Such variability in Model 2 is structured along an axis of formal education and specialized scientific training.

Climate change, however, is not only a local level process. Secondary cycle students and development employees explicitly and strongly emphasized that deforestation is a global phenomenon with wide and diverse effects including reduced rainfall, desertification, and flooding. The local level environmental behaviors that reduce the number of trees work synergistically with the global level processes of burning gas and large-scale industrial operations. To a degree, informants also implicated their neighbors in this process saying that burning petrol—engine fuel—is a significant contributor to climate change through the release of greenhouse gases into the atmosphere. Informants accused mopeds, cars, and trucks of spewing carbon gases into the air. One student expressed this sentiment rhetorically, “What is the main cause of these changes [in rainfall]? Burning gas...of course! The fumes change the clouds and storms.” While informants noted that the exhaust from vehicles at the local level contribute to atmospheric greenhouse gases, they noted that these contributors are not as significant as large-scale industrial operations.

Repeatedly, I was told that “large industry” is the main cause of climate change. The term, “large industry,” was never clearly defined but is employed to capture a wide range of intensive economic processes and to demarcate these from small-scale economic activities. Large industry, I was told, is the industry of Western nations and China. When asked if the industry of Burkina Faso contributes to climate change, informants chuckled heartily asking, “What industry? There is no industry in Burkina!” Informants explicitly excluded African nations and those nations *sous-développés* [underdeveloped] from the list of main perpetrators of climate change. By spatializing large industry, informants added multidimensionality to climate change, indicating that it has its genesis at specific locales but with global effects. Climate change is here less a process operating above and somewhat apart from the terrain, but a process intimately interconnected with daily activities everywhere in the world.

The Technoscience of Climate Change

As with the outlying individual described in Model 1, those who hold to Model 2 explicitly state that this knowledge is acquired during formal education. Variation within Model 2, then—as it is between Model 1 and Model 2—is a condition of formal education level. Informants provided more or less detail of the ways in which greenhouse gases influence temperature and rainfall depending on the level of their scientific training. A wide gap of scientific experience is found between secondary cycle students and Program employees. All USAID WA-WASH and Winrock staff hold advanced graduate degrees; the graduate students who rotated through the program offices on three- to six-month internships were all working on their first graduate degree. The majority of these are Masters of Science degrees with concentrations in agriculture and planning, water and the environment, and engineering. The educational backgrounds of Program

employees focus on environmental dimensions, leading to an emphasis on the technical aspects of natural processes, rather than, say, the social or epistemic aspects. I borrow Donna Haraway's (1997) "technoscience" to emphasize the physicality of such specialized scientific training and the mechanical logic embedded within it.

During interviews I held with Program employees, the scientific knowledge they employed to explain climate change often included intricate and complex details. One intern working with Gabriel, Climate Change Coordinator, eager to prove the extent of his scientific training, extensively elaborated on the similarities and differences between carbon and carbon-equivalent greenhouse gases, and launched into an explanation of positive feedback cycles triggered by global warming. Alphonse, the agricultural specialist with Winrock and charged with managing the Conservation Farming project, when asked if according to his knowledge climate change directly influences temperature or rainfall, immediately responded that temperature is primarily affected and described in detail the global hydrological cycle to explain the complex interaction between global warming and precipitation shifts.

Whereas Model 1 includes a specific cause for improper behaviors that anger God—the relationship between money and people—Model 2 references only a vague causality. As the cause of climate change, students and Program employees cited large and unidentifiable global political economic structures that located carbon-emitting industry in the West and in China. This was spoken about in two ways. First, informants noted that the large industries of the West and China are simply a matter of the world "being like this." Informants repeatedly referenced some nonspecific quality of Western societies that places importance in technological development and economic growth. China, they noted, had excelled in being able to "copy" the West and strive for economic growth. In this way informants placed value in the technoscientific

achievements that seemed to emanate from the West and to conterminously understand the poverty and lack of industry in Burkina Faso as examples of a lack of capacity for industry.

The second way of speaking about the cause of global asymmetric political economy follows from the first. Informants expressed the lack of industry as the result of the lack of political will to develop local industry and as a result of global asymmetric relationships. In conversations with students and in meetings with development officials, the corruption of political officials was frequently noted as a significant source of Burkina Faso's industrial and economic underdevelopment. This is a sentiment often expressed on the street as well and I found people eager to talk about this injustice. One man whom I often saw at a local café recounted anecdotes in which the government actively kept foreign companies from hiring Burkinabè employees so that they wouldn't become habituated to high salaries; he exclaimed, "The government wants us to be poor!"⁴¹

Many informants placed corruption within the context of the rapacious effects of French colonization and contemporary neo-colonial relationships and were eager to express their views of France. "Look at the former British colonies—Nigeria, Ghana," a friend of the CVD president in Tama told me. "The British set up their colonies to succeed. What did the French do for us? Nothing! The French took everything. And they keep coming back!" The same man then launched into a diatribe against France and their continued involvement in uranium mining in Niger and the political operations in most former colonies. In this view Burkina Faso is continuously the victim of socio-historical injustices that have led to underdevelopment, political corruption and the lack of industry.

⁴¹ This individual, like many others, references a profound distrust of the state government, which is associated with seemingly extravagant wealth and evidence (in poor infrastructure and general poverty) of little effort. In short, the individual is referencing the mystical nature of capital accumulation that undergirds many people's suspicion of government corruption and ties to powerful Western nations.

Industry, also, is conceived in terms of overexploitation of natural resources. This view led to several interesting conversations with both lycée students and development employees about the responsibility of carbon emission reduction. Many uncharacteristically raised their voices and gestured expressively, accusing the industrialized nations of ignoring their innate responsibility and then asking that developing nations curb their emissions. One student in Tama saw this as hypocritical, asking, “Why do some people say that Africa can’t have the same industries as the rest of the world? Why can’t African countries have industries that pollute and develop themselves when that is what the developed countries have already done?” Such a view expresses a tension between development and climate change insofar as both are caused by industry—a tension explored more thoroughly in Chapter Six.

Education and Variation

The detail with which informants conversed on such topics as industry was stratified according to levels of formal education. Secondary cycle students in Tama and Ouégoulega often spoke in generalities while Program employees launched into sometimes-exhaustive detail. In recounting conversations I had in Tanghin-Dassouri to employees in the offices of USAID WA-WASH, I was never told that students were “wrong” but that they didn’t have all the information. This illustrates that informants understand scientific knowledge to exist along a spectrum—that one can have more or less scientific knowledge—and that secondary cycle education is necessarily limited. All students I spoke with said that they hoped to continue their formal education—to acquire more specialized knowledge that would prepare them for a lucrative and stable profession. Program employees and secondary cycle students in Tama and Ouégoulega understand lycée to be a necessary step within a larger process of scientific knowledge

acquisition. This is an understanding that is perpetuated and reinforced by the institutional structure of formal education that gradually builds on knowledge acquired in previous years of training.

Necessarily, lycée students of Tanghin-Dassouri were unable to provide the extent of detail of climate change by greenhouse gases as program employees. While all lycée students with whom I spoke stated that “gases” contribute to the ozone layer (*la couche d’ozone*) and trap solar radiation, only three students I interviewed explicitly referred to carbon dioxide as the most significant factor driving climate change. Each of these students, significantly, is enrolled in Terminale at the Lycée de Tanghin-Dassouri. Other students in lower grade levels, in contrast, simply referred to “gases” and “fumes” or “smoke” from vehicles and industry that cause climate change. The difference in detail is more significant for variations between lycée students and program employees. While employees stated that increased greenhouse gases in the ozone increase global temperatures, which disrupt atmospheric functions and precipitation patterns, students were uncertain as to whether increased gases in the ozone shifted global temperature or rainfall directly. Everyone agreed, however, that increasing carbon emissions contributed to climate change in one form or another.

When asked how gases might influence the climate through the ozone layer and solar radiation, many students equivocated. I often recorded students sitting in silence, looking at the ground and avoiding eye contact, shrugging their shoulders, fidgeting, and chuckling before saying that they didn’t know. Such responses indicate two social processes at play. First, these responses suggest that students believe there is a “correct” answer that currently eludes them. By refusing to answer, students indicate that they recognize there is a body of knowledge that can broadly be labeled “science” that is the standard for determining what is correct and incorrect.

Importantly, some students refused to offer guesses; one student replied, “I can’t say. I don’t want to give a bad [wrong] answer.” Second, by refusing to answer, students suggest that they lack the necessary training to attain “correct” information or that they have failed to acquire it through their current studies. The world, in this view, becomes strictly stratified along an axis of truth – non-truth, wherein scientific knowledge conditions the side of truth. The question then becomes how those who hold to Model 2 perceive and interact with Model 1. This question is the subject of the following chapter.

CONCLUSION

This chapter has addressed the first research question: what are the knowledges of the environment and climate change held by USAID WA-WASH employees and residents of Tama and Ouegoulega. Uncovered using CMA, the models describe seemingly contrasting views of how the environment functions, our place within it and the environmental effects of our actions. Both models account for environmental change, yet provide individuals with strikingly different logics of interpretation. The most salient factor determining if an individual will hold to Model 1 or Model 2 is the level of formal scientific education. Model 1 prioritizes God. Model 2 prioritizes technoscience.

Residents of Ouegoulega and Tama who have no formal education or formal education only through the first cycle of public education hold Model 1. While much of the social science literature on climate change has noted how many populations know that God is ultimately responsible for changing weather patterns, this is sometimes referred to reductionistically as “the God frame” (Wolf and Moser 2011) and few scholars have placed this knowledge within a wider logic structure. Filling this gap, I have shown how the model states that God is causing climate

change due to displeasing social behaviors by humans around the world. As punishment, God changes the rainfall, reducing the quantity and increasing its temporal and geographic variability. Environmental behaviors, such as deforestation and pollution, also anger God and invoke his punishment—a potential source of syncretism that will be discussed later. The relationship between money and people is the primary cause of behaviors that displease God. When individuals compromise their moral fortitude—allowing money a central point in their lives, and allowing greed and the desire for quickly and easily earned wealth to consume their lives—they resort to dishonorable measures. Importantly, it is not money, itself, that causes these behaviors, but the corrupting influence it has on individuals with poor character. Individuals are to blame for their own behaviors in this model.

Those with secondary cycle and advanced formal education—USAID WA-WASH and Winrock International employees and lycée students still residing in Ouegoulega and Tama—hold to Model 2. This model states that climate change is caused by an increase of greenhouse gases in the ozone layer. Fumes from vehicles and industries on the global scale are the main contributors of greenhouse gases. Deforestation and bush fires also contribute to climate change by reducing the number of trees in the local environment and disrupting the rainfall patterns. More variation between those who hold to this model exists than between those who hold to Model 1 due to the perception and acceptance of the metanarrative of science.

The descriptions of both models, however, have skirted a dimension that has yet to be discussed: the social function of knowledge. Those who hold to Model 1 are often more assured in their responses, confident that the knowledge they recall is accurate. Several residents of Tama and Ouegoulega initially avoided my questions, responding that they didn't know the answer. Many of these individuals later opened up after more circuitous questioning and lengthy rapport

building. Yet even those with less detail in their responses than their neighbors eventually responded in similar fashion to their neighbors: with authority and certitude. Residents performed truth through the directness and consistency of their responses. Though individuals vary in the degree of detail provided during formal interviews and informal conversations, the certitude of responses suggest that individuals are confident in the truth-value of their knowledge. Moreover, the certitude of relatively less detail reveals that individuals are comfortable in the amount of knowledge they hold.

In contrast, lycée students who are uncertain of their knowledge and the possibility of providing the “incorrect” answer to a question reveal that Model 2 knowledge functions differently. The largest source of variation between those who hold to Model 2 is the level of formal education, generally, and scientific training, specifically. Those with more scientific training do not necessarily reject the knowledge of those with less training, but respond that there is more detail that is needed to fully understand the environmental processes of climate change. This explanation constructs the scientific knowledge of Model 2 as a distinct corpus of information with finite boundaries. While an individual may not have received all information through scientific training, the awareness of more information, is embedded within the knowledge structure, itself. Students who refused to answer, responding, “I don’t know,” reference the extension of scientific knowledge beyond their current epistemic situatedness.

The widespread acceptance of Model 1 and residents’ general confidence in describing components of it, as well as lycée student’s uncertainty of providing the “correct” indicate that both knowledges are learned in different ways. Model 1 seems to be a form of iterative common-knowledge, or common sense, in that it is knowledge widely held by the majority of community residents, and most are aware that others know the same thing (Lewis 2002). Model 2 is less a

matter of common-knowledge; rather lycée students in particular seem to indicate that there is an objective body of knowledge about climate change and that they are not privy to all details.

Program employees, in contrast, demonstrate a comfort with the knowledge that suggests that, through their levels of scientific education, they have acquired sufficient knowledge.

In other words, Model 1 and Model 2 point to the formation of different types of epistemic communities. As mentioned in Chapter Two, I build on Cross's (2012) reworking of Haas's (1992) original definition of an epistemic community as any group of individuals with shared knowledge (rather than just experts). I therefore note that those who hold to Model 1 are an epistemic community, and it may be possible to argue that those who hold to Model 2 are likewise an epistemic community. However, lycée students' hesitations and employees' confidence seems to suggest that there may be multiple epistemic communities within Model 2, reflecting the gradual accumulation of technoscientific knowledge. Likewise, as Peter Haas has astutely argued, epistemic communities do not passively exhibit knowledge, but use knowledge towards political ends. Thus, the identification of two broad epistemic communities corresponding to Model 1 and Model 2 belies potentially divergent uses of environmental knowledge. How do those who hold to Model 1 arrange themselves within an epistemic community and use that knowledge? How do those who hold to Model 2 structure themselves socially from student to development worker and what does this knowledge do for them?

I explore these questions in the following chapters that tease apart the dimensions of the second research question. I endeavor to show that the models of the environment form informational nodes in larger knowledge-networks, which I trace to identify their socio-historical interconnections. Chapter Five begins by exploring how the models of climate change have and continue to interact socio-historically. This analysis provides insight into how Model 1 and

Model 2 contribute to the formation of different epistemic communities. I then continue in Chapter Six to reveal the two very different, multilayered conceptions of development that are conditioned by the knowledge-networks. I explore how development is broadly conceived as an event or end-goal to be desired and as an acutely sought process of adaptation to the effects of climate change. This begins the work of tracing the two knowledge-networks in operation during the labor of development. In subsequent chapters I illustrate how behaviors—responses to internal and external community forces—logically follow from the knowledge-networks that extend from the two models of climate change.

CHAPTER FIVE

ESTABLISHING KNOWLEDGE-NETWORKS: SOCIO-HISTORICAL INTERCONNECTIONS AND CONTEMPORARY STRUCTURES

Excerpt from my field notebook, 10 April 2013

Amadou, my research assistant in Tama, and I have just wrapped up a long day of interviews with community residents. We're sitting in the shade of the *paillot* [shaded structure] just outside his household compound and casually chatting about the structure of the school system in Burkina Faso. Every year, he tells me, the Minister of Education decides, before the start of the school year, themes for each grade level. The teachers then try to address the grade-specific theme in one form or another. Amadou can't remember but believes that climate change was the theme when he was in either 4th or 3rd, but this year, Terminale, the theme is the Industrial and Scientific Revolutions. In History he's learned how these events were instigated and transpired. In Science he's learned about human evolution, the migration into Europe, the increasing levels of carbon dioxide, and the effects of greenhouse gases in the atmosphere. Amadou is at the top of his class and I've always assumed that that means he thoroughly accepts Model 2, but I've never asked.

It isn't surprising that climate change should be covered in Science with the theme being the Industrial and Scientific Revolutions. I tell him that most of the lycée students to whom

we've spoken hold to Model 2 when explaining climate change. "*C'est ça*," That's it, he agrees, but looks away, his mouth slightly open as if he's about to say more. After a short pause he looks up and says that in all honesty he's still unsure what causes climate change. "*Ah, bon?*" I say smiling, inviting him to tell me more.

Amadou continues, "There are many causes [of climate change] that people talk about and I am not sure which one is most correct, or if there is some combination of them. Maybe it is because of the greenhouse gas effect, but this is a process that is very difficult to understand."

"Science and religion are not the same things," he says. "They tell us different things and it is difficult to decide which to follow. For example, science teaches evolution, that human beings started as small organisms. Maybe they walked on four legs and didn't have ideas in their heads. Eventually they evolved and changed and became smart and figured out how to live in a house and build a bicycle. Religion teaches that Adam and Eve were the first people. So," Amadou pauses. "Why not both answers?" he exclaims. We both laugh.

Excerpt from my field notebook, 18 September 2013

Gabriel, the Climate Change Coordinator for USAID WA-WASH, is sitting across from me. He holds a Masters of Science degree in agriculture and a Masters of Professional Studies degree in planning and management. Gabriel directs all WA-WASH activities related to climate change, builds collaborative bridges between the Program and other organizations and institutions, and disseminates USAID-approved climate change knowledge through workshops and implementing partner projects. He is the go-to person in the Program for knowledge on climate change.

Whenever we've talked about his duties he's held to Model 2 but I know he is deeply religious,

attending his Protestant church multiple times a week. I feel there is more to his worldview than he lets on.

I ask him what he feels is needed in the rural sectors, places like Tama and Ouegoulega, to increase mitigation and adaptation to climate change. “Self-reliance [*autopromotion*] and education,” Gabriel says, “are projects that could develop the rural sectors.” Self-reliance projects, he clarifies, include many types of different projects that are meant to be self-sustaining and build local capacity. “We need to build local capacity and education.”

“But what does this mean for people without much formal education?” Gabriel looks up at me and begins to speak deliberately as if to a child, “If one follows the analyses of science then there is no place for God. But this does not deny divine law. There is still the obligation that man [sic] must respect nature. But modern man doesn’t follow this law and doesn’t behave with God in his heart. Instead, they say that the divine law is false. But God knows all including what science tells us. There is a problem when people have more confidence in science than in God. They extend what science already knows into the idea that God doesn’t exist. But those who have no scientific training and knowledge will only say that climate change is due to God.”

I ask him expressly if God is causing climate change. “Carbon emissions,” he tells me, “are the immediate cause of climate change, but God can still be the ultimate cause.”

INTRODUCTION

This chapter continues to address the first research question—how the models of climate change are similar and different—and begins to address the second question—how are the models interconnected with one another. There are two main goals of this chapter. While the previous chapter established Model 1 and Model 2 as seemingly distinct and separate epistemes, the first

goal of this chapter is to deconstruct that boundary by revealing the socio-historical interconnections that exist between them. The second goal of this chapter is to extend that analysis further by illustrating how each model is characterized by different structures of acquisition. This is to say that the social structures through which one learns either Model 1 or Model 2 are distinctly different. To achieve these goals, this chapter addresses the following questions: Why is there the inclusion of social *and* environmental behaviors that anger God in Model 1? Do those who adhere to Model 2 completely reject all Model 1 knowledge? How does one come to acquire Model 1 or Model 2?

The apparent division between Model 1 and Model 2 is conditioned by the CMA methodology. Both models are necessarily generalizations of particular populations that gloss over individual variability, agency, and illustrations of knowledge in everyday life. While the previous chapter made note of the primary sources of variation in each model (i.e. formal public education), the first goal of the present chapter aims to examine the socio-historical interconnections between the models to reveal how they have influenced one another.

In this argument, I reverse Webb Keane's observation (2007) that evidence of hybridity may refer to historical fields of influence, such as colonialism and missionization. Historical records are clear about the colonial influences on present day Burkina Faso and the Mossi. Chapter Three detailed how colonialism throughout West Africa was both an economic and epistemic mission. Therefore, if there is evidence for historical fields of influence, then one may seek out, and, indeed, expect to find instances of hybridity. In short, this chapter asks how Model 1 and Model 2 may have been influenced by one another.

As explained in Chapter Two, I acknowledge that "hybridity" has been a useful term to highlight the comingling of multiple ways of knowing, but I avoid this term in favor of the

imagery of the networks. Although the notion of hybrid knowledges is meant to deconstruct the ontology of distinct ways of knowing: Science *versus* Traditional Ecological Knowledge (writ large), for instance, the term, nonetheless, analytically rests on those boundaries. The reification of the boundary establishes a spectrum with “pure” epistemes at each end and a plurality of hybrid knowledges in the gradient—the gray space—in between. Yet STS scholars have shown that all knowledges, including science, are messy processes of translation and interconnection.

In our increasingly globalized and interconnected world, the work of hybrid knowledges does not do enough to highlight the potentially inherent syncretism of all knowledges. A more fruitful avenue of exploration is to demonstrate how knowledges interconnect into wide socio-historical networks. This work is nowhere more pertinent than in Africa, which is popularly seen as a land untouched by external influences until the Colonial Era. Yet Charles Piot (1999) reminds us that African “traditions,” mores, and values have been influenced by the world system to varying degrees for more than 500 years. An analysis of knowledge cannot overlook this observation.

I employ the term “knowledge-network” to reference the socio-historical connections that tether different knowledges. By emphasizing a network formation for knowledge, I aim to avoid the *a priori* assumption of distinct and bounded epistemes. The knowledge-network term does not reject the possibility of radical difference between seemingly different epistemes. Networks interconnect nodes. Knowledge-networks interconnect nodes of information into vast systems of thought and associations. Through socio-historical influences networks can also be interlinked with one another; their boundaries blurred as they adapt and change with each new interconnection.

All knowledge is born from particular sets of socio-historical variables and some knowledge-networks may have similar cultural foundations. Others may be recently interlinked through the sociological process of translation (Callon 1995, Latour 1993) wherein objects—experiences, information, the physical world—are encountered by one’s knowledge-network and appropriated in unique and contingent ways. Knowledge-networks continuously move and shift as they translate the emergent world. What happens, then, when the object encountered is another knowledge-network? What happens in the colonial and development moments when knowledge-networks work to translate one another?

I reveal in this chapter the processes of translation between the models. Through historical data of governmental and external interventions, I argue in “Translating Knowledge-Networks” that Model 1 has been in contact with and has translated Model 2 knowledge, which has led to the incorporation of environmental behaviors that anger God in Model 1. This argument points to the relative stability of the overarching logic structure of the knowledge-network in which Model 1 is embedded. I also show that in the contemporary moment, those who adhere to Model 2 actively translate Model 1 knowledge such that individuals may hold to knowledge that is not strictly scientific. Yet in the development arena, these individuals self-edit their knowledges, conforming to a modernist ideal of development that is purely technoscientific.

These observations leads to the second argument of the chapter in the section titled “Structures of Acquisition.” Motivated by a call within the epistemic community literature to blur the boundaries between ideas and structures (Adler and Haas 1992),⁴² I argue that the

⁴² Adler and Haas’s call is slightly different than my intent. Coming from the original notion of epistemic community that is any expert or scientific community, the authors ask scholars to explore the role of ideals within institutional structures. Instead, I draw from the classical anthropologist to explore the role of knowledges in shaping social structures as well as the role of social structures in shaping knowledges. Nonetheless, Adler and Haas’s argument is instructive to highlight the relationship between knowledge production and dissemination and the socio-cultural arrangements of individuals.

acquisition of Model 1 and Model 2 knowledges are conditioned by very different social structures. I show one learns knowledge by passing through individuals or groups who function as gatekeepers, or epistemic thresholds, for that knowledge. While the individual functioning as an epistemic threshold is hierarchically positioned vis-à-vis the learner, passage through the threshold establishes an epistemic community of shared knowledge. The primary difference between the acquisition of the models is that Model 1 is structured by a single epistemic threshold, while Model 2 is structured by multiple thresholds, creating nested epistemic communities. The age hierarchy of the community is the primary threshold for acquisition of Model 1, constituting a naturalized process. In contrast, the acquisition of Model 2 is marked by sequential thresholds within formal public education (i.e. teachers); each threshold marking one's entrance into more specialized epistemic communities. The number and arrangement of these epistemic thresholds are co-produced with the social function of the knowledge. The single-threshold structure of acquisition of Model 1 promotes social solidarity, while the nested threshold structure of Model 2 emphasizes hierarchy; I refer to these as communal knowledge and hierarchical knowledge structures respectively.

TRANSLATING KNOWLEDGE-NETWORKS

The previous chapter nodded to potential interconnections between knowledge-networks. Model 1, the model of the environment that states that God causes climate change due to displeasing behaviors around the world, included both social and environmental behaviors that transgress His law. Informants listed terrorism, war, and rape, as well as deforestation, burning gas, and pollution, as behaviors that invoke punishment in the form of rainfall variability. The

combination of seemingly scientific knowledge of climate change—deforestation and burning gases indirectly influencing rainfall—suggests that Model 1 is not purely “traditional” or “indigenous.” Similarly, Model 2, which states that climate change is caused by increasing carbon emissions into the atmosphere, is informed by individuals’ scientific training. Yet these informants also understand scientific knowledge to be conditioned by the level of one’s education: those with more education have stricter scientific knowledge while those just beginning school may fit scientific knowledge within an existing knowledge-network in novel ways. Such individuals may hold to knowledge of the environment and climate change that is neither wholly Model 1 nor Model 2. Thus the knowledge-networks around which Model 1 and Model 2 are based have been and are engaged in the labor of translating information that is part of the parallel and overlapping knowledge-network. I explain each of these in turn.

Model 1 Translating Model 2

I argue here that the incorporation of behaviors such as deforestation and pollution that anger God in Model 1 is an appropriation of scientific knowledge. From where might this knowledge have come and how might it have been incorporated into the knowledge-network? Community members claim to learn Model 1 through social gatherings but primarily through the household in which elder members play a significant role. In this environment, elders are seen as repositories of knowledge, which younger generations are expected to respect and learn as part of their sacred traditions, or *rog n miki*. Over time, however, variation has been introduced through colonial and governmental efforts to combat deforestation and environmental degradation through awareness-raising campaigns based in scientific knowledge. The

knowledge-network of Model 1 appropriated only pieces of information that fit within the overall logic structure, leaving the rest of the knowledge-network largely in tact.

Sites of informal education consist of the household as well as places of worship and markets. But informants did not state that mosques or churches were places of significant environmental education. Interviews with Muslims, Catholics, and Protestants reveal that local Imams, priests, and pastors did not explicitly talk about the causes of climate change. However, the Imams of both Tama and Ouegoulega stated that during particularly dry rainy seasons they ask congregants to pray to God for rain. Catholic and Protestant informants in both communities stated that their priest and pastor of their respective churches—who travel from Ouagadougou to the villages once a week for services—similarly ask their congregants to keep God in their hearts in order to have bountiful rainy seasons. Three informants stated that their priest and pastor mentioned how important trees are to the environment but did not specify why trees are important. Here, informants only made a tentative connection between church and the dissemination of Model 1: the implicit link between being faithful and receiving adequate rainfall and a vague importance of trees.

Social Interconnections

Many residents of Tama and Ouegoulega who were able to articulate where they may have learned about the environment and climate change suggested that they simply picked it up from the community. When asked directly where she may have learned that bad behaviors cause God to limit the rain, Fati the conseil of Tama, simply smiled and said, “people talk.” An older man replied, “It is what people in the community say.” Such responses suggest that knowledge exchange in the community is not confined to specific sites but is a condition of social

interactions. Community knowledge exchange is a condition of the fission-fusion of daily interactions and casual conversations. Of course, there are certain occasions where knowledge exchange among individuals is more frequent and rapid.

The market place is a prime example of such interactions in that it is a site where community members frequently meet, visit, exchange news and gossip with multiple social partners. Older men often congregate at the *tchakpalou* stands drinking and gossiping all day. Women circulate the market buying tomatoes, onions, and spices for sauces, stopping to talk with the women selling these goods or beignets and fried fish. Groups of young boys and girls often cluster together and roam the stalls. No matter the season the weather is often a significant topic of conversation. Community members talk about the timing and strength of the rains, the intensity of the heat, or the consistency of the wind. God, *Wendnam*—the ultimate source of weather—is peppered throughout these conversations. The market, then, might be seen as “a highly intricate network of partial or complete understandings” between community members who more or less hold to Model 1, which “is being reanimated or creatively reaffirmed from day to day by particular acts of [communication]” (Sapir 1949 [1931]: 104). Yet the market is not necessarily the primary site of environmental knowledge acquisition.

Indeed, the majority of community residents stated that they learned the knowledge of Model 1 from their parents. Of respondents to the initial demographic survey conducted in Tama, 103 (or 64%) stated that they received only “familial education.”⁴³ The household is the site in which children learn from elder members, as one middle-aged man put it, the means “for correct living.” As such, parents and elder community members are seen as repositories for knowledge. As with the implicit veneration of religious doctrine and traditions contained within Model 1 (see

⁴³ See Appendix A for further elaboration.

pages 117-123, Chapter Four), informants venerate parents, grandparents, and elder community members because of the knowledge they possess by virtue of being older. This is a direct logic in which age is understood to equate to the accumulation of knowledge—knowledge accumulation that is venerated due to its inherent relationship to the sacred. Many anthropologists throughout Africa have catalogued the respect afforded to community elders (e.g. Evans-Pritchard 1969, Fortes 1945, 1948, Meillassoux 1975, Mendonsa 2002, Rasmussen 2009, Skinner 1963, 1989). The analysis of this chapter deepens these studies by revealing that in Burkina Faso, respect, as a rule, must be afforded to those with age because they have accumulated more, potentially sacred, knowledge.

Only elder, male community members, for instance, criticized their neighbors and families for bad behaviors (see pages 124-125, Chapter Four). Hierarchical positionalities, along axes of age and gender, afford certain residents with the social power to place community behaviors within a larger sacred-profane framework. More significantly, the hierarchical positionalities permit these residents to criticize those who are perceived to deviate from the norm. The Imam of Ouegoulega, for example, admonished his wives, who were sitting within earshot, for disobedience. Other elder men admonished women, children, and grandchildren for their lack of respect. Such actions accomplish a double movement by attempting to reaffirm both the hierarchical positions of the speakers and the relative subordination of those being disciplined.

Additionally, the veneration of age and the circulation of individuals within the community suggest that the knowledge of Model 1 is built horizontally as well as vertically. Age is the framework for a more or less clear cut hierarchical ordering within the community. Of course nuance is added to this age hierarchy according to additional roles an individual

occupies—such as a position in local government or organizations, generosity with community peers, and even one’s dedication to and productivity of his or her labor (see pages 85-94, Chapter Three). Nonetheless, the basic age hierarchy indicates a power-knowledge nexus in which knowledge is handed down to younger generations who are considered empty receptacles. Conterminously, knowledge is built horizontally, or communally, as community members circulate inside and outside of the village and with more or less familiar individuals. Such socialization exchanges information through largely informal yet complex communicative settings, building and reinforcing knowledge—that is more or less homogeneous—in a continuous, emergent process (Fogel 1993).

Even while this knowledge is distributed throughout Tama and Ouegoulega, communication precipitates variation (Ochs and Schieffelin 2001) and the most significant source of variation of Model 1 is found in one’s level of public education. Secondary cycle students of Tama and Wegelga depart from the knowledge of their parents, despite being members of the community and following implicit and explicit mores. As such, the age conditioning hierarchy prohibits current lycée students from teaching their parents knowledge acquired through public education. The “age taboo” seemingly isolates Model 2 knowledge children learn in public school from Model 1 in the wider community. Students explicitly attest that they are not in positions to teach their parents. One student stated, “parents won’t accept what they [their children] have to say because they are still children. They will ask them what they know being so young.” Similarly, one parent (with no formal public education) of a child attending the premier cycle of public school reported that he speaks to the teacher occasionally about the child’s progress but he does not ask the child what he learns.

Even while elders dismiss children as knowledgeable, and even while elder men of Tama and Ouegoulega complain about the lack of respect from women and children, the age hierarchy is illustrated on a daily basis. Specifically, behavior reinforces the age hierarchy as younger generations publically defer to older generations. Greetings by a youth to an older individual, for example, entail the youth bowing (or dropping to one knee if the elder is seated) and averting his or her eyes. Unless one individual has significantly higher social status due to additional social roles and responsibilities, individuals of the same peer-group greet one another as equals—without posturing or averting one's eyes. For these reasons, the age taboo confounded discussion-oriented focus groups as a method for investigating shared knowledge. Participants sit quietly until the most senior member of the group responds to the question. As in the opening vignette to Chapter One, once the elder has spoken others speak up to wholly agree or elaborate on the central point that has been conveyed but never to disagree, contradict or challenge; doing so would be a serious breach of social respect and etiquette. Often times, individuals won't speak at all, allowing the elders to speak for the group or community at large.

It is improbable that the taboo of speaking knowledge to age is an impenetrable cultural barrier between Model 1 and Model 2. However, the explicit statements against accepting knowledge from younger generations within the community and the observed behaviors of youth deferring to elders suggest that the age taboo is significant enough to rule it out as a possible source of environmental behaviors as precipitants of God's anger. If the source of the interconnections between Model 1 and environmental behaviors does not lie within the communities, then, we must look outside of them—to interventions led by external groups. Unfortunately, an exhaustive search for a catalogue of outside intervention to the Commune of Tanghin-Dassouri proved fruitless. Nonetheless, there is evidence to show that both communities

have received attention from colonial and post-independence authorities regarding environmental behaviors and environmental degradation.

Historical Interconnections

The evidence of this interconnection is encoded in three colonial and post-independence laws that currently guide the activities of government groups, national organizations and associations, and international development organizations including USAID WA-WASH and its implementing partners. These laws are (1) a colonial era law written by the French administration in 1900; (2) the Agrarian Property Reforms initiated in 1985; and (3) the Forestry Code established in 1997:

1. The French colonial law of 1900 is the foundation for contemporary engagement with the environment in Burkina Faso. Referred to simply as “*le loi de juillet 1900*” this piece of colonial legislation aimed to protect natural resources from depletion and regulate their usage by issuing permits for commercial exploitation, allotting land concessions for territorial and commercial interests, establishing protected zones and classified forests, and enacting usufruct rights. The primary natural resource with which the law is concerned is wood. As Bouda (2009) has written, the colonial government appropriated communal lands so that French companies could plant and harvest economically valuable trees. The law states that indigenous populations would be able to continue to use wood and forest products as they traditionally have. In practice prohibitive taxes were enacted against the gathering of firewood, the production of charcoal, and the transportation of forest products, all of which had previously constituted central subsistence and economic activities for rural residents (Bouda 2009, Hill 1970,

Skinner 1989). This law, of course, was predicated on an imaginary of Sahelian ecology as deforested and degraded—an imaginary that was mobilized by French scientific forestry developed on Mauritius (Grove 1995, Scott 1998). The marginalization of colonial subjects and increasing colonial state control over natural resources began a process of environmental constructivism that fetishized trees.⁴⁴ While the colonial government did not initiate sensibilisations to disseminate this logic, it nonetheless tacitly increased the symbolic value of trees for colonial subjects beyond immediate subsistence and economic ends, and has since become the legal framework to which subsequent laws have been molded.

2. The Agrarian Property Reform (RAF, or *Reforme Agraire Foncier*) was meant to divorce Burkina Faso from its colonial heritage and neocolonial influences (Traoré 1999, Assemblée Nationale 2012). Initiated in 1984 during the Revolution,⁴⁵ the RAF was meant to weaken international economic tenure of lands and natural resources and transfer property to the state that would collectively hold the land for the mutual benefit of all citizens. Communities were brought into this process by being given authority to

⁴⁴ A story, part political and part environmental history, was fabricated that depicted the Sahel as a once densely forested environment that contributed to the might and majesty of the Roman Empire (Davis 2004). Ecological degradation was due not to Roman mismanagement but to the “hordes of Arab nomads and their rapacious herds” (2004:363) that moved in after the fall of Rome. It was written as early as 1864 that

There is good reason to believe that the surface of the habitable earth, in all the climates and regions which have been the abodes of dense and civilized populations, was, with few exceptions, already covered with a forest growth when it first became the home of man... I am convinced that forests would soon cover many parts of the Arabian and African deserts, if man and domestic animals, especially the goat and camel, were banished from them. [Perkins 1864 in Davis 2004:367]

The French thus institutionalized an Orientalist environmental narrative that justified the “pacification” of Sahelian communities, instated forced sedentarization and outlawed livestock grazing throughout much of West Africa. It is here that we find the birth of the narrative of desertification that continues to shape views of the Sahel held by the international development community.

⁴⁵ See Chapter Three.

effectively manage their communal lands. However, regulations for the “proper” management of communal lands under the RAF were decided not by the historical users of the land but government employed “technicians.” Such scientifically trained experts advocated continued protection of classified forests and reforestation among other environmental efforts. President Sankara emphasized these efforts by advocating tree planting as part of yearly household celebrations honoring ancestors. Recent revisions of the RAF—as in 2012—have initiated private ownership of land delineated from State-owned forests while continuing to promote reforestation and the regulation of forest products. The State enforces these legal developments through sensibilisations held by government officials that advocate tree planting and the protection of local forests (State-owned or not), and that outline the legal structures in place.

3. The law establishing the Forestry Code (*le Code Forestier*) in 1997 is perhaps the law most concerned with engaging communities on an epistemic level. This law continues to support the maintenance of public and private forests (as well as fauna and fish resources) as the “natural wealth” of the nation, needed for the “development” of the country and the “betterment” of the citizens (Compaore 1997, Assemblée Nationale 2013). More importantly, the law explicitly calls for raising citizen participation and accountability [*responsabilisation*] in “the conception, execution, monitoring and evaluation in foresters’ activities.” State foresters, installed at the commune-level, are tasked with managing forest resources and with raising public accountability by reporting infractions and administering fines and penalties. The forester of the Commune of Tanghin-Dassouri, Mr. Ouedraogo, stated that due to severely limited funds for Forestry Agencies throughout the country he spends most of his time with bureaucratic duties and

by engaging external environmental organizations to work within the commune. External organizations, he said, are the ones most often directly engaging communities about the importance of trees.

These laws have continued to influence how external organizations engage communities like Tama and Ouegoulega. Most notably these laws have directly influenced the drafting and implementation of the Burkina Faso government's plan to deal with continued climate change (see PANA 2007). Thus, these laws have guided the activities of intervention initiatives, including USAID WA-WASH, aimed at mitigating environmental degradation and, to a certain degree, local level pollution. The environmental laws of Burkina Faso, which have directed efforts of the colonial regime, national government, and external development organizations, are predicated on scientific knowledge of the environment and especially the role of trees.

Communities such as Tama and Ouegoulega have been exposed to external, scientifically framed knowledge since 1900 and direct awareness-raising intervention since the 1980s. The structure of the laws suggest that such intervention has been piecemeal and sporadic, with efforts ranging from political to legal to directly instructive. The local knowledge-network engaged the socio-historical influences of governmental actions, gradually appropriating the most salient and significant pieces of information. As a result, the environment—the domain of natural resources—is constructed and reinforced as a privileged sphere in which the presence of trees is emphasized. Thus, Model 1 appears to have translated the early scientific fetishization of trees into the already existing knowledge-network rather than being fundamentally altered by it.

Model 1 has gathered new information through interconnections into other ways of knowing.⁴⁶

⁴⁶ There is also the possibility that the environmental behaviors that anger God are also derived from a pre-colonial model that had a more pronounced role for Tenga, the Earth Goddess. Evidence for this is speculative given that early European visitors to Mossi country and early anthropologists during the

Model 2 Translating Model 1

How do USAID WA-WASH and Winrock employees engage with, think about, and, if at all, work with Model 1? Are there processes of translation within the labor of development? As many STS scholars have shown, technoscientific knowledge is mobilized through a hegemonic narrative of meta-rationality, pure objectivity, and universal applicability. Sandra Harding (2008) has noted how science has become tied to notions of modernity as the ultimate fruition of human knowledge. Tim Forsyth (2003) uses the term “orthodox science” to highlight the view that scientific positivism is politically neutral. Harding, Forsyth, and others agree that science is, at heart, a collection of messy practices that involve continuous negotiating among researchers and among multiple ways of knowing the world.

I argued in the previous chapter that scientific knowledge acquisition for many residents and employees is envisioned as a necessarily gradual process (see pages 140-142, Chapter Four). Informants differed in the amount of detail they provided about greenhouse gas emissions and their effects in the atmosphere according to the amount of scientific training they had received through formal education. Prior to formal education, however, informants who hold to Model 2 are not blank slates. They hold knowledge about the world that mobilizes their actions in it. Only through the formal process of public education do they adopt Model 2 knowledge of the environment and climate change.⁴⁷ Scientific knowledge, therefore, involves not just a

Colonial Era did not describe Mossi religious thought in detail. Contemporarily, Tenga is spoken of as having ensured soil, animal, and household fecundity and is unknown to have administered punishments.

⁴⁷ Interpersonal communication is likely the only significant source of knowledge acquisition. Due to low formal education rates, the majority of residents do not regularly read national newspapers that might cover environmental stories. Additionally, I only met one resident who owned a television, but he only used it to watch films and not news broadcasts. Many residents do own and listen to national radio

negotiation with others, but also a negotiation with oneself as the implicit desire to acquire Model 2 must necessarily be negotiated with preexisting ways of knowing. In the cases of Tama and Ouegoulega students and Program employees, Model 2 must translate Model 1.

The gradual accumulation of scientific knowledge is readily observable in secondary cycle students. I administered a survey to two classes of each grade level at the Lycée de Tanghin-Dassouri, in which 397 students participated.⁴⁸ The survey consisted of a mixture of propositions from both Model 1 and Model 2 verification surveys. Students were asked to agree or disagree with each statement but were not given the opportunity to modify statements with which they only slightly agreed or disagreed.

The most important propositions are those that refer to the causality for the contemporary lack of rain. Figure 5.1 illustrates the percentage of students from each grade that agreed with Model 1 propositions: “God directly causes the lack of rain to punish human behaviors such as wars, murders, theft, and greed;” and “God directly causes the lack of rain because of human behaviors such as deforestation and burning petrol.” Figure 5.2 shows the percentage of students from each grade that agreed with Model 2 propositions: “Deforestation directly causes the lack of rain;” “The gases from engines burning petrol directly cause the lack of rain” (“Personal Emissions” in figure 5.2); and “The gases from large industry directly cause the lack of rain” (“Industrial Emissions” in figure 5.2).

broadcasts and this may have had and continue to have some impact on community knowledge, but it is difficult to say how much.

⁴⁸ The number of students by grade is as follows: 6th, 77; 5th, 75; 4th, 67; 3rd, 51; 2nd, 38; 1st, 54; Terminale, 35. Complete survey results can be found in Appendix D.

Figure 5.1: Percentage of Lycée Students Who Agree with Model 1 Propositions

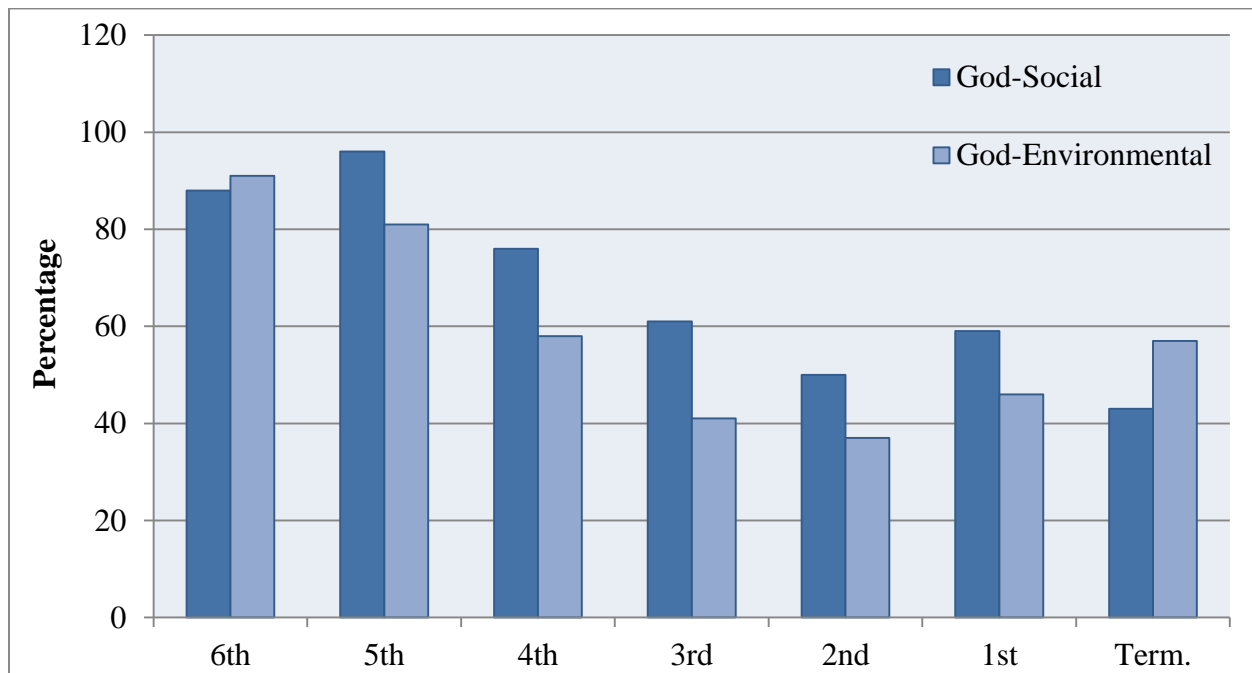
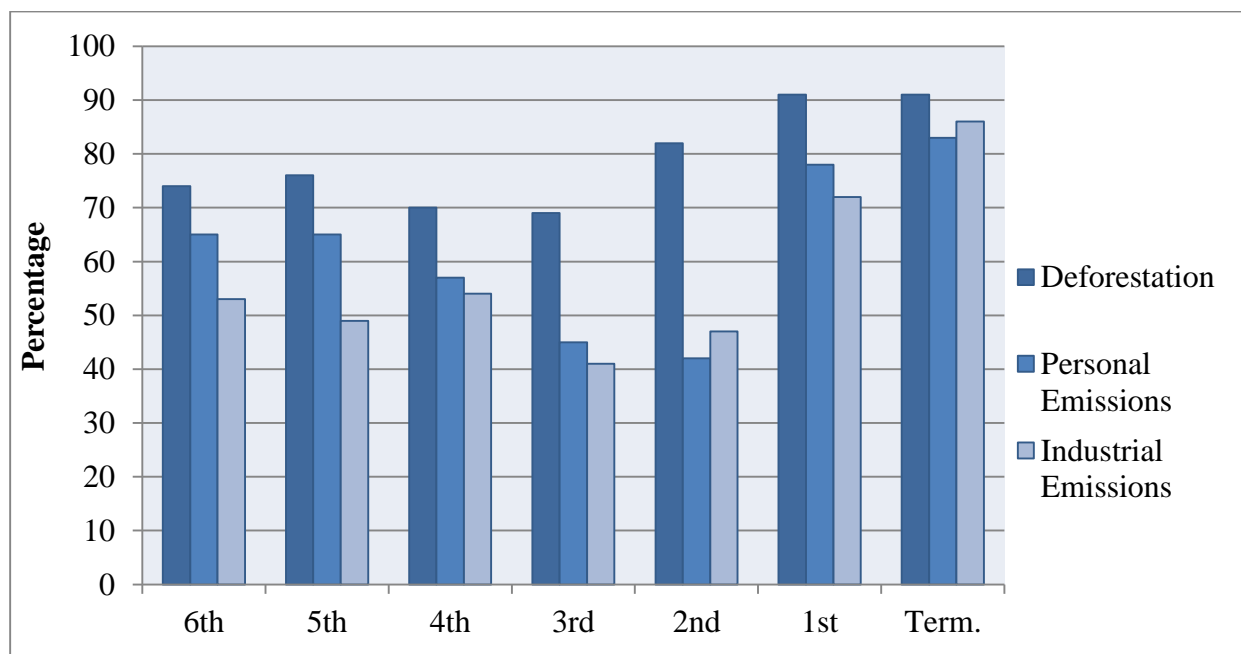


Figure 5.2: Percentage of Lycée Students Who Agree with Model 2 Propositions



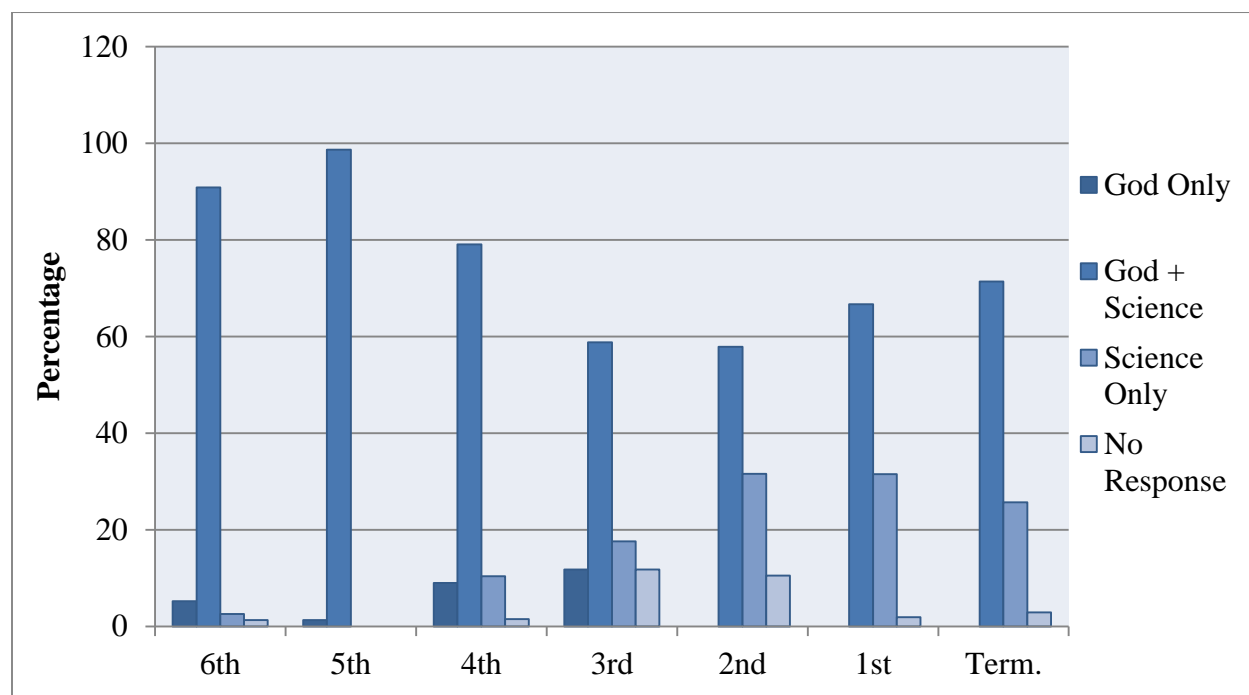
Survey results indicate that secondary cycle students are capable of holding to both Model 1- and Model 2-derived knowledge. There is a trend that reveals that over time students are less likely to consider God as a cause of climate change and more likely to consider more

strictly scientific explanations, even while many students still hold to the knowledge of their community. With more scientific training, students are more likely to consider Model 2 knowledge correct vis-à-vis Model 1 knowledge. The graph shows a clear inverse correlation between holding to the knowledge of one's parents—Model 1—and quantity of state-sponsored public education—Model 2. Significantly, however, a complete public education is not enough to shift all senior students from Model 1 to Model 2 knowledge.

Processes of translation, however, are also revealed in the responses. Figure 5.3 shows students' degree of translation between the models. God Only includes those who marked "God causes the lack of rain to punish human behaviors such as war, killing, theft, and greed," or "God directly causes the lack of rain because of human behaviors such as deforestation and burning petrol," or both. Science Only includes any combination of "Deforestation directly causes the lack of rain," "The gases from engines burning petrol directly cause the lack of rain," and "The gases from large industry directly cause the lack of rain." God + Science includes those students who marked any combination of propositions from the above two categories.

Figure 5.3 reveals that students are engaged in processes of translation between the two models. There is an inverse correlation between a strict Model 1 view of the environment and the quantity of scientific training. As students progress through school, they are more likely to hold to Model 2. However, data do not show that students are less likely to hold knowledge that combines Model 1 and Model 2 information as they progress through scientific training. In other words, the amount of scientific training one has does not determine that that individual will adhere to a strict model of the environment. Of course the variability may be due to other factors: For instance grades with lower percentages of students who chose both God + Science might not have covered climate change as thoroughly as other grades. There may as well have been

Figure 5.3: Percentage of Lycée Students Who Agree with Either or Both Model 1 and Model 2 Propositions

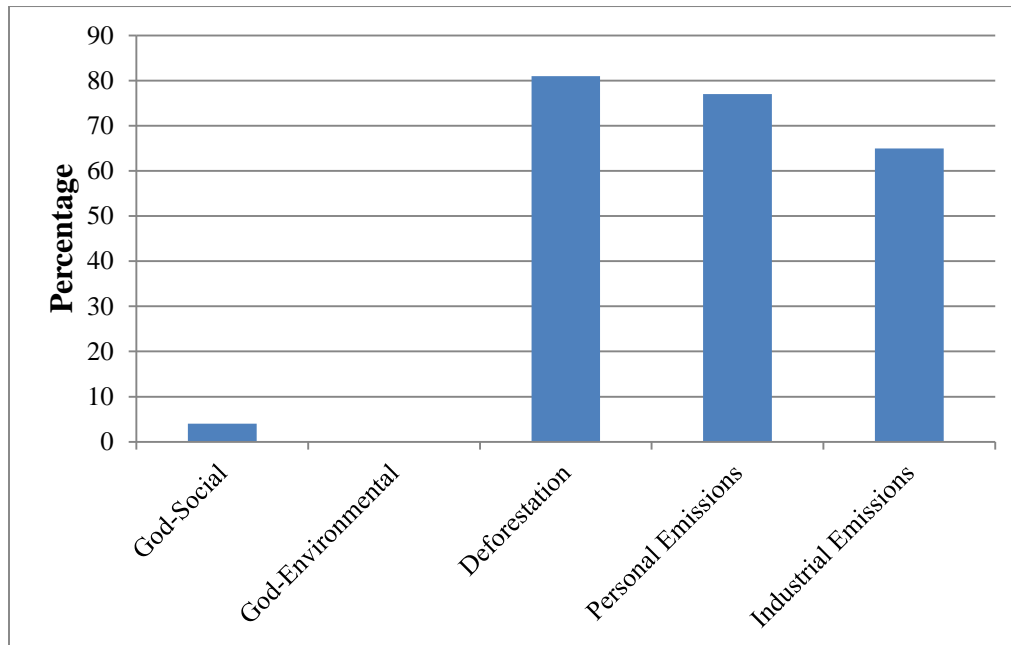


significant misinterpretation of either or both statements on the survey. Nonetheless, there is a slight trend in students being less likely to synthesize Model 1 and Model 2 as they progress through public school and more likely to adopt Model 2.

The same questionnaire was also administered to USAID WA-WASH program employees.⁴⁹ The participants included general staff—including the finance officers and information technology specialists—as well as program coordinators—such as those managing WASH and climate change activities. Because their offices are located in the same building, employees of Winrock International and CARE were also included. Results are presented in figure 5.4. Data reveal that Program employees are even more likely than lycée students to hold to scientific explanations for the causes of reduced rainfall and climate change. This reflects the more longitudinally intensive scientific training that employees are required to have. Only one

⁴⁹ Full results are listed in Appendix E.

Figure 5.4: Percentage of USAID WA-WASH Employees' Agreement with Model 1 or Model 2



individual, the primary secretary for the office, marked both God-Social and human deforestation as causes of climate change. Five individuals did not mark the questionnaire at all, later saying that carbon emissions are to blame for climate change, but these directly effect global temperatures directly, not rainfall. In doing so these individuals ultimately reaffirmed their adherence to Model 2 knowledge.

Clear from survey results is that secondary cycle students are in a process of knowledge translation but that program employees have more thoroughly accepted Model 2. One reason for this is that students are in a formative period in which they are increasingly exposed to and evaluated on their understanding and application of scientific knowledge. Coming from home environments in which Model 1 is the implicit knowledge through which the world is engaged, students are actively translating this knowledge through the framework of Model 2 that is being taught in public school.

This observation led to a reevaluation of initial conversations with secondary cycle students who had originally recounted a strictly scientific interpretation of climate change and additional interviews. Further probing questions with these individuals revealed that while several students are unwavering in their adherence to scientific knowledge, two had hidden their processes of translation. A young woman in 2nd, stated that she has learned in school the climate has changed because population has increased. She went on to say that she couldn't remember how exactly population increase is changing the climate but believes it is due to more people who "don't accept what their grandparents did and don't make sacrifices for the rain... And there are new types of work that aren't good, like prostitution." This young woman has clearly accepted some scientific knowledge but is unable to wholly engage Model 2 due to an inability to remember the details. She has compensated for this by incorporating Model 1 information to construct a holist logic structure about the environment and climate change.

Likewise, Amadou, in the first vignette that opens this chapter, confided that he internally wrestles with the seeming contradiction between Model 1 and Model 2 knowledges. Amadou stated that in Science class he and his peers have learned about the greenhouse gas effect and how the Industrial Revolution has influenced the amount of carbon dioxide in the atmosphere. But this is not the only explanation he hears, nor is it knowledge that he completely understands. Gabriel, the Climate Change Coordinator for USAID WA-WASH, in the second vignette, expresses a similar conundrum to Amadou. But unlike Amadou, Gabriel verbalizes a stronger self-assurance of translation between the models of climate change. This is likely conditioned by the difference in age and level of scientific education, of which Gabriel has had more experience, training, and, thus, time to enact the process of translation.

Such an allotment of time seems integral for translation. Gabriel identified a strict divide in what knowledges science and religion are able to provide and suggests that neither have offered rote processes of translation. Model 2 translating Model 1 is, for Gabriel and Amadou, a personal, even improvisational, process. Unlike Model 1 translating Model 2, wherein the community has reworked and appropriated some Model 2 information through a largely social process, Model 2 translating Model 1 is a personal process. This does not imply, however, that the translation is not without social influence for, as Tim Ingold (1996, 2000) reminds us, the individual is rightly understood as a socio-environmental nexus. A thorough exploration of what precisely has influenced Gabriel or Amadou to translate Model 1 through Model 2 in the personal ways that they have is beyond the scope of this study.

Not all USAID WA-WASH employees have engaged in translation like Gabriel. Several Program project coordinators—those, like Gabriel, who are directly engaged in the implementation and management of certain activities—have thoroughly situated themselves within Model 2. Alphonse, the agriculture specialist for Winrock International, rejected Model 1 as false. “*Je suis rationnel*,” I’m rational, he told me. “Climate change comes from human behaviors,” Alphonse specified, “but it is from releasing carbon gases into the atmosphere and the consequences of the greenhouse gas effect. Those without school think that...God causes climate change...Water is a chemical. It doesn’t come from God. Those who think this lack school.” Similarly, Issaka, the project manager for Winrock International, stated, “Science explains water. There’s no need for God. It’s the same with climate change. It is caused by human behaviors like deforestation, pollution, and industrial toxins.” Both Alphonse and Issaka are unwavering in their adherence to Model 2. No matter how intensely I probed for more

personal—and potentially more guarded—knowledge, they both presented themselves as strictly scientific and, in Alphonse’s words, “rational.”

Other Program employees were forthcoming about their individualist processes of translation. Similar to Gabriel, Constance, the Gender Specialist for Winrock, admitted that the answers she marked on previous questionnaires were derived from the scientific knowledge she learned through public education. I asked her if this left any room for God. “Yes,” she explained, “God is the ultimate source of water and He can act through natural processes like the hydrological cycle. But climate change is caused by the greenhouse gas effect and other human behaviors that release carbon into the atmosphere. God can also be the solution to climate change,” Constance stated, “as long as people pray.” Here Constance makes reference to a complex personal process of translation between Model 1 and Model 2. Constance does not see contradiction between the ways of knowing and has actively engaged both knowledges. Her process of translation, however, is not easily reducible to “Model 2 translating Model 1” or even “Model 1 translating Model 2.” Like Gabriel, the complexity of translation indicates that branches of both models have reached into one another, building a unique network that is predicated on her personal experiences, social life and education.

Interestingly, questionnaires administered to and initial conversations with Program employees suggested that everyone held to a strict scientific interpretation of climate change, including Gabriel and Constance. After probing further, it became clear that those with more nuanced knowledge actively and intentionally self-edit their personal translations when practicing development. This is to say that those who less strictly hold to scientific knowledge nonetheless engage with the labor of development through purely technoscientific knowledge—they engage in the work of purification—dividing science from non-science (Latour 1993).

Constance, in the same conversation stated, “We don’t talk about religion in the [Winrock] office. We use scientific knowledge.” Gabriel noted, “Development is normally about innovative technology... This is all based in science... Development is too strict in material and scientific explanations... There is no space for new and different knowledge.” Constance and Gabriel express explicit views that development is scientific labor. More specifically, and as Gabriel indicates, it is technoscientific labor—scientific labor that prioritizes the material and technological aspects of scientific knowledge.

Within USAID WA-WASH, there are two ways in which development practice becomes a domain of technoscience. As described on pages 73-74 of Chapter Three, hiring practices favor those applicants with significant formal education and advanced degrees in the physical sciences. Specifically, those individuals are hired with technological and scientific education that is directly relevant to Program projects such as hydrology, agriculture, and engineering. In the first movement, through hiring practices, USAID WA-WASH actively constructs itself as a strictly technoscientific environment.

Constance and Gabriel illustrate the second and more intriguing movement of filtration. The conceptualization of development as a technoscientific environment influences employees who might translate between multiple knowledge-networks. Constance and Gabriel edit their knowledges to mimic and exemplify the technoscience of their surroundings. Both admitted that within the labor of development there is no room for God, that the office is a space of science, and that the incorporation of alternative ways of understanding the world is stymied. Significantly, Constance and Gabriel confided that no one had explicitly told them to only work with technoscientific knowledge when engaged in their duties. Constance and Gabriel both implicitly comprehend development as a domain of strict technoscience.

The question then becomes why this should be so. Bruno Latour (1993) has written about the work of purification and the work of translation, revealing that the construct of modernity rests on the practice of dividing the world into distinct ontological categories such as nature and society, religion and science. Gabriel and Constance exhibit such a movement of purifying—categorizing—the world when they self-edit their knowledge. But there is another, complimentary explanation suggested by Alphonse’s comment that he is “rational” and that he rejects God’s influence in climate change. Alphonse implies, of course, that those who believe that God is involved in climate change are irrational and he accuses these people, whom he never identifies explicitly, as lacking education, or proper knowledge acquisition. It is not just that Alphonse, or Gabriel and Constance for that matter, conceive of technoscientific knowledge as developed or modern in relation to the irrational or pre-modern residents’ knowledge of Ouegoulega. Rather, they are socially, and thus epistemically, interconnected with the residents of Ouegoulega in and by the social structures that are coproduced with the knowledges. Alphonse, through strict adherence to the technoscience of Model 2, positions himself hierarchically vis-à-vis those who accept Model 1 and those who translate Model 1 through Model 2, such as Constance and Gabriel. The question then becomes why should Alphonse position himself hierarchically? What are the potential social mechanisms by which knowledges are established as truth and others delegitimized as irrational? I do not suggest that Constance and Gabriel consider their respective knowledges as embarrassments. I do suggest, however, that Alphonse’s statement is exemplary of how the technoscience of Model 2, and the interconnections between Model 1 and Model 2, are socially structured.

STRUCTURES OF ACQUISITION

Why, then, would Gabriel and Constance, self-edit and engage with development on purely technoscientific grounds without explicitly being told to do so? How does technoscience perpetuate social hierarchies? Many scholars have, of course, shown how science is incorporated within larger definitions of modernity and the promise of development, and is used socially to affect social distance (for example Meyer 1999, Mbembe 2008, Ferguson 2006, Piot 2010). I extend these analyses by showing that, in addition to the epistemic association of technoscience with a particular ideal of modernity, development agents use technoscience in a manner that perpetuates the particular social structures through which the knowledge is acquired. In other words development agents replicate those structures of acquisition in the development moment. But structures of acquisition are also evident in Ouegoulega and Tama, and because these structures are different than those of technoscience, residents use or practice their knowledge differently than development agents.

Here, I argue that all knowledge is acquired through epistemic thresholds, but the primary difference is in the number and arrangement of the acquisition of these passage points, constructing varying social structures. This perspective broadens the question from *what* knowledges are acquired to *how* knowledges are acquired. In this section I show that there are two structures of knowledge acquisition, corresponding to Model 1 and Model 2 knowledges, that I call communal and hierarchical, respectively. The acquisition of Model 1 is structured by a single threshold and reinforces social solidarity. The acquisition of Model 2 is structured by multiple thresholds, which establishes hierarchically arranged, nested epistemic communities.

I argue that the difference between communal knowledge structures and hierarchical knowledge structures is manifest in the number of thresholds and how they are arranged. The

knowledge of Model 1, for instance, is characterized by a single threshold where youth are expected to receive knowledge from elder community members to move through the threshold. The result is a vast, horizontally structured, epistemic community built on shared—communal—knowledge. In contrast, the perception of scientific knowledge as rational and an objective representation of the world establishes multiple epistemic thresholds for individuals seeking to gain more scientific knowledge. The thresholds are, importantly, hierarchically arranged and socially defined by the accumulation of more detail, more facts, and better logic. Moving through the thresholds moves one into increasingly specialized epistemic communities (Cross 2012, Haas 1990, 1992).

Structures of Communal Knowledge

There are particular features of communal knowledge. First, communal knowledge is widely shared across social divisions and categories. Alessandro Duranti (1997: 28-29), following Ward Goodenough, has argued that shared propositional knowledge—beliefs and values about the world—is a fundamental quality of any physical community. But it is also a quality of an epistemic community. I extend the epistemic community literature by advocating a broader definition of epistemic communities that are understood to include scientific or non-scientific knowledges and structured by varying degrees of internal cohesion among group members. Model 1 knowledge fits this definition by constructing community on a wide scale (more so than Model 2 as I explain below) by neutralizing demographic differences of age, gender, religion, and, to a degree, education. Granted, Model 1 is a generalization of community-shared knowledge but the degree to which all demographic strata of Tama and Ouegoulega verify the

model contribute to the observation that, in terms of the environment and climate change, this knowledge contributes to a sense of a physical community as well as an epistemic community.

The epistemic community of Model 1 is structured largely through informal processes of knowledge acquisition. The physical community generally and household structure specifically are conducive for the spread and reinforcement of shared knowledge. But informants identified the household as a particularly rich site of knowledge acquisition, wherein younger members afford older members respect and authority by virtue of accumulated experience and knowledge. Community is here reinforced hierarchically and codified in the Mooré term *rog n miki*, or tradition (see page 121, Chapter Four). Individuals are “born to find,” to see, to accept what has come before, and to replicate it. Tradition is characterized by the sacred because of the impression that countless generations have been born into and replicated it before. Thus, hierarchy ensures the replication of Model 1, where elders are socially structured as the single epistemic threshold for shared knowledge of the environment. The second feature of communal knowledge, therefore, is that even though it may rest on hierarchy in order to perpetuate itself, the hierarchy consists of a single threshold.

But neither tradition nor knowledge are static; replication exposes knowledge to variation (Ochs and Schieffelin 2001, Sapir 1949 [1931]). While the age-knowledge nexus and the weight of the sacred ensure strong epistemic cohesion within Tama and Ouegoulega, the strongest source of variation is in the length of one’s public education. Formal knowledge acquisition external to the community is the primary source of knowledge variation, which is not lost on Tama and Ouegoulega residents who have only completed the premier cycle of public education or who have not received public education at all. The majority of residents said the value of public education rests in the child’s ability to read and to write but many residents said that

public education changes children, creating a “different kind of intelligence,” as Rokia, a young woman with two children in Tama put it. A Ouegoulega resident, Awa, replied vaguely that children who have gone to school are simply “different.” Both women intimate that children with advanced public education are becoming part of a different epistemic community while still part of a geographical and cultural community. Even though both women acknowledge that children learn different knowledge through formal education, children learn this knowledge through a social structure different to Model 1 in the communities.

My argument here is only for the acquisition of Model 1 knowledge. As mentioned in Chapter Two, Arun Agrawal (1995) has critiqued investigations into indigenous knowledge for too readily concluding that such knowledges are communal and enforce social solidarity. Appreciating this critique is one reason I avoid the term “indigenous knowledge” as a seemingly coherent, homogenized, body of knowledge; and I have shown in the first section of this chapter that the models of climate change are, in fact, socio-historically interconnected. However, one should not be precluded from investigating how particular types of knowledge are used to enforce social solidarity and others to enforce hierarchy. Indeed, as I show in Chapter Seven, there are types of knowledge within Tama and Ouegoulega that are revealed in the development moment to function hierarchically, exacerbating social stratification.

Structures of Hierarchical Knowledge

The first characteristic of hierarchical knowledge is the presence of not one but multiple socially structured epistemic thresholds. The first threshold in the acquisition of scientific knowledge are state-salaried educators. During the period of fieldwork, Amadou, my research assistant in Tama, showed me one exercise related to climate change as part of his English class. The exercise

consists of an excerpt from a 2009 Newsweek article titled “Climate Change: A Challenge for Our World.” Students were asked to write responses to a series of questions the instructor created to measure students’ reading and writing comprehension of English. However, the article and the response questions both enforce technoscientific knowledge of climate change. For instance, the excerpt includes the following passage:

Food security is already at risk because of soil erosion and the volatility of oil and gas prices that sustain industrial farming, while demand is rising because of population growth and changing diets. Climate change will exacerbate this squeeze. According to a United Nations Environment program [sic] projection, agricultural productivity could drop by up to 50 percent in many developing countries by 2050, not least because of changed patterns in rainfall.

Students were to use this passage to answer the following question: “According to the text, what impact does climate change have on the developing countries?” In this instance the English instructor becomes an threshold for technoscientific knowledge (as well as foreign language competency), illustrating the role of instructors in formal, public education generally.

Even if students succeed in meeting instructor expectations, subsequent grade levels function as subsequent thresholds, which culminate in graduation from lycée. If one pursues advanced scientific training in graduate work and in the professional realm, thresholds are structured throughout the entire process. This is evidenced in the way scientific training is characterized by Program staff as a gradual accumulation of more “facts” (see page 140, Chapter Four). Program staff understand there is still more detail regarding the technoscience of climate change to be acquired. The gradual accumulation of technoscientific knowledge is formalized in advanced scientific training, such as earning a Masters of Science degree as many Program staff possess. But the gradual accumulation of technoscientific knowledge is also structured within the

development context through trainings and workshops designed to convey more intricate and specialized details about the technoscientific dimensions of climate change.

One workshop series in particular positions USAID WA-WASH as an epistemic threshold for climate change knowledge within the context of development. These workshops were conducted throughout the regional Program area—Burkina Faso, Niger, and Ghana—during the rainy season of 2013 with a second series planned for the following year to catalogue and evaluate how initial attendees have benefited from and incorporated climate change knowledge into their programs and institutions. I attended the workshop held in Ouagadougou along with governmental officials and organizations’ representatives including representatives from environmental departments such as the Direction General of Water Resources (DGRE) and the National Office of Water and Sanitation (ONEA).

Gabriel organized and facilitated the workshop along with a Ghanaian colleague from Water and Sanitation for Africa (EAA). Entitled “Integrating Climate Change Adaptation into Development Strategies” the workshop aimed to disseminate climate change knowledge to USAID WA-WASH “collaborators,” or those not directly implementing USAID WA-WASH projects but part of the larger governmental and institutional network of development in which USAID WA-WASH is embedded. Gabriel stated that the objective of the workshop was twofold: (1) to present knowledge of climate change—the science, projections, and effects—both globally and for Burkina Faso; and (2) to present and provide participants with the conceptual and analytic tools to plan and manage various water resources within the context of climate change.

Over the course of five days, Gabriel and his colleague covered specific ways that climate change can be incorporated into policy decisions. The workshop began with an informal true-false quiz aimed to reveal the baseline knowledge attendees held about climate change.

Questions were strictly limited to the technoscientific knowledge of climate change such as “The average temperature of the planet has increased about 0.2°C (0.3°F) over the course of the last century,” and, “It will take about 13-16 years for the climate to return to ‘normal’ once GHG emissions are stabilized at their 1990 levels.” The workshop facilitators then built on this knowledge throughout the course of the first and second days with sessions titled, “Recalling Climate Change Concepts,” and “Overview of International Negotiations of Climate Change.” These sessions covered, in great detail, the types and quantities of greenhouse gases in the atmosphere, their sources, and environmental consequences.

The majority of this information was gleaned from Kyoto Protocol documents and recent reports from the Intergovernmental Panel on Climate Change (IPCC),⁵⁰ which is under the management of the United Nations Environment Program (UNEP). The IPCC is considered to be “the leading international body for the assessment of climate change” and is tasked with providing “the world with *a clear scientific view* on the current state of knowledge in climate change and its potential environmental and socio-economic impacts” (IPCC 2014 emphasis added). The most recent IPCC report from Working Group I titled “The Physical Science Basis” condenses projections into three primary but detailed future scenarios that “reflect the state of knowledge,” including the development of new tools and data systems to “cope with this large increase in information” (IPCC 2013: 121). By distilling this information and adapting it to the context of the workshop, Gabriel established it as an arena of pure technoscientific knowledge, which ultimately conforms to the perception that development is a domain of pure technoscience.

Significantly, the workshop then perpetuated this perception, structuring itself as a threshold of technoscientific acquisition. Gabriel stated that the workshop was difficult to

⁵⁰ The IPCC has a different name in French: le Groupe d’experts intergouvernemental sur l’évolution du climat (GEIC). Both French and English versions of official documents were used in this analysis and can be found under their respective names in the bibliography.

organize because the participants come from diverse professional and educational backgrounds. Indeed, some participants had advanced degrees while others had only attended public education through the secondary cycle. The first objective of the workshop listed above was meant to establish baseline knowledge on which the rest of the workshop would build. Participants were directly incorporated into development-as-technoscience not only through passively receiving knowledge from session presentations, but also from continuous group work.

Two group exercises are particularly illuminating. The first asked participants to analyze particular parties' vulnerabilities to climate change such as rural agriculturalists, urban residents, and government officials. I worked with the group that analyzed rural communities' vulnerabilities to climate change (figure 5.5) and found that, similar to Escobar's observation that development employs Westernized frames of reference for those "in need" of development, the entirely Burkinabè group (save for myself) constructed the hypothetical rural community as a singular, homogenous group. Part of this constructed identity includes the characterization that the rural community is without epistemic or material means to find solutions to problems. This was brought to bear in the second exercise, which built on the first, asking groups to enshrine the workshop's lessons into action plans for incorporating climate change information into public policy. The members of our group listed the parties that would need to be mobilized in order to safeguard against community vulnerability: national and local governments, regional businessmen [sic], development organizations, and water companies. When I suggested that we incorporate community organizations, I was told that this isn't a feasible idea because local politics would derail any action. Again, the community was constructed as without the means to take charge of its own development.

Figure 5.5: USAID WA-WASH Climate Change for Decision Makers Workshop



These group sessions, and the workshop generally, had a more subtle and pervasive impact on participants' models of climate change and development. By focusing on the technoscience of climate change, and by implying that communities lack the means for engaging their own development, climate change and development are constructed as technoscientific problems with technoscientific solutions. Moreover, USAID WA-WASH is conterminously constructed as the source of necessary knowledge and technology for those technoscientific solutions. For instance, a presentation on the second day entitled, "Climate Change and Development: The Strategy of USAID," outlined the three objectives of USAID's strategy to deal with climate change: (1) "Accelerate the transition to low emissions development;" (2) "Increase the resilience of people, places and livelihoods;" (3) "Strengthen development outcomes by integrating climate change in the programming of the Agency in policy dialogues and internal operations." The presentation then included a list of climate change risks such as

deforestation and drought, and the explicit activities in which USAID has been engaged to mitigate deleterious effects. For example, in the arena of deforestation Gabriel stated that USAID has been engaged in REDD+⁵¹ activities with notable successes in South America. In regards to drought, it was stated that USAID takes a global perspective to identify risks and those populations most vulnerable in order to effectively direct activities. Specifically emphasizing USAID's role in engaging with climate change vis-à-vis development repeats the implicit message that USAID has specialized knowledge and experience to which the larger development community ought to listen. This is to say that USAID WA-WASH constructs itself as a threshold of technoscientific knowledge for the wider network of development in which it is embedded.

While the institutional-level efforts of USAID WA-WASH rest on the dissemination of technoscientific knowledge, the dissemination of that knowledge reveals an inherent paradox: By positioning the Program as a generator and storehouse of technoscientific solutions to climate change and development, USAID WA-WASH constructs and reinforces a hierarchical position even while the explicit goal of institutional capacity building, as formulated by the Regional Director, is to weave a network of development, and to create a collaborative community of development organizations. Epistemically, that is, the labor of disseminating technoscience of climate change and development to other organizations and institutions is meant to (1) establish and strengthen a development community—social solidarity—even while it (2) exacerbates distance and difference—hierarchy—on the basis of accumulated technoscientific knowledge.

Yet participants eagerly sought out this knowledge and hoped to profit from the training. One participant with whom I spoke, the local governmental representative for Koudougou, stated

⁵¹ Reducing Emissions from Deforestation and Forest Degradation, or REDD, refers to the effort to attribute a financial value of the carbon stored in forests and includes incentives for developing countries to maintain forests. REDD+ additionally includes conservation, sustainable development, and forest management in those incentives.

that he would return home and hold several training sessions of his own to disseminate this knowledge further. He said that he had “profited from these experts” and could now pass along this knowledge. This participant, in short, had felt himself part of a new epistemic community, hierarchically ordered to his previous epistemic community and the epistemic community of his colleagues and peers in Koudougou for whom he would now function as an epistemic threshold. This is likely one reason why the presentation of certificates to attendees of workshops facilitated by foreign and national organizations and national and local governments is so culturally important. The certificate is physical proof of the acquisition of knowledge. In this case, the certificate ceremony that closed the weeklong workshop formally brought participants into the epistemic community of the specialized technoscientific knowledge of climate change and development.

Multiple epistemic thresholds in the gradual accumulation of technoscientific knowledge establishes complex and overlapping epistemic communities. One does not stop being a lycée graduate after earning a M.Sc. degree, for instance. The epistemic communities of technoscientific knowledge are hierarchically arranged according to gradually accumulated detail. The upper tiers of this hierarchy produce a particular type of epistemic community that is evidenced in USAID WA-WASH. The filtration of technoscientific knowledge structured in USAID WA-WASH hiring practices establishes an epistemic community of experts. Those who hold to Model 2 within the Program are recognized as having more specialized technoscientific knowledge directly related to their tasks. Peter Haas originally used the term “epistemic community” to refer specifically to those “with recognized expertise and competence in a particular domain and an authoritative claim to policy-relevant knowledge within that domain” (1992: 3). Within this conceptualization of an epistemic community, however, members are

positioned not only as experts but also as a threshold for others who wish to capitalize on their specialized knowledge. Thus, the second characteristic of hierarchical knowledge is that there are multiple thresholds through which one must pass towards becoming an “expert,” or, in this case, a development worker.

CONCLUSION

In this chapter I have strived to complete the analysis for the first research question and to begin answering the second research question. The structure of the chapter was divided into two questions: (1) What happens when knowledge-networks encounter one another? (2) How might such encounters be conditioned by the larger social structures in which the knowledge-networks are embedded? The first question invites one to consider the ways in which knowledges have been and continue to be influenced by complex socio-historical variables. The second question further elucidates the similarities and difference between the knowledges, but also begins the work of understanding how knowledge-networks interact in the contemporary moment of development. Both questions complicate the analytical boundaries between the models and situate them more appropriately in knowledge-networks with extensive and complex linkages.

In order to move beyond the two-dimensional terminology of “hybrid knowledge” and “hybridity,” I have shown how the knowledge-networks in which the models are embedded have reached out and into one another through processes of translation. Beginning with the observation that the environmental behaviors that Tama and Ouegoulega residents claim anger God are appropriations of external scientific knowledge, I discussed socio-historical influences encoded in colonial and national laws: the colonial law of 1900, which set the legal framework for post-independence laws that regulate human-environment interactions in Burkina Faso; the

RAF, which regulates land usage; and the Forestry Code, which regulates the harvest of forest products, and legally mandates reforestation and awareness-raising campaigns against deforestation. Rather than being fundamentally altered by this external knowledge, holders of Model 1 have appropriated pieces of information, modifying them so that they fit within a more or less cohesive knowledge-network.

In parallel, community lycée students and Program staff engage with Model 1 through the knowledge-network of Model 2. Lycée students gradually accumulate more scientific knowledge as they advance through grades. Survey results revealed that most students in their final year do not fully adhere to Model 2 knowledge but use Model 2 to translate Model 1. Several USAID WA-WASH employees claimed to strictly adhere to Model 2 while others admitted to nuanced processes of translation of Model 1. This suggests that advanced scientific training may not be enough for every individual to strictly accept and adhere to scientific knowledge. Moreover, these results leave open the possibility that even those who claim to hold a strict scientific view of the world may have manifestations of personal translations in other nodes of the knowledge-network. Nonetheless, survey results compared with interview responses revealed that individuals perceive the social importance of technoscientific knowledge within the development arena. Several Program staff admitted to self-editing, strictly using technoscientific knowledge during their development duties, and momentarily rejecting Model 1 knowledge.

The imagery of the network is borrowed from STS literature, to show that knowledge can be constructively envisioned as an interconnection of disparate nodes of information with historical roots. As such, I have shown how any knowledge is not a static, abstract constellation of information, but is being continuously negotiated and reinforced through everyday interactions and individual processes of translation. The individual and social interactions that

constitute the processes of translation are recursively conditioned by structures of logics within the knowledge-networks. The epistemic is recursively related to the social.

The epistemic-social relationship produces two types of knowledges: communal knowledge and hierarchical knowledge. Corresponding to common sense and specialized knowledges, Model 1 is an example of communal knowledge while Model 2 is an example of hierarchical knowledge. The acquisition of these models, which one might now see as different types of knowledge, are characterized by different social structures. While the acquisition of both knowledge-networks establishes epistemic communities, the primary difference between communal knowledge and hierarchical knowledge are the number of epistemic thresholds through which one must pass to become a member of the corresponding community. Communal knowledge is established through a single epistemic threshold; in the case of Tama and Ouegoulega this is conditioned by the age-knowledge nexus where elders are repositories of sacred tradition and knowledge. Hierarchical knowledge is structured by multiple epistemic thresholds that demarcate tiered epistemic communities, formalized in public education and the gradual accumulation of technoscientific knowledge. The pinnacle of the hierarchy manifests in development “experts,” the social value of whom contributes to those Program employees who self-edit their personal processes of translation.

The social value of experts is part of the overall hierarchical ordering of scientific knowledge. Evidence for this is found in how parents of students at the Lycée de Tanghin-Dassouri perceive their children as they gradually acquire Model 2 knowledge. As noted above, several mothers noted that those children who have attended formal education are somehow different, not only from children who have not had extensive formal education, but also from the community at large. Indeed, the children at the lycée are positioning themselves within an

epistemic community that is largely sealed off from those in the community without access to public school. The age-knowledge nexus prohibits children from teaching knowledge acquired in this setting to older community members. Model 2 scientific knowledge is further separated by the spatial and economic implications of the knowledge-network.

In the questionnaire administered to lycée students (Chapter Three), participants were asked where they hoped to live after completing secondary cycle and why. Of questionnaire participants 45.9% said they would like to live in a foreign country such as France or Canada; 56.9% marked they hoped to live in a large city such as Ouagadougou or Bobo-Dialouso, and only 5.5% said they would live in a small village or natal community. Many Tama and Ouegoulega parents echoed this desire for children with formal education to live outside of the communities. One man responded that living in a city is only practical for children with formal education, “With school, there is no work [for children] in the village.” A mother noted, “Children with education can circulate in the city. They can read signs. They understand.” But many parents note that formal education permits one to seek intellectual labor in urban centers that pay substantial salaries.

The potential for economic success is perhaps the strongest influence in pulling children from the rural communities into urban centers. Indeed, I did not speak to a single older resident of Tama or Ouegoulega who had completed secondary cycle and remained within the community. Of course, the urban center attracts those without formal education as well—migrant labor being a significant livelihood in West Africa (Skinner 1960a, Rain 1999). But those with formal education are more likely to be attracted by the allure of economic success and capital accumulation in the urban center and it is this potential for economic success that is likely the question that implicitly structures the thresholds of formal education. If so, then this analysis

strengthens previous analyses that formal education has its roots in the colonial project, revealing that not only has formal education inserted new types of knowledge into the colonies but that such knowledge is perpetuated through rigid hierarchical social structures.

Combining this analysis with prominent scholars of African modernity reveal that knowledges of the environment and climate change are not isolated from other epistemics. Charles Piot (1999, 2010) and James Ferguson (1999), for example, have noted the ways in which Africans, in anticipation of the materiality of modernity, look outside of immediate geographical communities. The expectant gaze is directed toward the West, religions, governments, development organizations, and global flows of capital. Piot and Ferguson have argued that for many rural Africans, sources of modernity—particularly governments, development organizations, and flows of capital—are spatialized on urban centers. Achille Mbembe (2008), however, extends this analysis by suggesting that the insertion of Africa into global political economic networks has fractured notions of identity and contributed to a tension between “nativism” and “cosmopolitanism”—between local and traditional values on the one hand and externally oriented identity formation on the other. Thus, the processes of translation between the models are tied to wider epistemic fields of values, meanings, and aspirations.

What the analysis of this chapter shows, however, is that formal education is perceived to be one means by which individuals hope to achieve modernity. Students acquire more than scientific knowledge about the environment in the form of Model 2 through formal education. The hierarchical structuring of scientific epistemic communities not only conditions students to strive for more specialized knowledge, but the structuring of multiple thresholds also conditions students to strive for particular suites of ideals for the future and, thus, modernity and identity. In this way, one can see that the knowledge-network in which Model 2 is embedded has

multidimensional interconnections with the social. The knowledge-network is a total social system (Mauss 2002) such that Model 2 knowledge is interconnected with social structures of knowledge acquisition, as well as social narratives of progress, modernity, and identity, all with political economic characteristics.

However, this analysis cannot be simply inverted and applied to those who hold to Model 1. It would be false to suggest that those who do not acquire formal education and remain in Tama and Ouegoulega reject the constellation of social factors that contribute to notions of modernity. Indeed, many parents with whom I spoke stated unequivocally that formal education is a social good and wise investment for their children. Two co-wives I interviewed, Odile and Rakieta, went so far as to chastise their own parents for not sending them to school. Yet the pursuit of formal education is largely conditioned by household capital accumulation. I argue in the next chapter that parents make acute economic decisions about their children's futures that must be weighed with the difficult financial realities of the present. This financial reality is, I show, conditioned by environmental change.

Local notions of modernity, as illustrated by definitions of development, additionally, condition the financial reality. This is an important analysis, for the perpetuation of either the communal knowledge of Model 1 or the hierarchical knowledge of Model 2 rests on individuals not only willing to accept the knowledge, but willing to replicate the social structures by which the knowledges are conditioned. In the following chapter I ask why Tama and Ouegoulega residents hold to Model 1 when implicitly confronted with Model 2 in the development context. Why do Program employees explicitly reject Model 1 and attempt to proliferate Model 2 in and through development projects?

CHAPTER SIX

KNOWLEDGES OF DEVELOPMENT: TRACING THE KNOWLEDGE-NETWORKS OF MODEL 1 AND MODEL 2

Excerpt from my field notebook, 21 February 2013

Gabriel and I are in Dassouri where Winrock has been hosting a weeklong training session. The topic of the workshop is Conservation Farming, Winrock's "climate smart" techniques meant to reduce physical and chemical inputs while increasing yields of household farms. Attendees—about 30, including 3 women—are representatives from village project sites throughout the commune, including Ouegoulega. Gabriel has been invited to give a presentation on climate change globally and in Burkina Faso to provide context for the project, to highlight the importance of the new techniques and motivate the audience.

The training is being held in the community center building of Dassouri. It's a large, bare concrete building with a stage. The building is just off the main road that connects Ouagadougou with the western part of Burkina Faso. Large, over-burdened trucks rattle down the road at high speeds, the noise reverberating throughout the community center, the sound echoing across the concrete interior. The occasional truck makes it impossible to hear the person next to me but the doors and windows are left open to allow the hot, dusty air to circulate

I've taken an empty seat in the middle row with the community representatives. Gabriel sits with the Winrock employees far off to my left, separated from the attendees by several

empty chairs. I happen to sit next to the representative from Koudieri and, it turns out, the representative from Ouegoulega, John. I strike up a conversation in French but quickly shift to Mooré; John has never attended public school and his French is limited. I ask him about the language of the sessions. The majority of presentations have so far been in Mooré and John is motivated to learn about new farming techniques. “*Nasaara-bengre yaa soama*,” he tells me chuckling, this technical knowledge is good. The Koudieri representative eagerly echoes the sentiment.

We quiet down as Gabriel takes the stage and introduces his presentation. Gabriel is just recovering from a cold, his voice is dry and rasping and he’s unable to project. When a truck roars by it’s nearly impossible to hear him. The trucks are bad enough, but I’m surprised no one is on stage translating Gabriel’s words. Gabriel isn’t Mossi so he conducts his presentation in French. I wonder how many in the audience are like John and unable to comprehend what Gabriel is saying. These concerns are soon overshadowed as Gabriel moves into the data of his presentation, naming and detailing the various greenhouse gases and chemical interactions in the atmosphere. Gabriel explains the difference between carbon gases and methane, their sources, their composition within the atmosphere, and the atmosphere’s relationship to global temperatures. His slides show graphs of atmospheric gases over time, chemical formulas, and the visual diagram of the greenhouse gas effect, the latter of which is in English! I can’t imagine that much of this information is making much sense to those who do speak French, and much less to those who don’t. I look around the room and see John nodding off in his chair. A few people in the front row, seated behind a long table, have put their heads down. One of the women even gets up and walks outside. I hear sighs during the presentation and twice someone sucks his or her teeth in displeasure. Gabriel delivers the scientific information unfazed.

Excerpt from my field notebook, 26 August 2013

Issaka is the Project Manager for Winrock International. He oversees the details of all projects, coordinates logistics, and generally keeps things in the office and project sites running smoothly. For a manager Issaka has significant contact with people at project sites, regularly making visits and getting to know the community members with whom Winrock is working. He grasps the conditions of community life but because of his position he also understands the institutional and governmental structures of development. As part of his job, Issaka navigates the differences between implementing development projects in communities and the development goals of USAID WA-WASH. I've met with Issaka to talk about these differences.

“Culture is changing because of modernity [*le modernisme*],” he tells me, “and that is changing the divisions between good and bad, particularly in small villages like Ouegoulega. For example, the [mobile] telephone. The telephone promotes communication on a vast scale. People can share knowledge and experiences. It is the same with the television. The television allows people to view the world through films...Normally, in tradition, when parents speak, children will listen and not cause problems. But maybe a child will see other children in a film speaking with their parents as equals and looking them in the eye. Children may try to imitate this with their parents and elders won't understand. They [the elders] will say that they [the children] are being impolite and that tradition has been lost. The same is true for the telephone. It is like those who say change comes from God.”

“How do these things impact your projects,” I ask.

“Development depends on the community and the [residents'] knowledge...One can't be sure about the community. So the government has the responsibility to develop the country. You know [Moussa, the recipient of the demonstration garden pump in Ouegoulega]? He is only

looking for water and food security. He has a limited vision of development. But the government has a large vision of development that includes the mayor of the commune [of Tanghin-Dassouri]. Even if it is an organization with the means to implement a project it is the government's vision they follow... It is important to include the strengths of the different groups because they all have different knowledge and means for development projects, even the community. [Moussa] contributed to the pump project only after seeing the demonstration pump. His knowledge was more limited and broadened when he saw the first success. This is how Winrock mobilized community capacity.”

INTRODUCTION

The first vignette that opens this chapter recounts one of many interactions between USAID WA-WASH and Winrock staff with residents of Tanghin-Dassouri. The episode centers on the attempted transfer of Model 2 knowledge to those who hold Model 1. It seems that no knowledge is actually transferred—that, at the least, the representative of Ouegoulega has either ignored or rejected the knowledge. At the least, John seems to lack the linguistic, and possibly the epistemic, literacy to translate the presentation, and there may have been others like him. How could Gabriel have so dramatically mistranslated the capacity of the audience? Why present detailed scientific information?

The new ethnographies of development have sought to understand development workers as mediating agents within often conflicting contexts. On the one hand many development workers are motivated by genuine humanitarian concerns (de Jong 2011). On the other they are caught within large, sometimes international, institutional structures that constrain development practice and dictate the labor of development (Mosse, Farrington, and Rew 1998). In short,

development workers are intermediaries between ideals and practice. This body of literature is in some ways a reaction to early critiques of development as a neocolonial process of oppression and exploitation (Escobar 1995). I do not overlook the neocolonial roots and occasions of oppression within development (a topic I explore more thoroughly in the following chapter). Instead, the current chapter joins the discourse of the new ethnographies of development by taking seriously the humanitarian concerns of Program employees, but argues that, in addition to institutional constraints, Program employees are epistemically constrained. In other words, development employees' actions are limited by often implicit—and sometimes explicit—assumptions of how the world works and ought to work.

Development has been called the orienting principle of our time (Cowen and Shenton 1995), but it has also been called a term with no universal referent (Mosse 2005). Peet and Hartwick (2009) have posited, however, that on the broadest level, development refers to the process of improving, of progress, what Gillian Hart calls “‘big D’ Development” (2009). In this view, development is a kindred concept to modernity, which, similarly, is popularly conceived as a binary opposition and often associated with definitions of progress and improvement (Harvey 1991, 2006). Yet many scholars of development have shown how definitions of improvement and progress are culturally constructed (Escobar 1995, Li 2007, West 2006), nodding to the *mise-en-abyme*⁵² between development and modernity.

Instructive here is Paige West's work in Papua New Guinea. West's main argument is that the villagers of Maimafu are socially tied to biologists and conservation agents of an administering conservation foundation via the formation of a wildlife management area. This connection comes with a myriad of socially constructed definitions and understandings of the

⁵² This refers to some signifiers, such as “development,” as having unstable signifieds, or to have as the signified, other signifiers. In such a case a concept simply signifies other concepts that are continuously referential.

Other and the environment that neither group explicitly articulates, including what conservation and development are and the means each necessitates, how the environment exists in relation to the local communities, and the nature of the fundamental relationships formed through the connection of these groups. West's analysis highlights the complex social relationships that result when two unarticulated conceptualizations of development come into contact.

In the first section of this chapter, "Development in Knowledge-Networks," I draw from West's insight and extend her position. First, while West's focus is primarily centered on socio-historically structured interactions and processual relationships, my focus is centered on the epistemic relationships. I argue that the knowledge-networks in which Model 1 and Model 2 are embedded condition particular definitions of development that are in logical consequence to the environmental models, themselves. I show that development for those who hold to Model 1 is understood as increasing economic productivity in order to create a buffer against climate change and increase connections to local and regional markets. For those who hold to Model 2, development is understood as a process of building capacity and changing behaviors through the delivery of "appropriate technologies" and "appropriate knowledge"—both of which are defined technoscientifically. The definitions of development conflict at multiple points, most significantly in the identification of who has the capacity for and responsibility to implement development projects.

This ethnographic orientation is pertinent given that development organizations are increasingly directing their efforts to inserting "appropriate technologies" into peripheral areas in order to spur economic growth. Appropriate technologies in this case are the fruition of technoscience, an expression of the knowability of reality and a rejection of the "messiness" of culture. I join this budding scholarship by examining how technology is considered by

development organizations as a means for delivering new knowledge (see Bauchspies 2014, Cherlet 2014). Taken in junction with political economic considerations, science becomes a tool—founded in real, narrated, and collective actions—that conditions actions between partners.

The second section, “Mistranslation,” discusses how Gabriel’s presentation illustrates the epistemic constraints of Program employees. While Gabriel admits to contending with institutional constraints that limited his effectiveness, I argue that the implicit definition of development discussed in the previous section constitutes a subtler constraint. I argue that the importance of delivering appropriate (technoscientific) knowledge through the presentation influenced Gabriel to provide more scientific detail, not less, to his audience. Issaka references this constraint in the second vignette by suggesting that the resident of Ouegoulega’s vision of development is narrow, limited by his immediate context and desires, but the government’s view of development is large, encompassing a range of conditions and possibilities. Issaka is motivated by genuine concerns but, like Gabriel, these concerns are mediated through his knowledge-network that establishes a specific definition of development and which become entangled in project design and implementation.

DEVELOPMENT IN KNOWLEDGE-NETWORKS

This section traces the knowledge-network from the two models of the environment and climate change into definitions of development. I argue that “development,” as understood by Program staff and Tanghin-Dassouri residents, is co-produced with the respective understandings of the environment. To argue that knowledges of development are conditioned by knowledges of climate change is highlight the recursive nature of the knowledge-network. “The environment” conditions “development” as “development” conditions “the environment” and as they condition

and are conditioned by other nodes in the network. However, this is not to deny the importance of wider fields of power; for any ability to act is conditioned by implicit or explicit knowledge apropos the situation. Instead I peel back the layers of meaning of “development,” revealing that it is a constellation term that encompasses a vast epistemic range that may not be readily expressible by those who adhere to it.

In brief, I argue that community residents desire to increase their economic production—to accumulate capital—as a buffer against uncertain climate variability. This manifests in explicit demands to increase the number and reliability of groundwater sources in order to ultimately increase garden production. Program staff understand development within a technoscientific framework that positions technology and scientific knowledge as key ingredients to building capacity and catalyzing behavior change within communities. The ultimate goal is to convey enough technoscientific knowledge to ignite an autocatalysis of development.

Data for this section come from a mixed methods approach. Through initial interviews with Program employees and Tanghin-Dassouri residents, general definitions of development were identified. A questionnaire was then created combining 46 attributes of development from both groups and from the social science literature on development. Thirty-five Program employees and interns (28 from WA-WASH, 7 from Winrock) and 49 Ouegoulega residents participated in the questionnaire. Participants were asked to mark those attributes they include in their definition of development. An agreement rate of 80% among participants was chosen as the threshold for including an attribute within the general definition of development.⁵³ Responses were further explored in follow-up, semi-structured interviews and casual conversations, but due to time constraints a verification survey was impractical, yet results from this method were

⁵³ Attributes of 80% agreement or greater for Ouegoulega residents and Program employees are listed in table 6.2 and table 6.3, respectively. Full results are provided in Appendix F.

compared against data from informal conversations and participant observation. Results show that in contrast to Issaka's assertion that Ouegoulega residents have a narrow view of development, Ouegoulega residents accept an encompassing definition of development, while the technoscience of Program employees construct a narrow definition of development.

Model 1: Economics as Mitigation and Adaptation to Climate Change

In Model 1, rainfall is limited by God as punishment for social behaviors that transgress divine law and traditions. Although "other people," external to the community, are perpetrators of these crimes, the residents of Tama and Ouegoulega are punished because God "does not discriminate". Because nothing is to be done for the perpetrators of divine law other than to allow them to find their path towards God, future projections of climate change are wrapped in uncertainty. "No one can know the will of God" is an oft-repeated refrain. When asked, residents, both men and women from all religious affiliations, name increased garden production as the best means for mitigating and adapting to climate uncertainty. Some residents also include increased animal husbandry as an additional method, but significantly, no residents identify increased agricultural production from family farms as an important method of mitigation or adaptation.

Increased garden production is a logical solution to climate change. First, the ultimate outcome of continued climate variability is unknown and unknowable, being, as it is, the domain of God. Second, the solution recognizes that garden production, like agricultural production, is a product of difficult manual labor rather than a divine gift. Humans must work hard for the fruits of the land even though God supplies the raw natural resources. Third, residents epistemically separate the contingent variability of rainfall from the seemingly infinitude of groundwater resources—groundwater as divine insurance against the end of the world. Since gardens are

largely supplied by hand-dug, local wells and are not dependent on the rain, gardening is productive insofar as one has access to reliable groundwater sources. But most importantly, residents identify gardening as a method of adaptation because it is the primary income-generating activity. Gardening is a source of financial wealth and capital accumulation. Thus, gardening is not just a method of adaptation; residents state that increased capital accumulation would directly contribute to development within the community overall.

Gardening as Capital Accumulation

While many residents suggest that animal husbandry is a significant source of wealth when done properly, it is too risky given economic and environmental constraints. Animal husbandry is only an alternative to gardening because, as residents complained, it requires intensive startup capital to purchase a moderate breeding stock. One resident stated that a healthy breeding cow costs up to 200,000cfa (approximately US\$420). Animal husbandry is also subject to continued expenses through vaccinations, medications, and the purchase of feed. The latter requirement is a significant constraint since animals suffer in years with below average rainfall when there is little bush and insufficient water. Finally, others complain that herds are too easily devastated by disease. Many residents voiced this concern particularly in the months of August to October 2013 when a small blight infected the poultry in Tanghin-Dassouri and several families lost a significant portion of their stock. Finally, women, in particular, are less likely to recommend animal husbandry as a source of capital accumulation because social interdictions block women in Ouegoulega and Tama from personally owning livestock. This means that increasing animal husbandry activities immediately benefits men rather than women and potentially exacerbates the political economic conditions of patriarchy.

Neither men nor women, however, recommend agricultural production via family farms as a viable income-generating activity. Even with relatively good rainfall, harvests are dependent on soil fertility and the size of one's field. During years with relatively good rainfall, as in 2012, household harvests still need to be supplemented with grain purchased at market. Gardening is the primary activity by which families accumulate capital in order to supplement the shortfall of harvest from the family farm. Alimata, a woman in Ouegoulega, explained that she gardens because she earns money that she puts towards her family needs. "The farm," she said, "is not sufficient for the year. The harvest is finished in January. It may last longer if the harvest is good. The money from the garden is used to buy sacs of grain after the harvest when prices are low." Thus, even in relatively good harvest years, gardening is needed to generate sufficient income to supplement grain.

Gardening does, indeed, generate significant income for individuals and households. Figures 6.1 and 6.2 illustrate economic data taken from two households.⁵⁴ Figure 6.1 represents the Yalpougdou household in Ouegoulega that extensively practices dry season and some rainy season gardening owing to two reliable wells on the household property. Figure 6.2 represents the Nikiema household in Tama that does not engage in gardening due to limited access to groundwater. The Nikiema household draws water from a community well, situated in the middle of multiple households, and generally agreed to be for household use rather than garden

⁵⁴ Data was collected every two weeks from March 2013 to March 2014. It was only until several months into the fieldwork period that I realized the importance of economic activities in relation to climate change. At this point I had established significant rapport with two families who were willing to allow me to enquire into their personal and household finances. Recorded data included cash-on-hand, sellable assets (such as livestock or surplus produce), costs of goods bought in the previous two weeks, and immediate and long term plans for cash-on-hand. Figures 6.1 and 6.2 only show quantities for cash-on-hand, and while data is not representative for the entire community they provide valuable insight into economic capacity and decision-making.

Figure 6.1: Yalpougdou Household Economic Data. Household of dry season gardeners.

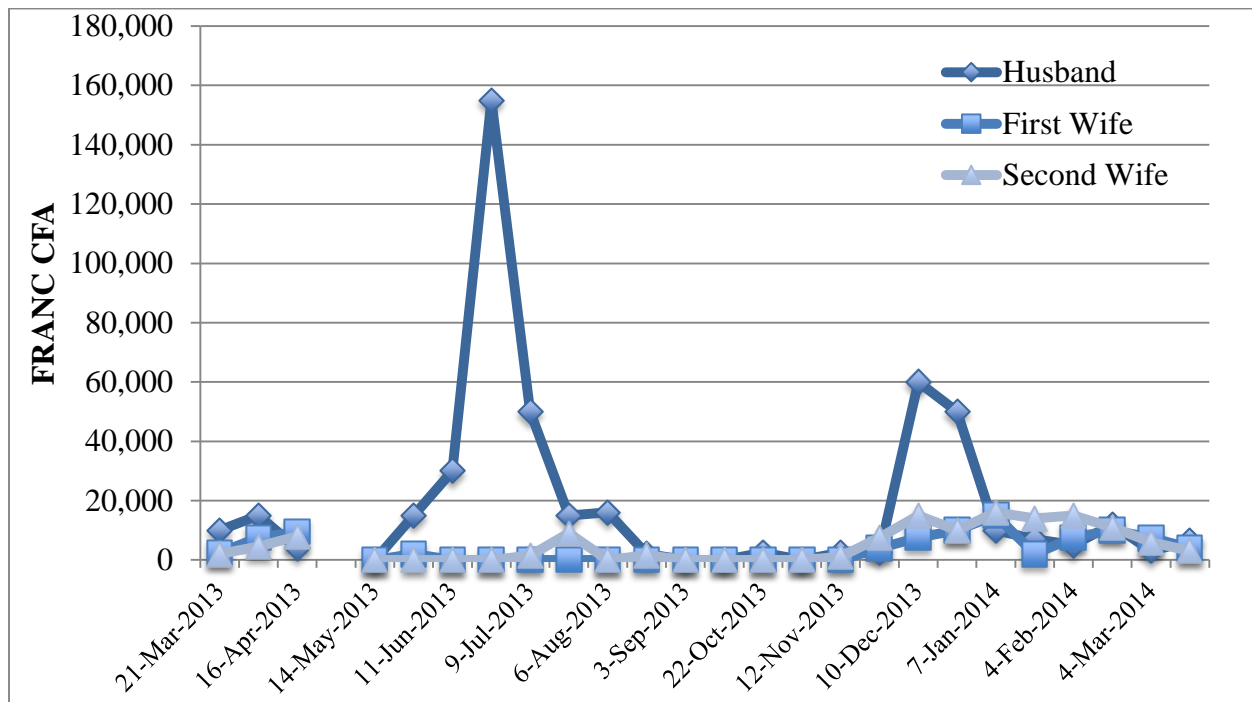
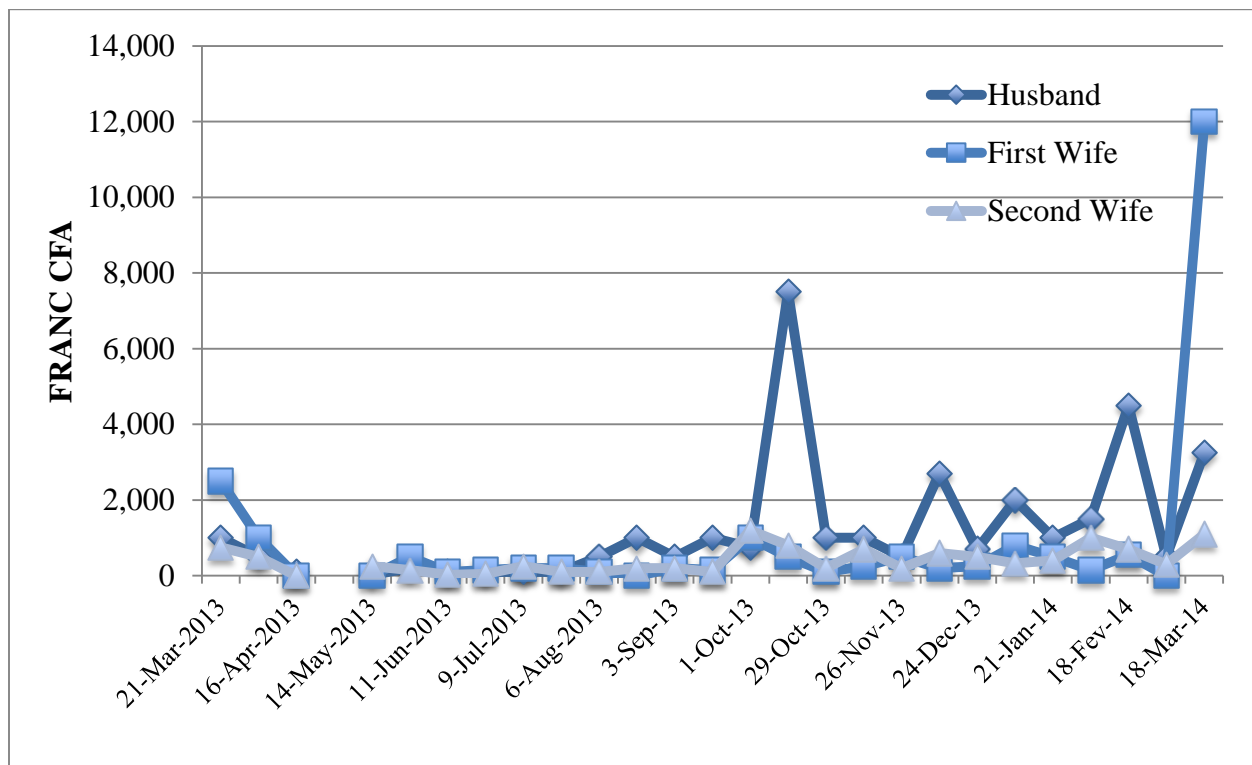


Figure 6.2: Nikiema Household Economic Data. Household of non-gardeners.



production.⁵⁵ Both graphs reveal that individual incomes within households vary throughout the year and that individuals are often immediately spending their capital on goods. Table 6.1 aggregates these data into individual and household averages over the course of the year. Clear from the table is that the Yalpougdou household income was, during the fieldwork period, over ten times higher than the Nikiema household.

Table 6.1: Cash-on-Hand Averages for Gardening and Non-Gardening Households. Quantities listed in Francs CFA.

	Gardening	Non-gardening
Husband	19,708	1,236
First Wife	3,560	842
Second Wife	5,217	412
Household	9,269	830

The individuals within the Yalpougdou household⁵⁶ primarily use their income to purchase foodstuffs. The first and second wives, Awa and Rokia, use small quantities from their garden capital to purchase ingredients used in sauces—such as tomatoes, onions, parsley, bullion cubes, salt, etc.—that are commonly referred to collectively as *les condiments* [condiments]. Moussa, the husband of the household, has the responsibility of buying surplus grain, which he did in varying quantities on 1 April, 25 June, 25 July, 6 August, and 3 September before the 2013

⁵⁵ According to a Winrock survey, there are 633 active gardeners in the village of Ouegoulega out of a total population of 2,663 (Winrock 2013, WA-WASH 2012c). It is difficult to say if the two families presented here are representative of the 633 gardeners and 2,030 non-gardeners. However, personal observation suggests that members of the Yalpougdou household do not garden more or less than other gardeners in his quartier. The Nikiema household, likewise, claimed that compared with other residents they are neither wealthy nor poor. Of course, the Nikiema household is located in Tama, which suffers from more restricted access to regional markets than does Ouegoulega, and this may also negatively influence the household's finances

⁵⁶ In total, there are 19 individuals for whom Moussa is directly responsible: 13 children, two wives, his elderly mother and father, one nephew, and Moussa himself. Moussa's eldest daughter has already married and lives in her husband's village.

harvest.⁵⁷ In total, Moussa spent roughly 110,000cfa, or US\$230, buying four sacs of maize and two sacs of millet to supplement the household between harvests. Likewise, Awa bought one half sac of maize at 6,000cfa but was later reimbursed by Moussa because, as he said, it is not her responsibility to feed the family.

While Moussa is able to use his accumulated capital to purchase entire sacs of grain as supplemental food, the Nikiema household depends on selling forest products, such as karité or tamarin grain, soap, shea butter, and firewood for capital accumulation. The first wife of the household occasionally sells small sachets of beans she grows on the edge of the family farm during the rainy season in order to purchase condiments for her sauces. Occasionally, the husband, Mohammed, sells one of his chickens to purchase sachets of millet or maize for the household. Due to the limited finances, however, the family does not partake in meals that are as large or as frequent as the Yalpougdou household. Mohammed, as financial resources and sellable assets ran low at the beginning of the rainy season, reduced his morning meal to sugared coffee, often not eating again until the evening meal. The children in the household, however, are often fed first and given, in the morning and midday, the remaining food from the previous evening meal.⁵⁸

⁵⁷ There are two dramatic spikes in Moussa's cash-on-hand for 25 June and 10 December. In both occasions Moussa received payment for produce that he had previously sold on credit. Conversations with Moussa, Awa, and Rokia revealed this to be a common practice even though several weeks might pass from handing off the produce to the middleman—who is likely a close neighbor or cognate—and receiving payment.

⁵⁸ Mohammed is directly responsible for 6 household members: himself, two wives, and 3 children. Mohammed is not financially responsible for his eldest son who still lives in the compound. Nor is Mohammed responsible for his second eldest son who is a migrant laborer on a cocoa plantation in Côte d'Ivoire.

Investing in Capital Accumulation

Proper gardening includes several essential inputs. Those without productive gardens, such as Mohammed and his household, prioritize the importance of reliable groundwater sources. Many individuals complain that the wells near their compounds run dry during the height of the dry-season, forcing women to travel greater distances for consumptive water. One woman in Ouegoulega mentioned that during the dry season she begins her day at about 3 or 4 o'clock in order to have enough time to gather water for the household before going to work in her husband's and then her own gardens. Mustafa, a young, unmarried man in Tama said that he makes five trips to and from multiple sources of water—pits in a dry creek bed, various wells, and a pump—each day to water his gardens.⁵⁹ Winrock estimates that all gardeners in Ouegoulega use 1,862,602 liters of water per day, mainly from wells but also borehole pumps and river beds (Winrock 2013).

The economic case study quantifies the significant difference access to reliable groundwater resources has on one's adaptation to variable rainfall. But gardening is dependent on more than just access to reliable groundwater. Moussa regularly purchased chemical fertilizer, and occasionally pesticide, for his gardens. He spent roughly 36,000cfa, or US\$75, on chemical fertilizer, while Awa and Rokia spent roughly 1,000-2,000cfa each on fertilizer. This is the second most important input for those who practice gardening, for people recognize that “the soil is tired.” If one is to transform the natural resources provided by God, one must work hard to maintain soil fertility, which includes adding chemical fertilizer to one's plot.

In addition to chemical fertilizer and reliable water, several women specified chicken wire fencing as a necessary input. Gardens are maintained during the dry season after the harvest

⁵⁹ The main method for transporting water is in a modified wheelbarrow called a *pousse-pousse* that will hold about 5 plastic jugs, each with a capacity of 25 liters. This young man is making about 5 trips to and from the various water sources to water his garden each day.

has been completed. Households often allow their herds of small stock to roam throughout the community to forage on their own. Since naturally growing herbs and bushes begin to dwindle with the lack of water the herds become increasingly aggressive. If one has not sufficiently protected one's garden it can be quickly and irrevocably devastated. The most cost effective method for garden fencing is with the dried millet and sorghum stalks of the harvest, tied to a wooden framework. However, gender asymmetries dictate that gardens of household heads are protected first and, secondarily, the wives' gardens, meaning that women's gardens may not be as sufficiently enclosed. If the household head has sufficient capital, he may invest in chicken wire fencing that is reusable for several years. Nonetheless, women often say that their gardens are disproportionately devastated by foraging herds and that chicken wire is the most cost-effective solution.

Finally, several residents suggest that besides material inputs, gardens are only productive if one has acquired "secret knowledge," which is directly influenced by Model 1 logic.⁶⁰ Mustafa, the young man introduced in Chapter Four and mentioned above, said that gardening is difficult work but it is facilitated if one has learned the secrets. "Every work has secrets," he told me. "If one learns them then there's no reason to be scared." Mustafa went on to say that the difficult nature of gardening means that if it is not done properly then the entire work can be lost, providing one with no capital at all. One must gauge the shift in seasons, the strength of the sun and evening temperatures, and weigh this against one's resources, both natural and financial. Mustafa also suggested a divine knowledge that facilitates gardening. "Before," he said once, "people followed 'special work' and restrictions that people now break. For example, people used to have sex inside. Now they have sex outside and anywhere and this makes the soil

⁶⁰ The "secret knowledge" of capital accumulation; see page 127-130, Chapter Four.

unfavorable.” By “‘special work’ and restrictions” Mustafa is referring to sacrifices to environmental spirits and ancestors and the cultural taboos that guide one’s behaviors. Mustafa is suggesting that people no longer make sacrifices or strictly adhere to traditional regulations, which jeopardize environmental conditions and the practice of gardening.

Likewise, during a transect walk with Moussa in Ouegoulega we passed a dense stand of trees, which he called *teng-koori*, or “place of the stone” (and commonly referred to in the literature as a sacred forest). He said this is where men go to make sacrifices for the rains and women sometimes make sacrifices for fertility. Although Moussa did not suggest that he makes sacrifices, he did not deny that sacrifices are beneficial for favorable environmental conditions. Along with traditional interdictions, such as honoring and respecting community elders, Moussa and Mustafa are explaining that garden productivity requires proper social behaviors that maintain divine favorability. When asked where the knowledge of inducing divine favor is learned, both Mustafa and Moussa laughed, saying that it is common knowledge learned from one’s parents.

All of this suggests that knowledge of gardening constructs an epistemic community—a community of shared experience and knowledge—that reinforces solidarity. Chapter Five revealed how a single epistemic threshold of household and community elders structures the acquisition of Model 1. Once through, residents possess the knowledge that the rest of the community shares. Likewise, the “secret knowledge” of gardening is structured along the same age-knowledge passage point, and like the structure of acquisition of Model 1, this epistemic community of gardening knowledge is conterminous with the geographic communities of Tama and Ouegoulega. This overlap helps to reinforce social solidarity and the conceptualization of “other people” that are largely to blame for current environmental insecurities.

However, the material inputs of gardening—access to groundwater, sufficient fertilizer, chicken wire—are insufficient. Residents specify that within Tama and Ouegoulega, there exists the knowledge for developing one's gardens but there are no means, no capacity, to do so. Residents repeatedly say that they lack the capital to invest extensively in chemical fertilizers to increase garden production. Women are adamant that their garden capital is not sufficient to expend on a hundred meters or more of chicken wire to protect their gardens, and all specify that while there are teams of well diggers within the commune, no one has the capital to hire them to increase well depth and reliability. In short, residents claim that the knowledge for development exists within the community but the capacity is lacking.

Gathering Sand: Wealth as Capacity

Dimensions of residents' identity play an important role in gardening as capital accumulation. Gardening fits integrally with the identity of Mossi as an ethnic group adept at cultivating and producing from the land. More saliently, many residents consider themselves too poor to invest in and increase the productivity of their gardening. A common phrase I heard repeatedly was, "*Nous sommes des pauvres*"—we are the poor. The article "the" frames poverty not as an adjective or condition of being (it is not "we are poor"), but as a noun, an identity (we are *the* poor). One middle-aged man said that everyone in the community works, cultivates, grows crops, gets married, has children, "but there is nothing. Nothing. *Nous sommes des pauvres*."

Residents concede, however, that current conditions in the communities are not catastrophically dire. When things become very difficult, I was told, people "*ramassent les sable*"—people gather sand. When things are dire there is no rain, many wells dry up, and therefore there is no work. Cultivation and economic activities evaporate and the only work is to

gather sand and hope to sell it to brick masons and construction teams. To gather sand is to be destitute; it means one has run out of options. Tama and Ouegoulega residents' identity is in part situated along a materialist spectrum of destitution and affluence, which conditions capacity for and responsibility to invest in development initiatives.

Residents agree that accumulating capital through gardening depends on difficult manual labor. To succeed with one's garden one must weigh the costs and benefits of investment. Moussa recounted an anecdote of a boy in Ouegoulega to illustrate this. He said that the child didn't have any land of his own and wasn't able to find anyone in Ouegoulega to lend him land for dry-season gardening. So the young man travelled to Bazoulé, which benefits from a *barrage* [man-made lake] and began asking residents if any land was available. Eventually he was able to strike a deal with a proprietor to cultivate a parcel of land conveniently located next to the lake; though the young man wouldn't have to pay for the land he would, Moussa assured me, give gifts of produce to the proprietor in reciprocation. Unfortunately, the boy didn't have any money to buy supplies for his garden, so he sold his moped and used the proceeds to buy seeds, buckets, and fertilizer. Without the moped, the boy had to walk the 10km from his compound to the garden every day. But, Moussa emphasized, he worked diligently to cultivate his garden and was rewarded for the hard work. The young man earned enough money to buy a new moped, a mobile phone, and more supplies for his garden. By accumulating capital through gardening, the young man's capacity for development was increased.

Mustafa also boasted of the economic success of his hard work. He claimed that since he began gardening as a young man he has been able to buy a moped, one cow, one sheep, and pay for school tuition for his two younger brothers. He has also been able to construct a house in Tama and two cement houses in Dassouri, the latter of which he rents out for additional income.

Moussa, likewise, has been able to put money toward constructing a house in Dassouri that he will rent out for additional income.

Residents agree that garden productivity allows one more freedom in terms of additional economic activities and purchasing power, which are not inconsequential. Moussa stated that school fees are a significant financial burden, spending roughly 25,000cfa (US\$50) per year to send 7 children to the premier cycle of public school. Healthcare is an additional expense with the Yalpougdou household spending roughly 10,000cfa (US\$20) on visits to clinics and medicine, and the Nikiema household 5,000cfa (US\$10). Additionally, residents spend money on certain material possessions such as mobile telephones (expenses for which include credit to talk and send text messages, 500-5000cfa; frequent charging at the local market, 200cfa; battery replacement and even replacement of the entire phone, which is common for the Chinese brands residents often buy, 2,000-10,000cfa) and mopeds (which include petrol and maintenance expenses); goods to which Issaka, in the second vignette, refers to as modernity.⁶¹

While the importance of gardening is directly linked with climate uncertainty, residents also linked capital accumulation through gardening with development, generally speaking. Questionnaire results parallel interview responses when I asked residents if they have the

⁶¹ Program employees explicitly reject the rationale for using limited funds to purchase such goods. The Program's GIS/Food Security specialist, reasoned that people are aware of what they need to develop, whether it be more efficient pumps, a school, or health clinic. He said that households could set aside a small portion of money each month, plan ahead and save—a sentiment that was later echoed by the Regional Program Director. When I recounted this statement to the Yalpougdou household they laughed, saying that there isn't enough money to even cover all household expenses like new shoes and clothes for children. Clearly, Program employees envision a division in goods that residents do not, though there is insufficient data to explore this division further. Nonetheless, it is reasonable to suggest that possessing mobile phones and other materials contributes to local conceptions of modernity and contemporary identity (Piot 1999).

resources to implement projects they feel the community lacks.⁶² Of respondents, 16.3% said that the community has the resources to implement projects. In stark relief, 93.2% noted that the government has the means to implement projects and 82% noted that external organizations have the resources. Similar to many other scholars of development, Ouegoulega residents position capital accumulation as the means to acquire the projects that would, in their view, develop the community, but understand that within the larger political economic terrain of Burkina Faso, the community is decidedly without resources and capacity.

What are the additional attributes of development that the community would like to see besides environmental security? Results from the questionnaire (with over 80% agreement) asking residents to mark those attributes of development are presented in table 6.2. When the

Table 6.2: Ouegoulega Residents' Attributes of Development. Categories are listed in bold.

Infrastructure Electricity in every house Running water in every house	Economy and Work Animal husbandry Gardening
Environment Natural resource management	Farm machinery Office work
Education Modern [public] school knowledge High level of education	Cash accumulation Socialist economy Technical knowledge
Government and Law Democracy National military strength Strict application of laws	Youth employment National economic strength
Health Family planning	Technology Possessing personal cell phones
	Social A system of life developed by the West

question was rephrased as what things residents would most want to see in their community, 81.6% volunteered that they would like to see a health clinic and 71.4% volunteered a school.

⁶² An important note on the questionnaire: I did not begin by asking what the community lacks. I began by asking whether or not the community lacks anything, I asked what those things are, and I finally asked whether the community has the capacity and responsibility to implement those projects on their own.

Residents, interestingly, did not volunteer water resource improvement in this questionnaire and when asked, many responded that, yes, water is important, but being able to seek immediate medical treatment and educate one's children do more in the long term to increase community capacity.

Results suggest that residents define development according to multiple scales. At the individual level, gardening increases capital accumulation and personal purchasing power. This aids household financial resources and contributes to expenses that benefit other household members, such as healthcare, education tuition, and other living expenses. At the community level, formal public education and health care are seen as the most effective means of development. As recounted in Chapter Three and Chapter Four, many residents equate education with an unarticulated ability to navigate urban centers, seek employment outside of the village, and insert oneself into more densely interconnected flows of capital. Thus, while gardening is seen to increase one's capital, public education is seen to increase the community's capital. To address either or both of these levels, residents agreed, increases the community's general capacity for development.

Capacity as Responsibility

The overwhelming majority of residents clearly associate capacity with responsibility. The perceived lack of wealth within the community, however, precludes residents from self-defining as having capacity and thus responsibility for development. While no resident with whom I spoke identified as affluent—the majority of individuals I asked laughed, repeating, “We are the poor”—many explicitly position wealthy, urban-dwelling Burkinabè and all Westerners as affluent following a spatialized construction of modernity discussed in Chapter Five. Specifically,

of questionnaire participants 95.9% said the government has the responsibility to implement development projects and 85.7% said that outside, Western organizations have responsibility. “There is no money here,” one woman said. “We can’t build a school for our children.” “Who could install a pump without help?” one man asked rhetorically. One middle-aged woman without access to reliable groundwater said that she hasn’t personally benefitted from government-implemented projects and doesn’t know if they can do anything, “but government money could bring in a well,” she said, adding, “*Nasaardamba* [Western groups/white people] have helped others with gardens. They could help with water.”

In naming the government and outside organizations as responsible for development projects participants reject community responsibility. Of questionnaire participants only 16.3% said their community has the capacity to implement projects and only 14.2% said their community has the responsibility to do so. The perceived poverty of the community, as much as the perceived affluence of the government and outside organizations, influences how community residents perceive and understand responsibility. Thus, poverty and wealth are relational just as responsibility is relational.

The logics of the model of the environment as well as of existing social structures condition this definition of development. Within Model 1, God interferes with individual human activities only sporadically, yet the end-goal is the beneficial influence of large groups of people. Several residents stated that individual success in gardening or benefits from development organizations would, likewise, benefit the entire community. The reason behind this is that households that own wells that are rehabilitated with efficient pumps cannot deny others’ access to them. Water, residents state, is for the benefit of everyone. When asked why, Moussa of Ouegoulega pointed to his household well and said, “My father dug this well for the benefit of

the community. I own it and I cannot refuse anyone.”⁶³ Similar to the material wealth of a reliable well to meet gardening and consumptive needs, financial success in individual gardening endeavors benefits large social networks. As stated above Moussa and Mustafa, who have highly productive gardens, have contributed to family and neighbors’ needs by paying school tuitions, giving gifts of cash, and contributing to yearly celebrations. Individual success in this view promotes communal success.

Yet individual success is not value-free. Marcel Mauss (2002) astutely analyzed the social conditions of gift giving, wherein the giver positions him or herself hierarchically vis-à-vis the receiver. The receiver, in this position, is indebted to the giver and must, therefore, reciprocate at a future time according to socially structured norms of etiquette. Understanding that wealth is responsibility, however, precipitates a social construction that demands gift giving. Those who are perceived to be wealthier, that is, are perceived to have more responsibility to give gifts to family and those within their social networks. This logic extends beyond the community to include the government and development organizations that are defined by community residents as affluent. The knowledge-network held by Tama and Ouegoulega residents, therefore, defines the government and development organizations as those with the responsibility to contribute to community development.

⁶³ The majority of wells in Ouegoulega and Tama are privately owned either by individuals who personally dug the well (or hired those who did), or by the current household head if the original proprietor has passed away. While there are community wells in both villages this does not seem to be the common pattern of ownership as it is in Togo and Niger, for instance. Even though the wells are privately owned, however, cultural mores dictate that water cannot be refused. It would be a serious breach of etiquette to deny neighbors or visitors water from one’s well.

Model 2: Technology (and Knowledge) as Mitigation and Adaptation to Climate Change

In Model 2 climate change is understood through a framework of technoscience. Climate change is due to increasing amounts of carbon and carbon-equivalent gases in the atmosphere, which are emitted by human actions at the local and global levels—deforestation and large-scale industry, for example. Lycée students and Program staff understand these concepts to greater or lesser degrees, which is a function of the amount of scientific training they've acquired through formal, public education. Projections of future climate change and, specifically, rainfall variability, are likewise understood technoscientifically. Projections rely on the consolidation and extrapolation of scientific data patterns such as decadal carbon emissions, global temperatures, and rainfall distribution. Following trends and mediating these trends through potential global mitigation recommendations, projections are calculated to provide a range of scenarios of future climate change that inform present day actions.

For Program staff, and for Gabriel in particular, projections of climate change come through IPCC reports. For instance, during the USAID WA-WASH funded training for local NGOs and Program collaborators on how to better integrate climate change information into program policy and project design that was discussed in Chapter Five, Gabriel presented data from the IPCC's fourth major report (GIEC 2007). In this report, projections are given in four primary scenarios that are conditioned by the degree to which climate change knowledge has been incorporated into public policy and used to influence human behaviors globally. This information is technoscientific in nature, prioritizing the physical dimensions of the environment such as hydrological cycles, the cryosphere, paleoclimates, the carbon cycle, and the behavior of aerosols in the atmosphere just to name a few. In short, the potential futures of climate change within Model 2 are, to varying degrees, realities due to the social valuation of technoscientific

information used. In the logic structure of this knowledge-network technoscience equals certainty, which drives USAID WA-WASH activities.

Capacity Building and Behavior Change

Within USAID WA-WASH, activities that promote climate change mitigation and adaptation are developed according to an overarching logic of development. As mentioned, USAID WA-WASH envisions its role as a catalyst that develops and inserts the necessary inputs to spark significant and beneficial change. The change that is sought is the ignition of self-directed avenues of development by beneficiary communities. USAID WA-WASH uses the terms “capacity building” and “behavior change” to capture the meaning of their catalysis whereby beneficiary communities are instilled with the knowledge and means—the capacity—to fundamentally change their current and potential conditions—behavior.

While in this sense one might speak of development *qua* capacity building to borrow Joel Wainwright’s linguistic device (2008), doing so conflates two terms that are inherently slippery. If “development” is something of a linguistic mise-en-abyme then “capacity building” is equally ambiguous. Yet Program staff employ “capacity building” in 2 ways: (1) to refer to capacity building at the institutional level and (2) at the local level. Both references to capacity building incorporate specific social dimensions and herein lies the ambiguity of the term. While the term is employed in specific contexts and in specific ways, the social, cultural, and epistemic dimensions of what is included in “capacity”—and thus what development initiatives ought to strive toward—go disambiguated by employees.

Because institutional capacity building does not directly affect the design and implementation of particular projects—aimed as it is at Program collaborators and parallel

institutions—I only briefly cover it here. It is important to note that institutional capacity building reflects an overarching definition of development that is, like the definition for residents of Tama and Ouegoulega, situated within the dynamic tension of hierarchy and community. This is exemplified by Gabriel’s climate change workshop of policy makers, discussed in Chapter Five, which, though not explicitly discussed as such, is an illustrative example of institutional capacity building.

Institutional capacity building is about forming and strengthening collaborative partnerships with governmental departments, academic institutions, private organizations and businesses, and parallel development organizations. The goal is to effectively build a network from which resources—political, intellectual, financial, and experiential—can be mobilized within the labor of development. Development *qua* capacity building at the institutional level positions USAID WA-WASH as a knowledge-generator of and knowledge-disseminator for development. The goal that follows from this would seem to be to create a network of development institutions and programs where the sharing of development-specific knowledge increases collective capacity. At the institutional level, therefore, capacity building is ultimately defined as being oriented toward solidarity within the development community.

In contrast, the processes of institutional capacity building ultimately reinforce stratification and hierarchy within the development community. Hierarchy is enforced when USAID WA-WASH trains collaborators and implementing partners on how to engage beneficiary communities, as in the use of Community Vulnerability and Capacity Analysis, or CVCA. In brief, the CVCA toolkit was presented to Program partners in Burkina Faso during a weeklong workshop in December. Here I wish to note that the workshop is structured similarly

to the methods of “collaboration” in that USAID WA-WASH positions itself hierarchically relative to Program partners through knowledge-dissemination.

The objectives of the workshop were to promote an understanding of the types of environmental catastrophes and risks due to climate change, and to teach partners how to effectively analyze communities’ vulnerabilities and capacities vis-à-vis effects of climate change. The toolkit manifests in a series of worksheets in which partners delineate the differences between catastrophes and risks, vulnerabilities, and capacities. The worksheet, as a tool of knowledge-production, attempts to quantify the social and behavioral components of risk assessment and management, however mnemonically, with the following formula:

$$R = \frac{Ca * V}{C}$$

Where R is risk, Ca is catastrophe, V is vulnerability, and C is capacity. After the Burkina Faso workshop, Gabriel travelled to Niger and Ghana, holding the workshop for partners in those countries. The goal being to standardize partners’ engagements with beneficiary communities. Importantly, however, the CVCA toolkit does not specify or outline solutions to various risks and vulnerabilities. In theory, solutions are thought to arise out of collaboration with the community during the CVCA assessment. In practice, solutions are conditioned by the logic of technoscience and the components of community capacity building that the Program articulates.

At the local level, when Program implementing partners directly engage beneficiary communities, capacity building takes the form of “appropriate technology” and “appropriate knowledge” dissemination. Two processes constitute the latter: (1) knowledge transfer about the mechanics of the project, such as how a water pump is maintained and how and when potable water ought to be treated; and (2) the justification for why the project is necessary, such as the

environmental or social “problem” to be “fixed” (e.g. climate change or sanitation). Both knowledge transfer processes are necessary components of a project as Program staff attest, but I show here that staff prioritize knowledge transfer of project mechanics over contextual knowledge.

The hierarchical positionality of the Program is exaggerated at the local level wherein the logic of techniscience—as rational and universal—confronts an alternate knowledge-network that is easily dismissed either as “irrational” or as insufficient, which Issaka does in the second vignette. In this conversation, he positions both himself and Winrock hierarchically relative to communities due to the possession of the necessary technology and knowledge that build capacity at the local level. This is a widely shared sentiment, as results from the questionnaire administered to Program employees confirm. Of Program staff, 77.1% see themselves as having the knowledge necessary for delivering development solutions, 71.4% responded that the government has the necessary knowledge, but only 37.1% said that communities have the necessary knowledge for development. Similarly, 85.7% said that external organizations have the financial resources to implement development, 91.4% said the government does, and 42.9% said that the community has the financial resources for development. Thus, the Program staff see themselves to already possess capacity through technoscientific knowledge and financial resources.

The requisite knowledge for development, however, rests in contradistinction to how Program staff define responsibility for development. In the questionnaire only 50% of surveyed staff responded that development organizations have the responsibility to practice development, whereas 94.3% said the government has the responsibility, and 82.9% responded that communities have the responsibility to develop themselves. Even though Program staff

responded that communities have the least capacity for development, communities are defined as having some of the greatest responsibility; and although external organizations possess some of the greatest capacity, they self-define as having the least responsibility.

This is not as contradictory as it seems. Program staff, it must be noted, understand capacity similarly to the role of USAID WA-WASH: as a catalyst. USAID WA-WASH sees itself as speeding development in local communities that are without capacity by delivering the components deemed to be lacking. What Program staff believe are lacking from these communities are technologies and knowledge. This is stated in official Program documents such as Work Plan 3 for performance period October 2013 through September 2014, which states:

The primary goal of the USAID West Africa Water Supply, Sanitation Hygiene Program (WA-WASH) is to increase sustainable access to safe water and sanitation and improve hygiene in West Africa. We will accomplish this by introducing innovative and low-cost water and sanitation technologies and promoting adequate hygienic behaviors at community level...

This passage explicitly defines Program objectives as disseminating technology and changing behavior. Here, the Program is defining itself not as a development organization—that is, an organization that *develops* communities—but as an organization that *inserts the ingredients for* development into communities: technology and behavior change.

The mentioning of behavior is important here. Program staff often use “behavior change” interchangeably with “capacity building,” defining it as a combination of both appropriate technologies and knowledge transfer. One Program staff member said, “behaviors can be changed but only if people have the knowledge.” Catherine, the Winrock field agent stationed in Tanghin-Dassouri stated, “Development is the betterment of one’s life, so people need to strive for it. If they don’t have access then they won’t strive...In other cases [development] requires sensibilisations and teaching what people need to better their lives.” When asked what sort of

awareness-raising this includes, Catherine replied that knowledge transfer sessions have to be “practical and relevant. They [organizations] can give new techniques to the community...it helps increase the capacity of the community.” Alphonse specified that Winrock’s main methods “are to introduce technologies and techniques that change behavior and allow people to adapt to climate change. Development is that principle.”

What is significant here is that Alphonse defines behavior change as the result or consequence, first, of introduced technologies and, second, the technoscientific knowledge of those technologies. Knowledge is subsidiary to technology in causing behavior change, while the primary transfer of knowledge consists of the mechanical techniques needed to understand and maintain the project. For the potable water pump and garden pump projects implemented by Winrock in Ouagoulega, for example, this consists of knowledge of how the pumps draw water and the knowledge necessary for replacing the rope when it eventually wears thin and breaks. It also includes the timetable and means for adding chloramine to the well through an access tube in order to maintain water purification. The paramount knowledge to be transferred then is technoscientific and it is justified by the importance of the new technologies being provided.

Appropriate Technologies, Appropriate Knowledge

In late September 2013, USAID WA-WASH hosted a semi-annual Partners Meeting in Ouagadougou. The regional directors for the implementing partner NGOs to USAID WA-WASH were invited to discuss the logistics of the Program and successes of certain projects, and to modify action plans for subsequent years. The second day of the meeting consisted of a site visit to the private metalwork atelier Winrock had contracted to build the potable water and garden water pumps, the pompe-en-corde and pompe-en-vélo, respectively. Phillipe, the regional

director of Winrock, explained the fabrication process and costs of the pumps. As Phillipe enthusiastically responded to questions raised by other partner representatives, the representative from CARE, quietly complained that his organization had tried this model of pump and subsequently abandoned it because it breaks too easily and is too difficult to repair.

While they disagree, this anecdote shows Phillipe and the CARE representative affirming that technology is the key to building capacity and affecting behavior change and, thus, catalyzing development. The crux of the disagreement, however, is over what constitutes “appropriate technology.” Phillipe considers the potable water and garden pumps to be appropriate technologies because they (1) incorporate locally available materials, (2) can be fabricated with locally trained artisans, and (3) are cost effective to both the implementing partner and to the beneficiary community. The Regional Director later mentioned an additional quality of these appropriate technologies—that they are “directly deliverable to the people” and bypass bureaucracies and social roadblocks that might disrupt efficient capacity building. The representative from CARE, on the other hand, prioritizes durability and efficient maintenance.

Yet there are more or less strict interpretations of what is appropriate. While the representative from CARE dismissed these particular pump models as ultimately too fragile and costly to repair, he intimated a continued process of seeking new and better appropriate technologies—technologies that, once found, would build capacity and induce behavior change. Phillipe later addressed this view on the third day of the Partners Meeting saying that Winrock aims for the technologies to be, first and foremost *moins cher* [less expensive] and that other similar organizations are using similar potable water pump models⁶⁴ for the same ends, such that Winrock’s proposed technologies are neither unique or bizarre. Likewise, the Burkinabè

⁶⁴ The model of the potable water pump is the pompe-en-corde illustrated in figure 3.4 (B).

organization PROMACO, which is contracted to increase household sanitation through point-of-use water purification, conducted an initial taste test with multiple purification tablets to determine the one that tasted the best to community residents. PROMACO now markets these tablets in multiple communities.⁶⁵ Thus, while the CARE representative holds to a strict interpretation of appropriate technology—as a singular solution—Winrock and PROMACO indicate that there may be a range of what is appropriate depending on the socio-cultural context.

As Alphonse describes in the conversation recounted above, however, appropriate technologies must be combined with appropriate knowledge in order to affect behavior change. Program staff did not explicitly use the term, “appropriate knowledge;” I use it here to emphasize the integral pairing of technology and knowledge within the design of a successful project. For instance, Issaka of Winrock voiced his perception during the Partners Meeting that the key to capacity building and behavior change is that communities understand how the project works and how it must be maintained in order for the technology to remain operational in the long term. Gabriel, in the quote mentioned on page 173, noted, “development is normally about innovative technology and bringing this to communities. This is all based in science. The next step is to teach people how to use the new technology.”

One such learning moment was improvised when the demonstration potable water pump in Ouegoulega began to run dry early in the dry season. The borehole drilling team that Winrock had contracted had initially added an additional 8 meters to the well, and considered that sufficient for year-round reliability. The fact that the well began to run low in March was a point of frustration to Winrock who took the responsibility to add more depth. Repairing a potable well-borehole is an arduous process that involves cracking the cement seal, lifting the cement

⁶⁵ Ironically, PROMACO did not ask taste test participants if unpurified water tastes better than any of the purified samples. Among community members the taste of the purified water has been the chief concern and hindrance to large-scale community acceptance.

apron and entire pump apparatus out of the well, hiring a borehole crew that can drill down several more meters, and re-cementing the apron. Winrock used this opportunity to demonstrate to the proprietor and community members how the well is repaired in order to teach them the necessary steps to maintain the project. While the pump proprietor figured that Winrock had simply not drilled the borehole deep enough, Winrock blamed the community for the dry well, speculating that more people than normal had begun using the pump and that some of these people might be using it for gardening instead of only household needs.

This illustrates that projects are technoscientific solutions that include, first, appropriate technologies and, second, appropriate knowledge, which is shorthand for technoscientific knowledge about how the project functions. The combinations of these elements are understood to precipitate behavior change and build capacity. It is confounding, then, that most Program staff said that the key ingredient to capacity is a higher level of formal education in the communities. The GIS/Food Security Specialist, mentioned during a particularly theoretical discussion about development that what permitted the Europeans to have the Industrial Revolution was education. “It was learning about mechanics and physics and chemistry. That is what is needed for Africa—an understanding of the world.” Likewise, Issaka of Winrock noted, “If there is no education there is no development.”

These comments suggest that Burkinabè communities need to be taught how to perceive development. For example, the Regional Director noted, “The main problem with this line of work is that you want to meet [the community] at a certain point and collaborate, but in order to do that you need to bring them up to a certain level—you need to change the way they think and the way they behave.” Likewise, one SOSSahel employee told me that his organization would like to install latrines in Tama. When I told him that the majority of residents complained about

the reliability of water he responded that he would still install latrines. Why? “Because people don’t know they need latrines. They are limited by their context. They feel they need pumps and a [health] clinic because that’s what they see. They don’t know the benefits that latrines will provide.” This line of reasoning, furthermore, replicates the epistemic dimension of the social structure of acquisition such that all knowledge is a continuum of more or less correctness, or truth—non-truth.

Program staff have very strong opinions about what is and is not development. In the same questionnaire administered to Ouegoulega residents, Program staff were asked to mark those attributes that they include in their definition of development. Those attributes, with 80% or more agreement, chosen by USAID WA-WASH employees and those chosen by Winrock employees are listed in table 6.3 and table 6.4, respectively.⁶⁶ There is a remarkable degree of overlap between the two sets of Program employees, yet both differ from Ouegoulega residents’ attributes of development in terms of inclusivity. Program employees exclude certain attributes from development that community residents include such as particular forms of labor. The Social category is also an interesting divergence, because Ouegoulega residents perceive development to come from the outside while Program staff see it as an internal progress.

Table 6.3: USAID WA-WASH Employees' Attributes of Development

Infrastructure Electricity in every house Running water in every house	Education High level of education Educated girls and women
Environment Natural resource management	Economy and Work Youth employment
Government and Law Freedom of expression	Social A system of life we create for ourselves

⁶⁶ Full results are provided in Appendix F.

Table 6.4: Winrock Employees' Attributes of Development

Infrastructure Electricity in every house Running water in every house	Education High level of education Educated girls and women
Environment Natural resource management	Economy and Work Farm machinery
Government and Law Freedom of expression	Technical knowledge Youth employment

This is intriguing on two levels. First, Ouegoulega residents perceive development to arrive from the outside, yet include within it very local attributes such as agricultural labor, animal husbandry, and even socialist economic behavior (or, sharing wealth widely). Residents are actively synthesizing perceptions of external development attributes with internal socio-cultural elements. Second, Program employees suggest that development is a process that is internal to the community being catalyzed with appropriate technology and knowledge. Yet, the ultimate effects of this catalysis strictly exclude the same socio-cultural elements that residents possess and desire to retain. Thus, in marked contrast to Issaka's opening statement, residents' vision of development is far more expansive and, I add, novel, than Program staff appreciate. Indeed, Program staff seem to have a more limited vision of development that centers on the production and dissemination of technoscience. This is illustrated by Gabriel's presentation to community representatives.

MISTRANSLATION

The vignette of Gabriel's climate change presentation to community representatives is an example of three arguments made in the proceeding section. First, Gabriel's presentation reveals that the models of the environment do not directly engage one another in the development context, but do so indirectly through the definitions of development that they condition. Second,

Gabriel's presentation can be read as a manifestation of the Program's definition of development, which is the result of autocatalysis sparked by appropriate technology and appropriate knowledge. Third, within this definition of development, the dissemination of appropriate knowledge is understood as technoscientific knowledge.

In this section I argue that in addition to the above, the presentation provides a venue through which one can analyze the contemporary processes of translation between the models. I argue here that, within the development context, translation is truncated for two main reasons: (1) climate change is presented as purely technoscientific to audiences without the prerequisite linguistic or epistemic literacy to comprehend it; and (2) the presenters of climate change technoscience understand that this is the most appropriate way to deliver the information. The information conveyed and the format in which it is presented are part of the larger knowledge-network in which Model 2 is embedded.

Gabriel's presentation includes several important instances of mistranslation or missed opportunities of translation. First, the audience was composed of multiple educational levels and ethnic backgrounds. John had never attended public school while the representative from Koudieri had some lycée education. Both John and the representative from Koudieri spoke Mooré, but the latter's slightly advanced education has left him with significantly greater French comprehension. When asked if the entire week had been conducted in French, the Koudieri representative replied that presentations had been in Mooré and Djula, the two main ethnic groups of the audience, as well as French. Some presentations were translated from one language to another, others were provided only in one language. John later said that he couldn't follow Gabriel's presentation, the French was too difficult to understand and too fast.

In addition to lacking linguistic literacy, a significant portion of the audience lacked epistemic literacy. If John couldn't follow Gabriel's French, it is unlikely that he was able to follow the technoscientific content of the presentation. I later asked John if, at the conclusion of the training, climate change was covered again—at least in synopsis—in Mooré. He affirmed that it was but that it remained unclear. He clarified that to understand something he needs “to hear it two or three times.” He understands that the rain is more variable today than in the time of his parents, of course—this is his experiential reality—but the ability to apprehend the world through technoscience is truncated by the newness or foreignness of that knowledge. John lacks the linkages that would bring the technoscience of climate change—as presented—into his knowledge-network. The linkages that have been established for those who hold to Model 2 by passing through the multiple thresholds of technoscience acquisition through the public school system do not exist for John.

Gabriel was aware of the audience's variable public education background and technoscientific knowledge prior to the presentation. He understood that Winrock was using the weeklong training to inform and motivate community members to accept and practice the new techniques of Conservation Farming. When asked, Gabriel admitted that the presentation was difficult to prepare because of the variable audience; he wanted to present the information for those who are unfamiliar with it, but also make it useful to those with some scientific knowledge. Afterward, Gabriel clarified that the ultimate goal of the presentation was to provide the basic concepts of climate change for people to begin asking “better questions about the world.”

Implicit here is that Gabriel hopes that residents will ask better questions about the world that will ultimately orient their perceptions toward rational thought. Gabriel's purpose in

presenting technoscientific information to residents is to underscore the importance of Conservation Farming (CF).

The Program recognizes that climate change is impacting communities in Burkina Faso and the vast majority of residents in Tanghin-Dassouri are agriculturalists who directly experience rainfall variability and temperature fluctuations that they attribute to global climate change. In theory, then, Gabriel's presentation is superfluous since both groups recognize climate change though they may disagree on many particulars. Yet both USAID WA-WASH and Winrock administrators deemed the technoscientific knowledge of climate change important enough to underscore the need for CF. The presentation highlights the Program's valuation of technoscientific knowledge in the catalysis of behavior change because the presentation includes, in both form and function, the rejection of local environmental knowledge. It is not enough to leave local environmental knowledge because, as Alphonse implied, it is irrational.

Why then would Gabriel present more detail, more complexity, rather than less to an audience with variable scientific training? Gabriel admitted to self-editing those knowledge nodes most related to Model 1 when engaging in his duties within the Program office because, in a view he shares with other staff, development is a domain of technoscience. For Gabriel, presenting the details of the technoscience of climate change was the most important knowledge he could convey to an audience with variable public education. Gabriel had to compensate for the lack of public education by providing more detail, not less; in other words, Gabriel was compensating for lost education, condensing multiple epistemic thresholds through which he has passed to become an expert into a single sensibilisation. Gabriel's efforts seem to suggest that he, on some level, comprehends that some knowledge ought to promote social solidarity by forming a widespread epistemic community. By condensing multiple thresholds, Gabriel is replicating a

structure of acquisition that closely mirrors the structure of acquisition of Model 1. These efforts are lost, however, because of the linguistic and epistemic differences between he and the audience.

CONCLUSION

In this chapter I have provided data to contribute to the second research question: How are knowledges of climate change interconnected with definitions of development. I have argued that the knowledge-networks in which each model of the environment is embedded, although they may share socio-historical interconnections—condition unique definitions of development. Model 1 influences a definition of development on the individual/household and community levels. The former is conceived as a process of mitigation and adaptation to climate change through the capital accumulation of gardening. The latter is conceived as large-scale projects to improve the health and formal education of residents, and thus, expand economic opportunities.

Access to groundwater, increased access to fertilizers, chicken wire and other tools constitute the material inputs to gardening but these materials drain valuable financial resources and often exceed individuals' existing financial capacities. Even those with significant financial resources relative to those who are unable to garden make economic decisions on a daily basis that spread their resources thinly. "We are the poor," is a common refrain among community residents. Limited financial resources means that one lacks the capacity to ameliorate the situation, while wealth is strongly associated with responsibility. Capacity denotes responsibility and residents see the government and external organizations to have the most responsibility.

Nonetheless, the capacity to adapt and to develop is something that is eagerly sought by community residents, contrary to the opinions of development workers. When sharing results of

both questionnaires and economic data analyses, many development workers saw fatalism and dependency. In community responses that named government and organizations as those with the capacity and responsibility to enact development, staff saw residents refusing to accept agency and empowerment for their own development. Development workers interpreted the results as residents “giving up,” a conclusion they felt was strengthened by the position of God in Model 1. Gabriel once remarked, “If God causes climate change the conversation is over.” Likewise, Program employees rejected the economic decisions made by the Youpougdou and Nikiema households as rational and prudent.

Yet results reveal that capital accumulation as adaptation to climate change is part of a wider view of economic activity. Residents seek capital not only to have enough money to buffer their household harvests but to become more engaged actors within local and regional capitalist markets through increased access to commodities. Money, as Karl Marx (1986) has written, is not like other commodities, for it is a medium through which diverse exchange values can be translated. Money provides access to mobile phones from China, mopeds from Japan and Taiwan; it provides access to education through school fees, health care, and clothes from Western countries. Money is the means by which residents gain access to modernity and the potentiality of modernity, for in capital accumulation residents seek to enact an outward looking vision. This is one reason why parents place such emphasis and spend such expense formally educating their children. More than agriculture, residents see formal public education as a more effective avenue for reliable capital accumulation based on intellectual labor and facilitates one’s access to capitalist markets through linguistic and epistemic literacy. At the same time, residents do not reject agriculture or rural livelihoods, but actively combine both within the definition of

development. Contrary to development workers' interpretations, residents' vision of development is broad, encompassing a plurality of realities and future realities.

This definition of development illustrates the complex relationship between “development”—as destructive and generative processes of capitalism—and “Development”—the projects of intervention in the Third World (Hart 2009). Residents see development as a process of capital accumulation, but given the poor political economic opportunities they see for themselves, advocate external (big D) Development intervention. Big D Development facilitates little d development. Such a view indicates, as speculated in the introduction to this chapter, that environmental knowledge may not be the only knowledge to influence this node in the knowledge-network. Indeed, such a definition of d/Development pays heed to the complexities of capitalist processes that have penetrated the African continent prior to the Colonial Era.

These conclusions support and extend the contemporary literature of development in West Africa. Several scholars of West Africa have explored how global capitalism and the narrative of development orients rural communities towards urban centers and towards the West (Piot 2010, Geschiere 2009, Smith 2007, Piot 1999). Achille Mbembe (2008) argues that contemporary Africans are currently negotiating the cultural and political economic terrain of “nativism” and “cosmopolitanism,” resulting in unique combinations of cultural practice and identity formation. This seems to be supported by residents' broad definition of development that includes quintessentially rural and urban cultural formations, but combined in unique bricolage. Indeed, when I was trying to flesh out this point in my analysis, having initially thought that public education is the only way people gain access to the urban sector, I was repeatedly told that formal education is just one of many ways people come to “know the world.” This analysis, additionally, extends current research by focusing specifically on widespread definitions of

development that includes the political economic (i.e. capitalist) dimension, but emphasizes the epistemic—a dimension that has been de-emphasized. Finally, by examining broad definitions of development, these conclusions add to the literature on agricultural and hydraulic development projects, placing livelihood practices within a wider epistemic frame of modernity.

For those who hold to Model 2, climate change adaptation through development (i.e. external intervention) is understood as a process of building capacity and changing behaviors. These goals are supposed to be accomplished with the acute application of appropriate technologies and appropriate knowledge designed to maximize natural resource usage. The former refers to the physical or mechanical aspects of projects that promote efficiency. The latter refers to the technoscientific knowledge needed for community members to run and maintain the technology. This definition of development states that with the proper application of these two elements, communities will gain capacity to generate their own process of development without continued external intervention.

Paralleling the big D and little d development of Ouegoulega residents mentioned above, Program employees' definition of development separates big D Development from little d development. Through the application of technoscientific knowledge, the inherent processes of capitalism seem to be analytically separated such that the delivery of “appropriate technologies” is and can only be conceived as tools for which they are designed. In the case of the potable water pump, for instance, the pump is only about providing access to potable water. The garden pump, on the other hand, is only about providing water to increase household food security. The pumps, classified as “appropriate technologies” for increasing sanitation and food security, are not defined by Program employees in terms of other uses. More interestingly, big D Development in this definition is logically prior to little d development such that the achievement

of Development (i.e. sanitation, hygiene, food security, etc.), residents will be able to put more effort into development (i.e. economic productivity).

Broadly speaking, for USAID WA-WASH and Winrock employees development is defined as an autocatalytic process that can only be accomplished by building capacity and changing behaviors. Appropriate technologies and appropriate knowledge are manifestations of the hierarchy of technoscience, for they position USAID WA-WASH and Winrock as superior to communities' extant technologies and knowledges. With appropriate technologies and appropriate knowledge, communities are considered to be capable of mobilizing and continuing their own processes of development. Program staff define the community as those most responsible for their own development even while they are simultaneously conceived as those with the least capacity. This underscores a tension within the development context as adaptation to climate change is defined technoscientifically with technoscientific solutions, yet those with the greatest responsibility to adapt are those without technoscientific literacy. In this sense, one might argue that development logically validates itself insofar as organizations define themselves as those with the capacity to deliver technoscientific solutions.

The quote from the Regional Director on page 225 seems to be exemplary of this tension and the hidden and unarticulated power dynamics. The quote seems to reference a recent (and popular) incarnation of modernization theory, which, shrouded in egalitarian discourse, says that the Others of the West are capable of being elevated to the West (Peet and Hartwick 2009) with the correct technoscientific guidance. This philosophy is acutely applied by Program employees who promote the assumed universality of the rationalism of technoscience through the delivery of appropriate technologies and appropriate knowledge.

USAID WA-WASH staff and organization representatives state that community residents' visions of development are narrow, limited by immediate contexts and desires. Communities must be taught, staff say, about the benefits of latrines and other projects—they must be taught to develop, to improve. Tania Li has used the term “trusteeship” to emphasize the role of those who claim the authority to speak for and to teach others what is best. Li writes, “The objective of trusteeship is not to dominate others—it is to enhance their capacity for action, and to direct it” (2007: 5). The methods leading to the objective, however, are an assemblage of practices, cobbling together specific vocabularies (capacity building, behavior change), perceptions (science as rational), non-human objects and devices (potable water pump), and inscriptions techniques (CVCA training). While Li and others have argued that this cobbling together can be a matter of bricolage or even improvisation, the analysis of this chapter has extended the insight by illustrating how the practices of USAID WA-WASH and Winrock International come from a specific knowledge-network characterized by technoscience. Practices may be improvisational in relation to the wider social context, but the underlying epistemics constrain the possibilities of action, thus limiting the Program's definition of development.

Practice, of course, denotes action, and action is a matter of power. The staff of USAID WA-WASH and Winrock International are indeed motivated by humanitarian sensibilities; the desire to speak-to is a desire to help. Yet the social function of the technoscience of the knowledge-network that mobilizes development discourse and practice, nonetheless, marginalizes alternate knowledge-networks and, thus, alternate definitions of and visions for development. Li and I both use “bricolage” to refer to the definitions of development and formations of development practice for both community residents and Program employees, and I carry this over into the next chapter. My conclusion adds to others who have shown that

development bricolage is not an unconstrained and unconditioned cobbling together of any and all possible elements. Rather, I have shown in this chapter that residents draw from a limited but wide range of potential developments (in the plural) as a condition of the tension between Mbembe's nativism and cosmopolitanism; Program employees are more constrained in their potential developments due to the strict adherence to technoscientific logic. What development is, for Program employees, is narrowly defined. In the following chapter, I reveal how the respective logics of climate change and development manifest through action in the development moment.

CHAPTER SEVEN

DUMB LUCK DEVELOPMENT AND MISTRANSLATIONS

Excerpt from my field notebook, 26 September 2013:

I'm standing in the hot sun in Ouegoulega with administration and staff from USAID WASH and representatives of implementing partners. It's the second day of the semi-annual Partners Meeting and we've brought a caravan of white SUVs out to *le terrain* [the terrain] to see the water pump projects that Winrock has been implementing. We've come to Moussa Yalpougdou's house since he was able to raise funds for the "community contribution" component of the potable water pump and has been chosen by Winrock to receive the demonstration garden pump that publicizes the initiation of the garden project. I've gotten to know Moussa, his wives, Awa and Rokia, and other family members very well over the past ten months; they've become key informants. But during these interactions—between the household and development workers—these familiar friends become different people.

Phillipe, of Winrock, stands behind the potable water pump addressing the crowd of representatives. To Phillippe's right is the lead of the Ouagadougou-based borehole drill team and part of "private sector" collaboration meant to enhance project sustainability. To his left is Catherine, Winrock mobilizer in Tanghin-Dassouri, who stands with Moussa and his two brothers. Phillippe is speaking about the technical aspects of the potable water pump, its component parts, how it functions, and how one adds chemical treatment and repairs a frayed

rope. He asks for questions and several partner representatives raise their hands. One asks about the financial cost: How much of the pump labor and supplies does Winrock subsidize? One asks about the durability: How often does the rope need to be replaced? Another asks about treatment: What is the supply chain and how easily can pump proprietors buy the chemical tablets?

The sun beats down and the representatives shift toward the surrounding patches of shade. There's a very small tree off to Phillipe's left under which everyone tightly clusters together. I move off to the right, joining the wives and children of the concession under the shade of the large mango tree where I've often sat and chatted with Moussa. But he, Catherine, and Phillipe remain in the sun; sweat glistening on their foreheads. Moussa is unmoving as if he's standing at attention. He's become something of the poster boy for Winrock's projects; we always come to his household to visit the projects. Awa and Rokia, and several other wives from the concession along with many children, are under the shade of the mango tree, uncommonly quiet, and far removed from the center of action. Neither Phillipe nor Moussa have introduced them and no one has asked them any questions even though the wives and children are the ones who use the pump most frequently.

Finally someone asks about Moussa's perception of the pump and the taste of the water. Phillipe asks Catherine to translate into Mooré. "*Koom yaa noogo*," Moussa replies, suddenly engaged, "The water is sweet." Another asks why he wanted this pump. Catherine again translates Moussa's response for the representatives, "There was sickness in the water. It was not clean. Now it is clean and there is health in the family. The cement covers the well and children are protected [from falling in]." Representatives nod and click in agreement.

Phillipe motions us to visit the site of the garden project slightly away from the compounds near where the five white SUVs are parked. Moussa and his brothers have brought

out the benches from their compounds and placed them in the shade of the tree under which the garden pump is installed. The representatives, already fatigued by the sun, cram together. The women and children remain behind under the mango tree. As soon as we move away the children begin playing and the women begin talking and joking, their sounds carrying along the short distance, as if they're finally relaxing. Moussa, too, hangs back. He stands behind some representatives, hidden, as Phillipe presents the garden project.

Again, Phillipe introduces the pump by focusing on the technical aspects and moves into the connection with the garden project. The latter is an additional component to the pump that involves improved gardening techniques and technologies. The representatives become increasingly engaged with the technical aspects of both project components asking about the integration of the private and development sectors, the cost, and availability of the imported seeds. As with the potable water pump, all questions are directed to the specialists while Moussa, who regularly uses the pump and conducts the labor of gardening, is ignored. Finally, someone asks if the new varieties of onions are as sweet as the local variety and if Moussa's wife adds them to her sauces. Moussa's answer, a short affirmative, seems to shock the representatives into remembering that he is there.

"Why are you in the back?" one representative asks in French. "Come. Sit." He stands up and pulls a chair into the ring of benches. Moussa chuckles and looks away. "No, no," he laughs, politely refusing to join the group. But the representative insists and is joined by another asking—almost demanding—that Moussa sit with the group. "It is your pump. You must sit with us." Moussa finally agrees but draws into himself. He keeps his head bowed and eyes averted, staring at the dirt just beyond his feet. His shoulders are slumped and his hands are clasped between his knees. His smile is gone. No one seems to notice; in fact, many representatives have

broken into small groups, engaging in their own conversations. But someone asks Moussa how the pump has improved his gardening.

“It is good,” he says quietly. “It is easy to pull water. It is easy to water the plots. It is very good.”

“How much time do you save?” asks the same representative.

Moussa hesitates but before he can answer Alphonse, the Winrock agriculture specialist, begins discussing the new technologies and how they are designed to save labor and time. He leads a few clusters of representatives into the garden where he shows off the technologies and how they function. Others continue their conversations and move around the pump, taking turns to draw water. Moussa and his brothers quickly move buckets to catch the water but the representatives continue to pump. The buckets over flow, spilling water around the pump, turning dirt into mud while the representatives laugh, delighted with how easy it is.

After some time we’re called back to the SUVs; we have other sites to visit. Moussa and his brothers try to shake everyone’s hands, bowing slightly, thanking us for coming. Some representatives, either too engrossed in conversation or simply ignoring him, climb into the air-conditioned cars without a formal good-bye. There’s a flurry of activity and suddenly the SUVs are pulling away, dust rising in the air. The group leaves Moussa and his brothers standing in the shade of the tree in the muddy earth surrounding the garden pump.

INTRODUCTION

In this chapter I address the third research question: How do knowledges of climate change and development influence action within the development moment. I argue that there is (part of) a causal sequence between the knowledge-networks and specific power dynamics that each group

employs. I continue the discussion from the previous chapter, which argued that knowledge should, in addition to the institutional and financial constraints of development agents, be seen as an epistemic constraint on how development is defined. Here I argue that the knowledges of the environment, climate change, and development constitute a network that influences the possible actions available to individuals and groups within the development moment. In other words, I argue that the knowledge-networks make possible some actions while limiting others. Such an analysis opens a space for investigating subtle negotiations among individuals and between groups. I conclude that the respective knowledge-networks and the resultant tactics each group employs during the installation of the potable water and garden pump projects ultimately opens a space for negotiation such that the Program and community essentially receives what they desire. In contrast, the implementation of Conservation Farming limits the possibility of negotiation and ultimately results in underwhelmed community responses.

By beginning with analyses of knowledge and knowledge formation, one is permitted insight into *how* such power dynamics are exercised through social structures. Power, for Foucault, is the application of knowledge through action, where all socio-historical struggles can be seen as struggles of knowledge, or regimes of truth. The microanalysis of power in this chapter explores how individuals and groups, each with their own situated knowledge-networks, which, as I have argued, influence and are influenced by different social structures, come together within the “development moment”—those occasions when both parties from the development divide engage one another in the context of project implementation. Therefore I am concerned with how individuals’ and groups’ actions are facilitated or constrained by the particularities of the knowledge-networks.

The micro-view of power is important for the anthropology of development. Initial analyses viewed international relations as structured by oppressive regimes of truth and political economy (e.g. Lenin 1939, Wallerstein 2007) and subsequent analyses saw interpersonal relationships as overdetermined by socio-historical tools of oppression and domination (e.g. Cardoso 2007, Escobar 1995, Frank 2007, Ferguson 1994). More recent literature has shown how development agents as well as local communities effectively employ complex forms of agency in subtle, and often overlooked, processes of negotiation and contestation (e.g. Baviskar 1995, Dubash 2004, Li 2007, Mosse 2005, Mosse, Farrington, and Rew 1998, Verma 2011, Watts 2001, Yarrow 2011). This chapter is heir to these scholars in recognizing that development, as a cultural product, is founded on and mobilized by international political economic as well as epistemic asymmetries. I also argue that those who “give” development are not unthinking agents of domination, nor are those who “receive” development hapless victims. I argue that for Program employees and community residents each epistemic community accesses and employs different power dynamics, or tactics, in order to assert the particular knowledge-network (or regime of truth) to which they hold.⁶⁷

The body of this chapter is divided into two sections that articulate the dimensions of the knowledge-networks that both facilitate and constrain actions in the development moment. The first section, “Dumb Luck Development: Water Pumps and Power,” discusses the design and implementation of the potable water pump and garden pump projects in Ouegoulega. I argue that the knowledge-networks in which Model 1 and Model 2 are embedded translate the two pumps in dramatically different ways, and while the projects are popular among community residents

⁶⁷ Some feminist scholars of development have used “strategies of power” to refer to actions and power employed by development agents (see Harcourt 2009). While useful, this term seems to imply intentionality—an argument that is difficult to make in this analysis given the subtle nature of the power dynamics being discussed. As mentioned above, I employ “tactics” for the connotation of improvisation, but some tactics are explicitly intentional and I note this below with the term “strategy.”

and considered successful among Program employees, Program employees are unaware of the underlying epistemic difference. I show that each group translates the pumps in the ways that they have due to the underlying knowledge-network *as well as* the range of actions available to them in the development moment.

The second section of this chapter, “Further Mistranslations,” continues this argument by providing a counter example. The implementation of Conservation Farming—USAID WA-WASH’s only project to primarily and explicitly address climate change adaptation through improved agricultural techniques—received a lackluster response from community residents. I show that the reason for this is that the translations of the Conservation Farming project by residents and Program employees, while different, do not permit the same actions. Instead, there is a far more limited range conditioned by the structures of interactions between Program and community, leaving both groups uncertain about the project.

DUMB LUCK DEVELOPMENT: WATER PUMPS AND TACTICS

Dumb luck development refers to the relative popularity, some might say success, among community residents of a project for reasons other than the development organization’s official objectives. Dumb luck development occurs when a single project is translated in different ways by two or more knowledge-networks, but the translations remain unarticulated to one or more of the other knowledge-networks. The point of dumb luck development is that despite this inexpression, the groups essentially reach their goals. Dumb luck development is not serendipitous; it is not a near-random result. Rather, as in the case of this research, it is the result of both USAID WA-WASH and Ouegoulega residents acting upon their knowledge-networks—sometimes explicitly, other times unknowingly—in order to achieve their desired definitions of

development. I argue that community residents' desired outcome of the project and the Program's desired outcomes more or less align.

Translations of the Potable Water and Garden Pumps

The potable water pump and garden pump projects are temporally distinct. The potable water pump project had been implemented prior to the start of the fieldwork period in October 2012. At that time implementation had been limited to the installation of one demonstration potable water pump to garner community interest. By September 2013 the Program had installed five more pumps in Ouegoulega—one of which is at the compound of Moussa, a key informant—and was in the process of facilitating additional installations. By the end of the fieldwork period, the garden pump project was limited to a demonstration installation in Ouegoulega—also at the compound of Moussa—that was completed in September 2013. At this time, Winrock was still in the process of determining the final costs of the garden pump, the community contribution component, and the private sector parties to facilitate up scaling.

The potable water and garden pump projects are intended to target very different dimensions within WASH activities.⁶⁸ The potable water pump is part of the Program's primary objectives, and is meant to increase households' access to potable water, increasing sanitation and hygiene, reducing healthcare costs, and increasing households' financial resources. The garden pump is part of a tertiary goal within the Program to increase food security through increased access to groundwater, thus increasing household incomes. Secondly, the Program considers the garden pump project to be a means for increasing household adaptation to climate

⁶⁸ Descriptions of both pump types as well as the other projects Winrock is implementing in Ouegoulega can be found on pages 77-80, Chapter Three.

change through increased food security—the logic being that increasing vegetable production at the household level means less capital is expended in the market.

USAID WA-WASH implementation of the potable water pump project has been very popular and data suggest the garden pump will be as well. By the end of the fieldwork period the Program had installed a total of 31 potable water pumps throughout the Program Region, six of which are in Ouegoulega. Winrock plans to install 24 potable water pumps in Ouegoulega and 135 throughout the program region by the cessation of Program activities in July 2015. During the Partners Meeting in September 2013, these results were presented to implementing partner representatives as the highest performing indicators within the Program. In contrast, the garden pump project was just beginning to be implemented by the end of the fieldwork period, but the demonstration garden pump proprietor, Moussa, noted that frequently community members asked him how much the garden pump costs and when it would be available for the rest of the population, indicating that the popularity of the garden pump may follow a similar trajectory as the potable water pump.

The Program, however, translates both pumps in terms of very different technoscientific knowledge. As part of the Program's most important activity, MUS provision (see figure 3.1, page 69, Chapter Three), the express purpose of the potable water pump is to increase household health and safety through increased access to clean, reliable water. As a rehabilitated well-borehole, the potable water pump is treated with chloramine every six months, and the well is capped with a cement apron to inhibit children from falling in. By increasing household sanitation, the Program adds as benefit increased household finances since less money is supposedly spent on healthcare costs. Likewise, the garden pump is a rehabilitated well-borehole but the well is capped or uncapped according to the proprietor's discretion. As part of USAID

WA-WASH's "WASH Integration to Enhance Food Security" activities, the garden pump is part of a larger project to improve gardening techniques through drip irrigation, plastic mulch, and improved seeds. The objective is to catalyze individuals and households to increase garden production, thus increasing household food security and produce for markets. By increasing food security, the Program notes that a benefit of the garden pump project is increased adaptation to climate change.

The translation of these two pumps is a direct consequence of Program employees' definition of development discussed in Chapter Six wherein development is catalyzed in local communities with the delivery of appropriate technology and appropriate knowledge. By the end of the fieldwork period, the official knowledge transfer session for the potable water pump project had not yet commenced. Issaka was planning information sessions with household members who were currently benefitting from the potable water pump to reiterate the messages that he and others had informally conveyed during installation. During the installation phase of the project, Program employees constantly reiterated to pump proprietors and household members that the potable water pump is only for consumptive purposes and that it is not intended to water one's gardens or animals. Employees repeated the health benefits of drinking and preparing meals only from the potable water pump, sometimes (but not always) adding that increased household health translates to reduced healthcare costs and therefore more money in the household. Additionally, the cement apron, they always noted, avoids injury and accidents.

During the installation of the demonstration garden pump Program employees were explicit that the water from the garden pump was not to be used for consumptive purposes. The differentiation is easily made, I was told by Issaka and Alphonse, because the water does not have to be treated and the well-borehole can be either capped or uncapped according to the

proprietor's discretion. The demonstration garden pump, for instance, is uncapped and Program employees noted that this is a clear signal to residents that the water is not suitable for consumption. Similar to the potable water pump installation, Program employees consistently recounted the benefits of improved access to groundwater for garden production, food security, and adaptation to climate change.

For Program employees, the designs of the two pumps explicitly convey the purposes for which they are intended. Similar to the Bush Pump of Zimbabwe (de Laet and Mol 2000) which is purposefully engineered to symbolically convey purity, freshness, and reliability, the technologies of the potable water pump and garden pump are considered to inherently convey the technoscientific knowledge of their use: the cement apron and treatment valve of the potable water pump located in or close to household compounds versus the open well of the garden pump located in or close to personal gardens. Thus, while the technology of the pump is primary to the formal knowledge-dissemination sessions, Program staff also understand the intention of the technologies as self-evident. Technology conveys at least partial technoscientific knowledge, meaning that the popularity of the pumps indicate community acceptance of project objectives.

Ouegoulega residents, clearly, do not translate the two pump projects technoscientifically. Model 1 of the environment and climate change defines the lack of rainfall as a divine punishment for errant social behaviors. Although there is no consensus whether the rains will continue to worsen or ameliorate, many individuals make an epistemic distinction between rainfall and groundwater such that groundwater is defined as a form of divine insurance against catastrophic climate change. Because agriculture is dependent on rainfall and yields are already inadequate for yearly subsistence, Tanghin-Dassouri residents engage in horticulture. One's capacity for gardening, however, is dependent on access to groundwater and, as I argued in

Chapter Six, conditions the accumulation of capital for purchasing supplemental grain and engaging with the market economy.

The local knowledge of climate change and valuation of gardening relative to farming are precisely the reasons that Ouegoulega residents have been motivated to work with the Program for both the potable water pump project and garden pump project. I argue that the popularity of the potable water pump is not due to an understanding of the technoscientific sanitation knowledge that is thought to be inherently conveyed with the delivery of the technology and informal processes of knowledge-dissemination. Slightly differently, the garden pump is not translated as a means for increasing household food security. Instead, the potable water pump and garden pump are translated by Ouegoulega residents as mitigating techniques against climate change vis-à-vis garden production, capital accumulation and the capacity to increasingly insert oneself into the market economy. The translation of both pumps by the community is an example of dumb luck development.

If given the option, residents state that they would prefer the garden pump to the potable water pump. In early 2013, almost a year after the start of the potable water pump project, the Program announced that it would begin testing the feasibility of the garden pump. Word circulated that this model pump, the *pompe-en-vélo*, would be less expensive than the potable water pump because one wouldn't need to add a cement apron or treat the water. This was frustrating for many residents including one man who complained, "Why did they not tell us first? It is less expensive!" One of the local youths who is being employed by the Ouagadougou-based team to drill boreholes during the well rehabilitations admitted that the majority of residents would prefer the garden pump to the potable water pump: "People are very motivated by the [garden] pump. It is less expensive." Indeed, Moussa said that countless individuals, in the

seven months of fieldwork during which Winrock was modifying and installing the pompe-en-vélo for the garden project, had asked him how much the finished product would eventually cost, hoping that they too would be able to benefit from the community's relationship with the Program. Clearly, Ouégoulega residents do not epistemically differentiate between consumptive and non-consumptive water and, if given the choice, prefer the cheaper garden pump to the potable water pump.

More illustrative than verbal complaints are residents' behaviors toward the two pumps, which reveal that residents do not epistemically differentiate between types of groundwater sources. Residents use the potable water pumps for non-consumptive purposes and drink from the garden pump. On several occasions I observed individuals from both Issa's and Moussa's households using water from their potable water pumps for non-consumptive activities such as washing clothes (figure 7.1). Moussa's youngest brother regularly uses the potable water pump

Figure 7.1: Clothes Washing with Potable Water



to water his garden because it is the closest groundwater source. However, even though gardens for Issa and his first wife are located near the potable water pump, neither used that water for gardening, which is likely due to the closer proximity of another, non-rehabilitated well. This is also the case for Saidou who, along with his brothers, engage in intensive horticulture throughout the year (figure 7.2). Of course, households with potable water pumps also used the water for consumptive activities but, in terms of behavior, there is no strict division between groundwater sources.

Figure 7.2: Saidou's Household Garden Plot with "Traditional" or Hand-Dug Well



Despite these behaviors, residents repeatedly claimed to understand the importance of potable water, often repeating to Program agents that the potable water pump is only for consumption. When asked why the potable water pumps are important, proprietors and users of the pump note that the water is clean and reliable, it reduces illness, and the cement apron keeps

children from hurting themselves. Residents with whom I spoke did not waver from this list, repeating it verbatim, as if it were common sense. Throughout the project's design, publicity, and implementation, Program employees always include these same three benefits of the potable water pump, and sometimes include others such as the reduction of healthcare costs and the increase of household disposable income. The disconnect between community residents' list of benefits and Program employees' list of benefits seems to suggest that residents do not fully accept the economic benefits of potable water. I argue, however, that residents do not even accept the benefits they list. Rather, residents are employing a particular tactic in order to benefit from the Program's relationship while appropriating the pump into the local knowledge-network. Appropriation occurs even as the Program asserts their own tactics in order to achieve their objectives.

Tactics

In this section I support the argument that dumb luck development is not serendipitous. I argue that the residents' and Program employees' definitions of development do not simply happen to coincide within the potable water and garden pump projects. Instead, I reveal that the potable water and garden pump projects are popular (and successful from the Program's perspective) because of a subtle negotiation of power dynamics between and within the groups. The overarching theoretical argument to be made here is that the knowledge-networks in which Model 1 and Model 2 of climate change are embedded, and which influence particular definitions of development, and which meet in the development moment, condition the possibility of a particular range of actions.

The range of actions, of power, available to residents and employees can only be understood within the development moments in which they occur. I show that the Program positions itself hierarchically to the community as a threshold of technoscientific knowledge and development. The result is the marginalization of women from the development moment even as some male community residents jockey to position themselves between the community and Program. As a form of resistance, community residents employ hidden transcripts, complaining about Program operating procedures such as the cost-sharing component of both pump projects. Yet the Program uses cost-sharing as an explicit tool to financially discipline particular types of economic behaviors. While financially burdensome, residents acquiesce to cost-sharing because of the social value of increased groundwater access even as they employ hidden transcripts as well as mimicry in order to maintain the beneficial relationship. I do not presume that each of these tactics is a conscious strategy to resist or oppress. Though there is evidence to show that some are intentional, I argue that whether intentional or not, each is directly influenced by the corresponding knowledge-network and may, to a degree, be improvisational (de Certeau 1984).

Hierarchy in Program-Community Engagement

Hierarchy is established in the very first instances of project initiation. Standard protocol dictates that implementing partners receive official permission from the mayor of the commune, village conseil, and CVD.⁶⁹ These individuals and organizations mark the sovereign boundary between local communities and external organizations. During the fieldwork period, USAID WA-WASH and Winrock staff developed long-term working relationships with the assistant mayor of the Commune of Tangin-Dassouri in charge of sanitation and hygiene projects, as well as the conseil

⁶⁹ See Chapter Three for more detail on each of these positions.

and CVD of Ouegoulega. Catherine, the Winrock agent stationed in Tanghin-Dassouri, works closely with both the conseil and officials of the CVD in order to announce and publicize projects, administer questionnaires, and recruit volunteers. By inserting themselves at this level of governance, however, USAID WA-WASH and Winrock staff are hierarchically positioned relative to the community and those residents engaged in particular projects and positioned subordinately to local levels of government and community organization.

While the Program actively seeks out communities and their explicit permission for development intervention, communities do not actively seek out development projects. No one with whom I spoke in Tama or Ouegoulega intimated that representatives from the community directly seek out or petition independent organizations for development intervention. This is striking given the well-formed definitions of and desires for development explicated in Chapter Six. Several individuals in both communities noted that the conseil occasionally requests services, such as public works and schoolteachers, from the commune mayor who in turn petitions the national government or may direct intervening organizations to the community. In fact, the conseil of Tama stated specifically that her job is to act as a liaison between the community and the mayor's office, which, she confirmed, is the body ultimately responsible for the well being of the people.

There is a sense in both Tama and Ouegoulega that residents cannot count on the government for those things the community desires in order to develop. As discussed in Chapter Six, community residents see first the government and second external development organizations as those bodies responsible for development initiatives, but many individuals question whether the government has the capacity for development. People I spoke with thought that perhaps the government doesn't have enough resources, is overstretched, is thoroughly

corrupt, or some combination of factors. As a result many individuals state that should help be given from an external organization, the community would never refuse. This places the community in a difficult position, for no matter the project and its methods—no matter how deleterious—Tama and Ouegoulega residents state that it would be welcomed. This complicates a simple reading of the Program as subordinate to local government and community organizations, for the community sees external organizations as the only viable source of development intervention given the government's presumed lack of capacity. To be clear, I am not suggesting that the methods employed by USAID WA-WASH are pernicious; I argue that even though the methods employed exacerbate social distance and stratification, residents act in order to maintain the potentially beneficial relationship even as they occasionally subvert it, as I show below.

Marginalization of Women

One such instance of power dynamics is evidenced in the effects on local gender asymmetries. As noted in Chapter Three and Chapter Six, women are significantly disenfranchised from land tenure and animal husbandry but benefit from usufruct laws. Women are marginalized according to cultural gender politics through which they are positioned subordinate to men whose property, labor, and needs are given priority. Men, additionally, occupy roles of both endemic Mossi authority and more recent organizational forms of authority such as the conseil and CVD administration.⁷⁰ By engaging official governmental structures at the commune and community

⁷⁰ Of course, Fati is an exception to the rule. In discussing her election to conseil of Tama, Fati recognized that not many women occupy positions of local authority. "Maybe they are afraid," she speculated, "to upset their husbands." She told me that she did not ask permission from her husband to run for conseil, but was motivated when several community members saw her work in Tama's women's organizations (le groupement des femmes) and encouraged her to run. Her husband ultimately agreed and

levels that are staffed by men, USAID WA-WASH and Winrock reaffirm gender divisions with long-term repercussions.

Certainly, the Program does not expressly intend to marginalize women. On the contrary, Program staff and Winrock employees include Gender Specialists who, first, conduct research into the prevailing gender norms at project sites and, second, incorporate components into project design and implementation that are specifically tailored to the different social roles genders occupy. The work of the Gender Specialists, however, is ultimately influenced by the underlying logic of the knowledge-network that mobilizes development initiatives.

The technoscience of development constrains humanitarian concerns by subtly perpetuating a narrative that equates technology, science, and equipment with male and the masculine (Haraway 1997). Anne Fausto-Sterling (2000: 119) has written how the logic of technoscience has discursively constructed and othered women through linkages with the science of hormones and patterns of cognition. Such linkages not only construct women as objects of scientific inquiry, but also as socially, if not biologically and epistemically, less capable of scientific labor. Linking these observations with international development, Donna Haraway (1991) has shown how the logic of technoscience has been carried through from the Colonial Era into contemporary development discourse. Many ethnographic accounts describe the ways in which gender is conditioned by scientific knowledge of the environment, which illustrates how particular bodies are dually constructed as female *and* ultimately excluded from, and thus denied power in, the development context (Nightingale 2006, Schroeder and Suryanata 2004, Sundberg

she was elected to the position. During an introductory focus group with many notable persons and officials in Tama, Fati was the only woman to sit with the male president of the CVD, Imam, and others on the only wooden bench (while all other women sat on the ground, and spatially distant from the meeting), illustrating that her position of authority regarding community affairs is enough to significantly disrupt some gender divisions.

2004). What is unique about the development context is that it includes particular actions that interlink local and state levels into subtle practices on individual bodies (Harcourt 2009).

How then does the marginalization of women through technoscience manifest in Ouegoulega? The relationships USAID WA-WASH builds with state governments at the national and commune levels is a network that condenses at the community level as Winrock directly and consistently engages with the male-dominated CVD as a venue to publicize and gain support for projects. While several Ouegoulega CVD members are women, none of them hold administrative or authority roles. During the fieldwork period I attended several Ouegoulega CVD meetings. During meetings women are spatially subordinated to men, sitting off to the side of the center of attention and often sitting on the ground, and remaining silent for the meeting while men ask questions and direct discussions. This spatial arrangement is replicated during those Program-community engagements, such as the one described in the opening vignette, and others (figure 7.3).

Figure 7.3: Project Site Visit by Winrock Staff



Women in Ouegoulega are acutely aware of their marginalization from the development moment. During an impromptu group conversation with the wives and women who live in Moussa Yalpougou and his brothers' concession the women voiced their experiences and concerns about their engagement with the potable water pump and garden pump projects. Awa, Moussa's first wife, stated that when Winrock arrived to announce and begin the process of installing the potable water pump, they never spoke with the women of the concession. The women were never asked how often they use the well that was to be improved, how much water is used throughout the year, for what purposes, and other experiential knowledge. Instead, Awa stated to the clicking of other women, "Winrock spoke with the women after the pump was installed" and then the conversation was limited to asking the women to form a group that would keep the pump clean and to notify the men in the concession should anything happen (such as discoloration of the water, reduced efficiency, reduction in water, or mechanical malfunction). When asked if they could approach Winrock staff and talk about projects the women laughed. Awa spoke up again, "Winrock came to talk to the men. It is not for us [to speak with them]." Significantly, women here blame Winrock's actions for their marginalization rather than the men of the community. Thus, marginalization is perceived by women in Ouegoulega to be the result of Program-community engagement rather than extant patriarchy. Women are, at least implicitly, also suggesting that there may be an opportunity for the Program to disrupt the patriarchal status quo and directly engage women.

Conversely, Program employees view their actions as constrained by local cultural practices and do not perceive themselves as capable of directly challenging asymmetric gender norms. When asked about the structure of engagements that exclude women, Constance, the Winrock Gender Specialist, stated that in order for a project to be successful—to gain

community support and to have the project continue after the tenure of the Program—one cannot directly challenge the status quo. There are often women’s groups that work in parallel to the CVD (such as le groupement des femmes); Constance said that if one were to engage these groups it would be to gather data and inform rather than ask permission to conduct a project. Constance here understands her role as one that is about changing local conditions even while working within the same social structures. Constance’s comments reflect the subtle effects of women’s marginalization that are applied in the development moment such that subordination and marginalization are seen as “common sense” or “natural” (Harcourt 2009).

Catherine, who has consistent contact with Ouegoulega residents, agreed with Constance’s view but hoped that her interactions with individuals and households might help dislodge entrenched patriarchy. “It helps,” she said, “that I speak Mooré, but I sit with the men and speak to them as equals. I wear pants and ride a motorcycle. I think the women see me as an example of how the genders can be equal.” Catherine later added, “there is still a long way to go,” signaling that she recognizes the impact of her actions may be limited. And this is likely the case, for none of the women with whom I spoke said that they have or would confide in Catherine should they have concerns about a project. While Catherine hopes to have a positive impact on the women in the community, she is nonetheless part of a larger structure of social engagement that implicitly marginalizes women due to the underlying technoscience of the knowledge-network that operates at multiple scales.

Hidden Transcripts

By expressing their frustrations and concern with the protocol of Program-community engagement, the women in the impromptu focus group mentioned above are actually employing

a form of resistance. The women exemplify the public and hidden transcripts identified by James Scott (1992) as “weapons of the weak.” While hidden transcripts are not directly influenced by the content of the knowledge-network in which Model 1 is embedded, they are conditioned by the social valuation of specialized knowledge and structures of knowledge acquisition. I argue here that hidden transcripts are a result of the hierarchical positionality of specialized knowledge, generally, and the hierarchical positionality of the Program through technoscientific knowledge-practice, specifically.

Hidden transcripts, however, are not exclusively employed by women but are tactics employed by many community residents. Repeatedly, Ouegoulega and Tama residents—men and women, youth and elders—stated that they could not approach USAID WA-WASH or Winrock officials to directly ask for particular projects or to modify existing ones. Residents state that it is not their “place” to directly engage development organizations in this way, even as many Ouegoulega residents occasionally complain privately about certain development practices.

As the opening vignette illustrates, the actions of community residents in front of Program employees reveal that women’s marginalization is overlaid with another tactics that is made manifest through public transcripts. While the wives and children of the compound internalize the marginalization of development by remaining physically and sonically separated from the attention of the presentation, the children begin playing and the women begin talking once the representatives move away. Likewise, Moussa, forced into the spotlight as proprietor of the potable water pump, is presented by Phillipe but does not directly or assertively engage representatives. In fact, after he is essentially commanded to join the group at the garden pump, Moussa physically retreats from occupying a collaborative or egalitarian position. While forcing Moussa into a more or less equal relationship by asking him to sit with the group may satisfy

certain representatives' needs to enforce collaboration, the act deeply unsettles Moussa insofar as it disrupts the seemingly "common sense" and "natural" structure of Program-community engagement that characterizes the subtle effects of power.

While the public transcript of community residents is characterized by subordination, the hidden transcripts elevate the community's position. In private, residents complain about Winrock's practices within the community. Women wonder why they never speak with them and many voice desires for projects other than what Winrock implements (see Chapter Six). Men raise concerns over Winrock's protocol and the lack of information willingly provided. For instance, Issa, the proprietor of the demonstration potable water pump, confided that he had called Winrock several times to inform them that the well had prematurely run dry. Exasperated, Issa said that he didn't know when, if ever, the team would return to repair the well. Moussa found himself in a similar position when Winrock arrived to deliver the pump that would eventually be installed as part of the demonstration garden project. Several weeks later, the team returned to take the pump but did not inform Moussa when the installation would be complete. Months later Moussa still had not received word. He later confided that he was nervous that Winrock had decided to move the demonstration pump to another location and hadn't told him. At this point I approached Issaka of Winrock to inquire about the garden pump and discovered that the metalwork team wanted to adjust it before using it as part of a workshop to train additional metalworkers and publicize Winrock's activities. Issaka didn't think it necessary to inform Moussa.

The incident with the demonstration garden pump is particularly illuminating for two reasons. First, it reveals a hidden transcript that goes unnoticed by Program employees. Moussa, having been chosen by Winrock to receive the demonstration garden pump, feels that he should

also receive information regarding the installation. Not receiving this information prompts criticisms that are not voiced directly to USAID WA-WASH or Winrock staff due to their hierarchical relationship. Second, the incident highlights the divergent perspectives of development from across the development divide. Moussa understands the pump within the framework of facilitating his gardening activities and, thus, his economic production. Issaka of Winrock sees the pump as technology that is still being developed and streamlined—work only the Winrock-contracted teams can accomplish. The hidden transcript reveals that at least partially, both Moussa and Issaka claim ownership over the demonstration garden pump. While Issaka performs ownership by taking the pump to the workshop without Moussa’s permission and neglecting to convey information to Moussa throughout the period, Moussa acquiesces and does not contest this performance.

The Program, likewise, exhibits something like hidden transcripts, though one might not call them “weapons of the weak.” I have already recounted how Alphonse describes non-scientific knowledge of climate change as irrational. The Regional Director similarly suggested that local knowledge is not sufficient for genuine collaborative development; that instead, the Program must seek to “lift” the community to a particular epistemic level. These comments are tied to modernization theory within development and do not seem to subvert community authority. Rather, these comments reaffirm the Program’s hierarchical position relative to the community that is justified and validated through the use of technoscientific, or specialized, knowledge.

Hierarchy and Specialized Knowledge

In the anecdote recounted above, why does Moussa not seek out knowledge of the pump from Issaka for himself? The answer lies in a subtle social function of knowledge that has not yet been addressed. Within Ouegoulega and Tama, individuals do not actively seek out new knowledge from those individuals deemed socially superior; it is the purview of those who are in positions of power to disseminate knowledge.⁷¹ In other words, those with particular knowledge may assert themselves as an epistemic threshold in order to affect hierarchy and social distance. Conterminously, those outside the epistemic community of specialized knowledge recognize the social distance created by the active construction of an epistemic threshold. Moussa cannot actively seek additional knowledge from Winrock because the relationship structured through technoscientific (i.e. specialized) knowledge between Program and community places the community in a subordinate position. This observation is exemplified by three events from diverse contexts.

The first event is a comment made by Catherine when I inquired about any difficulties she encounters as part of motivating community members to engage with certain projects. Catherine noted that it is difficult to mobilize different demographics of people at the same time: often elders won't join if there are many youths, and if only youths join the elders will never receive the knowledge. "Elders think the knowledge should be for them," she said, "they won't listen to youths." Catherine, of course, here identifies the age-knowledge nexus discussed in Chapter Five, recognizing that elders self-identify with a power structure that places them

⁷¹ This is likely a widespread characteristic of specialized knowledge in West Africa. Several Western expatriates I knew recounted stories where local hires were informed of duties by someone equal to or subordinate within the chain of command but who then refused to perform the duty until someone above them in the chain of command repeated the command. This is a different dimension of the same phenomenon wherein individuals ignore knowledge from those whom they deem without the social position or authority of an epistemic community to relay the command.

hierarchically vis-à-vis youth. Her perspective recognizes the social power of specialized development knowledge and the role of the Program as epistemic threshold. She also recognizes the community age-knowledge-power nexus that is attempting to co-opt or align itself with it in order to maintain hierarchy. Even though Catherine also believes that knowledge ought to be shared equally among residents, which essentially ignores an appreciation for the complex social functions of knowledge, she implicitly understands that the community also recognizes the social value of specialized development knowledge.

The second event is a Program-community engagement that occurred during the meeting Catherine and Alphonse facilitated in Ouegoulega to introduce Conservation Farming to CVD members. Just prior to the start of the meeting the vice president of the CVD arrived and angrily accused other members in the organization of conspiring to keep knowledge of the meeting from him. Having been notified about the meeting from another, subordinate CVD member, the vice president argued that his position within the group mandated that he should be one of the first to be personally notified by Program employees. Only after an exhaustive combination of apologies and excuses from Alphonse did the vice president permit the meeting to begin.⁷² Here the vice president of the CVD aligns himself with the social value of specialized development knowledge. By asserting his authority over CVD members as well as Catherine and Alphonse, the vice president also asserts a claim to specialized knowledge. It is inconsequential that the knowledge he is attempting to claim is the date and time of the meeting, for in being notified before other CVD members, the vice president would then be able to more effectively assert his hierarchical

⁷² In fact, the vice president became the most vocal and participatory member of the audience during the presentation. He was often the first to answer questions posed by Alphonse and the most boisterous in agreeing with Alphonse's comments. One reading of this is that the vice president was continuing to perform his positionality relative to the other community audience members.

position. In short, he understands his role as a potential epistemic threshold between community and Program.

The third event is an unsolicited comment from Boukari, a student at the University of Ouagadougou who visited his family in Tama for a few weeks during the rainy season. Boukari told me that he's noticed a difference in how Africans and Westerners [*les Occidentaux*] treat knowledge. "When a Westerner learns something," he stated, "he goes to teach others. He wants others to learn. But if an African learns something new it is for that person alone. He keeps it like a secret." When I asked what occasions might prompt an African to teach another I was told, "To make money," and after a moment's thought, "when he has to." Boukari went on to say that such occasions might include traditional healers passing along their specialized knowledge to a son or daughter. This comment illustrates that at the community level knowledge dissemination, for certain individuals, is not a free flowing process but subject to and overdetermined by social structures such as gender, age, and organizational authority positions. Boukari recognizes that specialized knowledge is often used to assert hierarchy, to create and exclude others from an epistemic community. Moreover, the comment illustrates that within the community (and perhaps throughout Africa as Boukari suggests) those outside the specialized epistemic community must recognize that their positionality precludes them from actively seeking such knowledge unless those who function as epistemic thresholds purposefully brings them in to it.

These anecdotes reveal that specialized knowledge is used to reinforce hierarchy not only between Program and community but within the community as well. Individuals employ specialized knowledge in the construction of an epistemic threshold that divides individuals into epistemic communities. These epistemic thresholds, in the first two anecdotes, are attempts to align certain individuals more closely with the development process while distancing others from

it, suggesting that even while residents define development according to communal benefits (see, Chapter Six), this strategy of power disrupts an easy notion of residents as a homogenous community.

Cost-Sharing and Financial Disciplining

In many ways, Program employees feel that the hierarchical relationship with the community is justified. As discussed in Chapter Six, the majority of Program employees responded that external development organizations have both the knowledge and financial means to implement development project. They do not agree with community residents' responses, however, that capacity necessarily implies responsibility. Responsibility, Program staff suggest, rests with the communities to implement their own development without external input. Cost-sharing, in this sense, is a means of financially disciplining community residents to make economic decisions that more closely resemble Program staff development ideals.

Cost-sharing is one of the more significant components within projects that is explicitly intended to change perspectives and behaviors. Cost sharing is included—to varying degrees—in all USAID WA-WASH implementing partners' projects and refers to the financial or labor contributions the community must agree to and follow through with during project implementation. The objective of cost-sharing is seen, by Program employees, as a means of empowering residents such that through financial contribution residents will recognize their own capacity and be motivated to initiate projects on their own. Additionally, Program employees define cost-sharing as a means for establishing a collaborative or communal relationship. The logic is that cost sharing equalizes the development hierarchy and that community residents will recognize their innate financial capacity to continue and even initiate projects after the tenure of

the Program. Cost-sharing is seen as an integral component to building community capacity and catalyzing behavior change qua development.

USAID WA-WASH includes community contributions in all projects in order to combat the existing development paradigm. Repeatedly Program employees state that they are working against the “international model” of development wherein projects are delivered as gifts without resident contributions. On several occasions I shared findings that Tanghin-Dassouri residents equate wealth with capacity and responsibility for development. Program employees interpret these results as evidence of the deleterious impact the prevailing international model of development has caused. This interpretation is, itself, mediated through the knowledge-network in which Model 2 of the environment is embedded. Here financial empowerment is equated with rational economic behaviors that are fundamentally capitalist.

The constitution of technoscience and capitalist philosophy are interlinked in the development moment by a singular historical genesis. Michel Foucault (1994) has argued that both forms of knowledge are expressions of a common episteme that fluoresced in 18th century Europe; an argument articulated by Karl Marx’s analysis of the disappearance of the yeomanry, the rise of the nobility’s agricultural production, and the production of raw materials to supply new forms of labor-power through mechanical means of production (Marx 1978). In these arguments technoscience and capitalism are ultimately expressions of a knowledge-network seeking absolute order in the world (Hahn 2007). In the development moment, however, order is codified through intentional strategies of power, revealing the knowledge-network to be equal parts fetishization of technology—the imposition of order on natural resources—and capitalism—the imposition of order upon economic bodies (Harvey 2007, Oya 2007, Scott 1998).

It is logical, then, that Program employees perceive community residents as epistemically irrational as well as economically irrational. I have already recounted how Alphonse and Issaka of Winrock label those who would attribute climate change to God as irrational, and how Gabriel self-edits his personal acts of translation to exclude God during development practice. Similarly, speaking to the economic irrationality of Africans generally, The GIS/Food Security Coordinator complained, “In the [United] States you lower the price to get as many customers as possible...But in Africa, the businessman hangs out and waits for the customer and hits him big.” He argued that the lack of fundamental capitalist behavior expresses itself in the communities where residents don’t understand their own economic capacity to earn, save, and invest in technologies without developmental intervention. Alphonse echoed this sentiment when he mentioned that development does not work unless communities contribute to the project: “The techniques and technologies are only possible through community contributions. They are meant to change behavior and ideas about how development works. It’s the realization of self-empowerment.” From the Program’s position, then, development is more than building the capacity to maintain proper sanitation or improved agricultural techniques. It includes the means for building financial capacity vis-à-vis economic behaviors—a manifestation of a specific form of the will to improve (Li 2007). Thus, cost sharing is intimately tied to the Program employees’ knowledge-network such that financial disciplining is interconnected with the social valuation of particular knowledges.

The contract between the potential potable water pump proprietor and Winrock explicitly states those items for which the pump recipient will be responsible. These items and their estimated costs are listed in table 7.1. In a conversation with Catherine she noted that the cost to the proprietor is actually less than the estimated 123,000cfa (or roughly US\$250) because

Table 7.1: Estimated Expenses of Community Contribution of Potable Water Pump

Pompe-en-corde	57,000f
3 bags of cement	18,750f (6,250f each)
3 carts of gravel ⁷³	22,500f (estimated)
2 carts of sand	
1 iron bar	4,500f
1 piece of iron wire	250f
Manual labor	20,000f
Total	123,000f

households can acquire gravel and sand in the community, and the manual labor is the monetary estimation of what the proprietor ought to personally contribute throughout the installation of the pump. This would mean that proprietors would only need to mobilize 80,500cfa (US\$161).

Contributing to the potable water pump project, however, is no small feat for residents. Moussa and other pump proprietors employed hidden transcripts to complain that Catherine's reduced estimate is inaccurate. Moussa admitted that, personally, he does not have enough money to contribute to the pump project. He and three of the other four pump proprietors relied on extensive social networks to raise sufficient funds. For instance, Moussa asked household heads within his concession—all brothers—to contribute 10,000cfa, and each woman 2,000cfa. Other proprietors, Alabert and Boukari, with the help of the CVD, organized neighborhood meetings and asked for contributions: 2,500cfa from men and 250cfa from women. Saidou, the remaining proprietor, raised the financial resources, he said, through his immediate household.⁷⁴

⁷³ The contract called for *les charrettes (de gravier/sable)*, which is a type of cart that is attached to one or two donkeys and is a ubiquitous household item. The amounts of gravel and sand that one cart can hold is difficult to quantify since it depends on how much weight the donkey can pull and the quality of the cart.

⁷⁴ The diversity of methods in raising the financial resources by proprietors is likely due to the conditions of well ownership and public usage. Saidou lives in a relatively isolated location in Ouegoulega and the rehabilitated well is not widely used by his neighbors, unlike the other proprietors who live in more densely populated areas. Additionally, all wells in Ouegoulega are privately owned by the individual or

All admitted that it took several months to raise the money because even modest sums make an impact on household expenses. Alabert quipped that even 250cfa from the women is a lot to ask: “How many plates of rice is that?” he asked rhetorically. Similarly, Moussa said that one sac of rice costs 20,000cfa and feeds his household for 20 days; meaning that contributing to the project is a significant investment with wider repercussions on household livelihoods.

Moreover, Catherine’s estimate is inaccurate, residents say, because all materials include some expense. Moussa noted that one cannot use just any gravel or sand to mix with the cement. The material must be largely free from impurities but gravel and sand like that cannot be found close to the community. Two of the proprietors admitted that they paid youths in the community to find and transport the material to the pump sites using donkey carts. Moussa complained that even searching for manufactured materials—the cement and iron, for instance—requires gas for one’s moped. Additionally, the well-borehole treatment of chloramine tablets requires a 2,500cfa expense every six months. This expense, along with any on-going maintenance or future reparations, means that once the potable water pump is installed proprietors must continue to invest in it, which may continue to strain household resources.

Therefore, the same economic behaviors practiced by potable water pump proprietors are translated by the two knowledge-networks in very different ways. The knowledge-network of the Program defines community economic behaviors as irrational because they appear to lack basic characteristics of capitalism. The Program does not observe, and therefore presumes the absence of, long-term economic decision-making, calculated investment, profit-oriented goals, and strategic reinvestment even though the economic analysis presented in Chapter Six and

male descendent who had the well dug. Residents explicitly state that wells are for everyone and one cannot deny others its use. In contrast, Phillipe and Issaka of Winrock stated that well ownership in their project sites in Niger is communal, which creates an additional difficulty in motivating individuals to raise financial resources for cost sharing and pump maintenance.

proprietors' fundraising actions reveal otherwise.⁷⁵ Contrarily, the Program also defines the community as a storehouse of untapped economic potential that needs to be disciplined in order to exhibit basic capitalist features, which constructs a hierarchical position for the Program as source of discipline and, thus, development capacity.

Community residents, conversely, act according to the local knowledge-network that translates development in terms of solidarity. Pump proprietors seek financial resources from familial and social networks due to the communal benefits of improved water resources (see Chapter Three). Yet residents' perceived poverty relative to the perceived wealth of the Program defines the Program as the body ultimately responsible for the potable water pump project. This responsibility precipitates hidden transcripts of complaints from Moussa and other potable water pump proprietors about the Program's actions and heft of cost-sharing components. In other words, proprietors begrudgingly accept the conditions of cost-sharing and mobilize limited financial resources in order to adapt to climate change and achieve development through capital accumulation.

Behavior Change, Mimicry and Appropriation

Residents acquiesce to project particulars, including the cost-sharing component, because doing so—from residents' understanding—maintains a potentially long-lasting and beneficial social relationship. To argue against the Program—to make hidden transcripts public—or to disrupt a harmonious relationship is contrary to standard social etiquette. Moussa hinted to this when he

⁷⁵ The Program is largely unaware of how proprietors raised funds to contribute to the potable water pumps. Winrock is adamant that no community money passes through organization hands. Instead, Winrock will put potential proprietors in touch with the private sector whereby economic exchanges happen directly. Phillipe later stated that this is a way for the Program to avoid accusations of stealing money and corruption.

once noted that he often feels as though he is a liaison between Ouegoulega and the Program and behaves subordinately because, as he stated, “I want them to come back.” Residents negotiate the tactics that the Program exhibits and that are available to them, sometimes, very intentionally. I show here, that in order to maintain the relationship with the Program, residents use mimicry even as they appropriate the potable water and garden pumps into the knowledge-network in which Model 1 is embedded. The Program, not recognizing these actions as agentic community tactics, define them instead as evidence of behavior change.

When Moussa and other community residents recite the benefits of the potable water pump—increased household health and reduced injured children—they are mimicking the salient objectives of the pump from Program employees. Moussa is acquiescing to Program ideals and terms of success by mimicking at least some of the technoscientific knowledge that the Program holds. Homi Bhabha’s (2000) notion of mimicry is valuable here because he defines it as fundamentally opportunistic. Some postcolonial scholars have shown how certain instances of mimicry—the appropriation of dress or language, for instance—can be seen as an attempt of the colonized to appropriate some of the power of the colonizer (Ferguson 2006). While this may be the case for some forms of mimicry, I am cautious of uncritically following this conclusion in this case, for it potentially denies agency to those who mimic and delegitimizes the decision to mimic (Furumoto 2000, Piot 1999). I follow those who have analyzed other forms of mimicry as forms of resistance and subversion (Stoller 1995).

I take mimicry in this context to be a tactic of empowerment. When asked by Program employees, many residents state that the potable water pump is for consumption while the garden pump is for non-consumption but actions often contradict these statements. More importantly, those who acted otherwise never did so in front of Program employees. Whether a short,

informal visit from Catherine or a longer, official visit from the Regional Director and visiting officials—residents neither drank from the garden pump nor used the potable water pump for non-consumptive purposes.⁷⁶ Such hidden behaviors can be seen as hidden transcripts, but the mimicry of technoscientific knowledge is a public transcript that maintains the relationship with the Program. Hidden behaviors and mimicry, combined as they are, are strategies for the community to facilitate the transfer of the technologies of development that residents ultimately appropriate within the local knowledge-network. The community does not seek to acquire the technoscientific knowledge of sanitation and hygiene, much less of “rational” economic behavior. Rather, Tanghin-Dassouri residents desire the technologies to achieve development—specifically, the technologies for efficient and reliable groundwater access that can be used to intensify gardening and create an economic buffer against environmental risk.

Evidence suggests that appropriation is a common tactic employed by community residents. I have shown in Chapter Five that the knowledge-network in which Model 1 is embedded has been resistant to change from contact with external development knowledge that has, historically, been inconsistent. At the same time, the more salient technoscientific knowledge related to deforestation and reduced rainfall has been appropriated within the knowledge-network. It becomes clear here that appropriation includes a process of translation in that some information is given new meaning within a larger knowledge-network. In similar fashion, residents do not wholly accept the technoscientific knowledge of sanitation and the implicit division between types of groundwater sources presented to them by the Program through informal conversations during pump installations. Instead, residents mimic the more

⁷⁶ The Winrock field agent who, like Catherine, is stationed among several project communities around Koudougou noted that he has observed residents using the potable water pump for non-consumptive purposes and the garden pump for consumption. This suggests that the residents in Didi’s project sites are less concerned with hiding their behaviors and performing the ideal development recipient. It also suggests that these community residents are enacting appropriation, a strategy of power I discuss shortly.

salient technoscientific knowledge only when asked directly why potable water is important even as they appropriate the technology of the pump, translating it according to the logics of the local knowledge-network.⁷⁷ The combination of mimicry and appropriation are essential components to dumb luck development.

In contrast to the potable water pump, residents used mimicry less often during the demonstration garden pump installation. As stated above, the goals of the garden project are to increase food security, increase income, and promote adaptation to climate change. Importantly, the limitation the Program places on the garden pump (that it is only for non-consumptive use) is already very similar to Model 1 translation of groundwater (i.e. groundwater is recharged by rainfall but not dependent on it for sustainability, and that groundwater may even be divine insurance against catastrophic rainfall changes). While residents do not see horticulture as a means for directly increasing food security, the garden pump is nonetheless translated by both Program and community as a means to increase garden production and increase income or capital accumulation. This increases one's capacity to adapt to climate change thereby indirectly increasing food security. Indeed, the relative popularity of the garden pump vis-à-vis the perceived expense of the potable water pump, suggests that there is a less intensive process of translation and appropriation involved. Significantly, Catherine noted that during the demonstration garden pump installation, community members approached her asking to be included in future phases of project up-scaling.

Clear from the examples of tactics employed by Program employees and communities is that each negotiate the terrain of the development moment in order to achieve particular goals. In

⁷⁷ A thorough investigation of residents' cultural models of sanitation and hygiene, and their interconnection with the wider knowledge-network is beyond the scope of this study. However, this analysis necessarily includes the possibility that the local knowledge-network may eventually incorporate much of this technoscientific knowledge of sanitation, hygiene, and water purification, and that that information may be translated and appropriated in unique and novel ways.

the examples given above, the knowledge-networks in which Model 1 and Model 2 are embedded facilitate certain actions. In general, the Program's valuation of technoscience facilitates a hierarchical positioning relative to the community. Community subordination is facilitated and constrained by the translation of development as a capacity-responsibility construct, as well as the social valuation of specialized knowledge, generally. Thus, community residents are doubly subordinated. The knowledge-network of Model 2 facilitates the legitimacy of cost-sharing component inclusion within project design and limits a definition of development of proper economic and natural resource management behaviors, even as community residents employ hidden transcripts to denaturalize the effects of cost-sharing and other tactics. Finally, residents are constrained to mimic Program epistemics but are facilitated to appropriate projects within Model 1 knowledge-network, translating certain program components within new systems of meaning.

In short, epistemics facilitate and constrain certain behaviors. Indeed, community residents employ hidden transcripts precisely because they are not afforded the social space to engage the Program collaboratively. I argued in Chapter Six, that we must think of action in the development context as constrained not only by the institutional and financial structures but also by the epistemic structures of how development is defined. I argue here that epistemic constraints occur on both sides of the development divide, among Program employees and community residents. The following section illustrates this argument through the implementation of Conservation Farming.

FURTHER MISTRANSLATIONS

Perhaps the best support for the case of dumb luck development is what happens when a project encounters difficulties—when the knowledge-networks misalign. Through the vignette recounted in Chapter Five of Gabriel’s climate change presentation to the Conservation Farming (CF) volunteers, I argued that the encounter provided an important opportunity for the knowledge-network in which Model 1 is embedded to engage with the knowledge-network in which Model 2 is embedded. However, the technoscience of the Model 2 knowledge-network influenced Gabriel to present more technoscientific detail, rather than less detail or modified detail, in order to convey to the audience the seriousness of climate change. Gabriel mistranslated the knowledge-network of Model 1 and, as a result, the audience mistranslated Model 2 knowledge.

During the initial implementation of the CF project, the two knowledge-networks continued to mistranslate one another. These mistranslations are important because they more restrictively limit the range of actions available to both Program and community. CF is a constellation of agricultural techniques developed in and transported from USAID operations in Senegal that are explicitly designed to increase soil fertility and improve crop yields. CF is a project designed to increase households’ capacities to adapt to climate change. While Model 2 of climate change and the resultant technoscientific projections are enough for Program employees to apprehend the importance of CF, residents were cautious about adopting the new practices. I argue that the difficulties encountered during the initial implementation of CF are due to the mistranslation of improved agricultural techniques by both knowledge-networks. I also argue that during CF implementation, community participants have reduced opportunities to assert their own positions via tactics and are thus unable to negotiate the meaning of the project.

Mistranslating Farming: Conservation Farming, Climate Change, and Fertilizer

CF is USAID WA-WASH's only project specifically and explicitly designed to mitigate the effects of continued climate change through improved agricultural techniques. This project began with a community introduction in late January 2013, included a weeklong formation of local volunteer agriculturalists in February, and agriculturalists' practice of the techniques during the rainy season. Program staff understand CF as the appropriate technologies and knowledge to improve the fertility of one's farm and increase crop production. It includes reduced soil tilling, composting, micro-dosing manure and fertilizer, and improving seed strains at specified times throughout the year. It is billed as "climate-smart agriculture" and is one of the few projects meant to directly increase communities' capacity to adapt to continued climate change.

Community participants, however, define CF not as a means for adapting to climate change, but as a social relationship wherein the Program has the responsibility to facilitate the acquisition of chemical fertilizer.

Winrock staff, though aware of seasonal fluctuations in temperatures and the corresponding fluctuations in work, considered these things inconsequential to the importance of the project. Catherine and Alphonse informed Ouegoulega residents of the intent to implement CF through a meeting with the CVD and gathered twenty interested agriculturalists—all male—to form the "lead" group that would test the techniques. They began preparing fields in March—as opposed to waiting until the initial light rains of the rainy season) in order to, as Catherine put it, "win time" (*gagner le temps*), but there are two problems with this. First, March marks the beginning of the period of the dry season known simply as The Heat (*Le Chaleur*) when temperatures are consistently above 40°C, or 104°F, by mid-morning. During this time the majority of labor in farms and gardens is significantly reduced as the ground becomes drier,

harder, and less workable. When the lead farmers met one March morning to learn how to measure a 0.25-hectare test field (figure 7.4), the temperature already exceeded 37°C and several of the elder men complained that it was too hot to be working so hard.

Figure 7.4: Ouégoulega Lead Farmers Measuring a 0.25 Hectare Test Field. Catherine, Winrock Mobilizer in green; John, lead farmer representative to Winrock kneeling in foreground.



Second, because Mossi identify as agriculturalists and because of the relative expense, many households do not keep draft animals to plow fields. However, CF protocol called for individuals to plow half of their 0.25-hectare test fields by hand (using the daba) and the other half by animal-drawn plow. Catherine recognized that many households do not have the animals much less a plow to prepare their fields; one objective of the lead farmer group, she later said, is to promote solidarity so that individuals can share their resources. This did not transpire,

however. While Catherine hoped that all test field preparations would be completed by the end of April (in time for the worst of The Heat in May), many lead farmers had not done so. Intra-group jealousies and animosities came to the fore as some group members refused to lend animals and plows to others. One group of Ouegoulega residents with whom I spoke speculated that perhaps some individuals in the group are not trustworthy or are not diligent in their work. One individual thought there might be a problem with the land and who has a right to work it. By the end of April only three of the twenty lead group members had prepared their fields, to Catherine's consternation.

As mentioned above, CF is USAID WA-WASH's primary project for directly addressing residents' capacity to adapt to climate change. The argument is that through improved agricultural techniques households will increase yields, increase household food security, and reduce the need to spend limited financial resources purchasing supplemental food. CF is built on the "earth system" dynamic of Model 2, in that human actions are capable of augmenting the long-term fertility of the soil through sustainable and natural means (i.e. animal manure rather than chemical fertilizers). The techniques to increase yields are posited as being exponentially ameliorative in that, for example, increased soil fertility is an on-going process that is capable of mitigating the projected effects of climate change. Lead group farmers, however, had a different view of the project.

Conversations with two of the elder members of the group revealed significant differences in motivation to CF objectives from Program employees. Lead group farmers when asked directly about the benefits of the project stated that the project improved soil fertility through the application of chemical fertilizer. Reduced soil fertility is a significant observation of climate change within Tanghin-Dassouri (see table 3.1, page 95, Chapter Three) and increased

access to chemical fertilizer is often seen as a valuable avenue for community development (see pages 200–202, Chapter Six). Lead farmers’ participation in CF is framed through Model 1 knowledge-network that prioritizes horticultural production over agricultural production. When asked, lead farmers never mentioned food security or increased yields—even as a direct result of chemical fertilizer application—as motivating factors for participating in the project. The single motivating factor is increased access to chemical fertilizer. One can read the demand for increased access to chemical fertilizer as a condition of Model 1 in that one wouldn’t buy chemical fertilizer only for one’s farm, but also for gardening. Additionally, increased access would benefit more than those farmers engaged in the CF project, but all horticulturalists.

The cultural import of chemical fertilizer is not inconsequential, for it is in lockstep with residents’ definition of development. The importance of increased access to chemical fertilizer is not limited to application in the family farm. Chemical fertilizer is a transferable product, meaning that it can also be applied to individuals’ gardens. In this light, lead farmers’ complaints for increased access to chemical fertilizer are communally constructed such that subsidized or reduced prices at local shops would potentially benefit more community members than just those directly engaged in the CF project. Moreover, lead farmers recognize the relative wealth of the Program and the conterminous capacity to establish economic relationships with local businesses. The capacity to build economic relationships and facilitate access to chemical fertilizer quickly leads to the conclusion that the Program *ought* to follow through with this. In this definition the Program has the responsibility to increase farmers’ access to chemical fertilizer, which would have far-reaching communal benefits.

The difference between residents’ motivation for joining the project and Program employees’ explicit goals was a source of minor confusion between the two groups. In many

conversations at the start of CF operations lead farmers stated that the project would bring chemical fertilizer into the community. When I asked Alphonse directly, he stated that the Program would not purchase or subsidize chemical fertilizer for farmers. The objective, he specified, is to wean farmers from the use of chemical fertilizers entirely through the application of animal manure and soil-working techniques to increase soil fertility. Chemical fertilizer may be applied initially, Alphonse added, only because soil fertility is so poor. Later, when it became apparent to lead farmers that they would not receive chemical fertilizer as part of their participation in the project, many privately suggested that I ask Winrock to at least subsidize the cost. Matthias, one of the lead farmers, suggested that with the financial resources at Winrock's disposal a deal could be worked out with a local merchant to sell fertilizer at a reduced price. He later stated that the interactions with Winrock are "difficult [because] the lack of money blocks many processes. The work requires money. There is no money." Here, Matthias is suggesting that it is unfair for Winrock to suggest the use of chemical fertilizer (at least at the beginning of the project) when lead farmers are unable to cover that cost.

Therefore, the obstacles and confusion produced during the initiation of the CF project reveal an important point about the engagement of knowledge-networks. The CF project does not seem to be an example of dumb luck development because a social space was not available for community residents to negotiate for their own translation of CF. Model 1 knowledge-network translates CF as a means for increasing community access to chemical fertilizer and not for increased food security. The knowledge-network of Model 2 translates CF as a sustainable technoscientific means for climate change adaptation without financial or chemical inputs. Due to the social valuation of specialized knowledge—from both Program and community positions—a hierarchical relationship between Program and community is constructed,

constraining the range of tactics available to community residents. Only hidden transcripts seem to be employed by community residents, although many did try to use their relationship with me to circumvent the epistemic threshold of the Program. The institutional constraints of the cooperative agreement as well as the epistemic constraints of Program employees ultimately blocked the appropriateness of including chemical fertilizer subsidies as a project component. Each of these constraints resulted in a lack-luster response by community residents toward CF.⁷⁸

CONCLUSION

This chapter has addressed the third research question that asks how knowledges of climate change and development influence action in the development moment. I have argued that within the development moment both Program employees and community residents employ certain tactics in order to act upon each other and within their respective communities. Instead of recounting the various power dynamics involved in the development moment—a topic that has been addressed since the earliest critiques of capitalism and development—I have shown that the underlying knowledge-networks should be seen as strong influencing dimensions to individuals' and groups' interactions with each other and the material world.

The knowledge-networks of Model 1 and Model 2 influence how Program employees and community residents translate and understand the development moment. Model 1 of climate

⁷⁸ As was to be expected, many Ouegoulega residents stated that they thought the project was a good idea because any external intervention in the community is translated as a benefit. However, shoring support and volunteers for the project proved to be an uphill struggle for Winrock. Many people I spoke with said that while improved agricultural yields are a good thing, they will wait and see what happens with the project.

In a recent phone conversation with Amadou of Tama I learned that the Program had begun implementing CF there as well. When asked about the community's response, Amadou unsurprisingly recounted that the president of the CVD had become the initial point of contact and representative farmer for the Program, and many people were waiting to see what happens with it to decide if they will also attempt the new techniques.

change precipitates definitions of development and climate change adaptation through augmenting local economic realities through increased groundwater access, translating the Program's potable water and garden pump projects thusly. Conversely, the technoscience of USAID WA-WASH's definitions of climate change leads to technoscientific definitions of development and technological solutions to climate change. Even as both knowledge-networks act to translate one another to varying degrees, the underlying social valuation of technoscientific knowledge for development agents, ultimately mistranslates the local knowledge-network, establishing a hierarchical relationship between Program and community.

While the knowledges of climate change do not directly engage one another, I have argued in this chapter that the knowledge-networks in which Model 1 and Model 2 are embedded facilitate and constrain the range of possible actions, or tactics, within the development moment. Because climate change is defined technoscientifically and development is seen as the insertion of appropriate technologies and technoscientific knowledge, projects are meant to change behaviors towards technoscientific ideals rather than delivering needed services such as sanitation and sustainable agriculture.

The results of this logic are specific tactics that are conterminous with the knowledge-network. The Program employs tactics that are meant to soften challenges to local cultural gender structures, but which women understand as a process of marginalization from the development moment. More subtly, the Program enforces the social hierarchies implicit in specialized development knowledge. First, Program employees replicate the hierarchical social structure through which each learned the specialized knowledge of technoscientific development. Employees position themselves as epistemic thresholds of development knowledge with the community. Second, this hierarchical structure also conforms to local functions of specialized

knowledge and the inability of those outside of a perceived epistemic community to actively seek out and demand admittance to it. In project implementation, the Program uses cost-sharing, or community contributions, in order to financially discipline residents to accept a new philosophy of development and recognize their own economic capacity. These tactics, influenced by the fetishization of technoscience, create a hierarchical relationship between Program and community even as Program employees expressly desire a collaborative relationship.

The residents of Ouegoulega, likewise, employ tactics that contest and negotiate the Program's strategies. Community residents employ hidden transcripts to subvert the Program's methodologies. Similar to Bourdieu's (1994: 160) observation that social subordinates' best tactic for neutralizing the power effects of a hierarchical structure lies in submitting to those tactics, residents acquiesce to the cost-sharing component in order to maintain a beneficial relationship with the Program. The value of this relationship is understood through the logic of wealth-capacity-responsibility and both pump projects, moreover, are valued as means for adapting to climate change through economic production. Residents, however, do not completely submit and employ mimicry in order to maintain the beneficial relationship with the Program, appearing to accept some technoscientific knowledge even though behaviors suggest otherwise. Mimicry leads to appropriation whereby residents explicitly state conformity to technoscientific project goals, yet translate the project according to the knowledge-network of Model 1.

The result is what I call dumb luck development. In this view development is neither a success nor a failure, but a process of subtle negotiation. Both parties get, more or less, what they desire. Community residents translate both pumps as means for adapting to climate change, accumulated capital, and facilitating the attainment of individual development. Program employees translate the potable water and garden pumps as the appropriate technologies inserted

to change behavior and begin the catalysis of development via sanitation and household food security, respectively. The Program counts the potable water pump project as a success because community residents seem to accept the technoscience of sanitation. Likewise, the popularity of the garden pump seems to suggest that residents are eager to increase their household food security, but hidden transcripts and mimicry conceal how residents have ultimately appropriated both pump projects as means for increasing economic horticultural production and thus the capacity to adapt to climate change. This translation of the garden pump is closer to the Program's translation, but the potable water pump has been significantly redefined.

This chapter is firmly situated within the new ethnographies of development and adds to the literature. This scholarship has shown how development workers' good intentions are nonetheless constrained by the institution and finances of development. This chapter has reviewed that epistemics should also be seen as a limit on the range of possible actions available to development workers. Additionally, I counterpoised Program employees with community residents to, likewise, reveal that residents are epistemically constrained. Moreover, epistemic constraints are crosscut by social positionality, such that individual community members negotiate their position vis-à-vis the Program and the rest of the community through knowledge. I recounted how certain community members seek to position themselves as epistemic thresholds of specialized development knowledge. This complicates the communal relation created through hidden transcripts by positioning the individuals hierarchically to the rest of the community. These same individuals are still, however, subordinated to the Program, for their position within the community is ultimately dependent on the mobilization of specialized development knowledge that must come from the Program. Ouegoulega residents are individually and socially

navigating an ever-shifting tapestry of power relations not only internal to the community but also with outside groups.

The illustration of the CF project more fully details this argument. While the respective knowledge-networks of residents and Program employees permits a greater range of possible actions, and thus negotiations, within the implementation of potable water and garden pump projects, the translations of CF are more limited. Program employees translate CF as only a means for increasing agricultural sustainability through cost-effective practices, conforming to Model 2 and the “earth system.” Community residents translate CF as only a means for potentially increasing residents’ access to chemical fertilizers that might be applied to both farm and garden, conforming to Model 1 emphasis on horticultural production. Program employees are not willing to negotiate chemical fertilizer and residents are not in socially structured positions to engage the Program in this manner. As a result, the community approaches CF with some hesitation and Program employees become somewhat frustrated with community responses. In other words, the respective knowledge-networks establish only a narrow social space in which both parties can negotiate their translations—their truth-values—of CF objectives.

This is not to argue that the ranges of actions or tactics available to both Program and community are symmetric, but it does illustrate that the structuration of hierarchy is concomitant with community. Tannen (2003), following the classical anthropologists, importantly reminds us that power and solidarity exist as a dynamic paradox. Superior-subordinate relationships predicate a mutual dependence since the superior is only superior in relation to the subordinate and vice versa. If we couple this with the observation that tactics—whether through verbal or non-verbal communication—are social tools (Duranti 1997) then the social labor attempted by either the superior or the subordinate can only be conceivably accomplished because of the role

the other occupiers. Scholars such as David Mosse (see also West 2006, Mosse, Farrington, and Rew 1998), then, are correct to argue that development is a process of continuous negotiation—negotiation with others, between groups, with institutional structures, and, as I have shown, epistemic structures. This conclusion, as with the conclusion of Chapter Six, extends the literatures of development in West Africa that have examined agricultural and hydraulic projects from largely political economic and political ecological perspectives, emphasizing the top-down constraints of development intervention.

Development is also a process of creation and a shifting space of conflict and resolution, which precipitate new forms of social relations and structures that are ultimately founded in knowledge and meaning. If culture is seen in large part as a mental or epistemic phenomenon (Lévi-Strauss 1966) that is continuously renegotiated through cultural practices (Bourdieu 1994), then moments of renegotiation are bound to be rife with overt and covert tactics and strategies. Like the knowledges of Model 1 and Model 2 in which they are based, the tactics may remain unarticulated by those who practice them. Moussa expressly recognizes his role as a liaison between community and Program, maintaining a beneficial relationship despite moments of mistranslation. In contrast, Program employees both recognize the power in financial disciplining but remain unaware of subtler forms of difference, such as the creation of epistemic thresholds that bottleneck information from the Program to the community. Nonetheless, the ranges of actions available to each group through their knowledge-networks allow for the negotiation of the development moment such that each receives—more or less—what they desire. Dumb luck development, then, is potentially an illustration of a new, emergent social structure.

CHAPTER EIGHT

RECAPITULATIONS, APPLICATIONS, AND PROJECTIONS

Excerpt from my field notebook, 21 June 2013

I'm presenting preliminary data and conclusions to a large audience at the US Embassy. The audience is composed of local university students and professors, American and Burkinabè US Embassy employees, and staff from USAID and USAID WA-WASH, including the Regional Director and the new USAID Burkina Faso director. I cover the two cultural models of the environment and climate change and note how the audience reacts. Some of the older members of the audience—perhaps they are embassy employees—smile and chuckle when I recount the characteristics of Model 1. More than a few youths click in agreement.

I also present preliminary analysis from the attributes of development survey that was administered to Ouagoulega residents and Program employees. The data is still very rough and I can only provide generalizations, but the data is clear that community residents and development agents have very different conceptualizations of development and, more importantly, who has the capacity and responsibility to implement projects. I note that development agents see themselves as having the capacity—the financial resources and the know-how—to design and implement projects in rural communities. A few older audience members nod their heads in agreement. I note that community residents see themselves as having very little capacity and very little responsibility, but that the Burkinabè government and development organizations have

both the capacity and responsibility. I think I hear someone quietly suck his or her teeth in disapproval.

I don't provide any overarching conclusions or outline steps for how this information might be applied to development. I haven't fully thought through what the preliminary results mean for development operations, much less how they might be applied to development. The only thing I can say for certain at this point is that there is a wide and significant epistemic divide between community residents and development agents. This is the point I try to reiterate throughout the presentation.

Afterward, the floor is opened for questions from the audience. One youth stands and thanks me for the presentation, saying that it was very informative, and that he's noticed something similar in the way his parents "in the village" think about climate change and what he now "knows to be true." An older Burkinabè gentleman stands. I recognize him from the embassy. I sometimes pass him in the halls of the Department of State section but I don't know if he's directly associated with USAID or not. He, too, thanks me for the presentation and asks how this might be applied to development. "You show that the community does not think that they have responsibility. How can we change this? How do we get them to recognize that development is their responsibility, too?"

I'm not sure how to respond. I quietly chastise myself for not having thought of a response to what is an inevitable question from this audience. Instead, I can only explain that the analyses are still preliminary and that I hope to be able to make recommendations to USAID WA-WASH by the end of the fieldwork period. I reiterate that I'm an anthropologist and note that we're often distinctly uncomfortable with changing culture to suit an agenda. To compensate, I fumble through an explanation of cultural relativism, finding it surprising that I've never had to

explain it in French before. Through this I recognize that I'm losing the audience; people are shifting in their seats. The audience wants recommendations. They want applications.

INTRODUCTION

While I wasn't necessarily prepared to provide the audience of the presentation recounted in the opening vignette with recommendations on how to improve development, that is, nonetheless, a subsidiary goal of this study. To situate research at the intersection of climate change and development is to necessarily situate research between two significant global issues. Moreover, by situating myself in the space of the development divide—between organization and community—is to be situated in a privileged position to offer insight into the development process and to offer recommendations for improving cross-cultural collaboration—to potentially contribute to the merger of critique and application that have long been divided within the discipline of anthropology (Ferguson 1997).

This chapter recapitulates the main arguments of the study, while also offering a summary of the recommendations given to the development community. The first section, "Recapitulation," reviews the arguments from previous chapters. I do not summarize the entire discussions; rather I aim to more clearly and explicitly interconnect the findings of the previous chapters into a coherent whole. In this section I braid together the findings in order to articulate the theoretical and ethnographic ground from which the recommendations are informed. The second section, "Applications," follows this through by explicating the methodology I developed and delivered to USAID WA-WASH to help improve their cross-cultural collaboration and potentially project success. By way of conclusion, I argue that the theoretical perspective of this study provides a fruitful avenue for shifting the emphasis of cross-cultural collaboration.

RECAPITULATION

There are three primary research questions that oriented this study. First, what are the cultural models of the environment and climate change held by USAID WA-WASH employees and Tanghin-Dassouri residents, and how are they similar or different? Second, in what ways are the knowledges of the environment and climate change interconnected with one another, and with definitions of and ideals for development? Third, how do these knowledges—of the environment, of climate change, of development—influence interpersonal and intergroup actions in the development moment—in the context of implementing a project? I recapitulate the conclusions to each of the research questions in turn, making parenthetical references to specific chapters where appropriate.

Knowledges of the Environment and Climate Change, Similarities and Differences

The first research question was answered using CMA, which allowed me to uncover two primary models of the environment and climate change in operation in Burkina Faso (Chapter Four). Model 1, held by Tama and Ouegoulega residents, states that climate change—specifically reduced rainfall—is a divine punishment for errant social and environmental behaviors by people around the world. War, terrorism, rape, deforestation, and pollution are against the teachings of tradition and religion, forcing God to alter the rain so that people around the world change their ways. Model 2, held by USAID WA-WASH staff and lycée students in Tama and Ouegoulega, states that climate change is due to increasing temperatures, which are caused by increasing greenhouse gas emissions through deforestation and large industry. The counterpoising of community residents’ and development workers’ knowledges is an important contribution to the

scholarship of ecological anthropology and STS (Chapter Two). Moreover, by placing climatic observations within wider understandings of how the environment functions, this analysis added to the relative dearth of environmental knowledge and climate change scholarship in Burkina Faso.

Each model is perpetuated through distinct social structures of acquisition (Chapter Five). For instance, Model 1, considered by community residents to be a form of common sense (Chapter Four), is acquired through a single epistemic threshold—based on age hierarchy (Chapter Three, Chapter Five)—establishing a widespread epistemic community. The structure of acquisition of Model 2, however, is characterized by hierarchically ordered epistemic thresholds, creating nested, specialized epistemic communities with development workers inhabiting the upper levels. This extends Haas’s original definition of an epistemic community, as well as more recent iterations, which emphasize the underlying Western episteme (Chapter Two). The conclusions of this research question call for an inclusion of broadly defined political actions that aim to further the truth-value of the mobilizing knowledge. The broad political aims of the Model 1 and Model 2 in this case are the corresponding definitions of development (Chapter Six), and the tactics that enact the knowledges (Chapter Seven).

Interconnections between Knowledge-Networks and with Development

The above dichotomy of Model 1 and Model 2 is a consequence of CMA, which necessitated the second question exploring the socio-historical interconnections. I employed the term “knowledge-network” to move beyond hybridity while recognizing an internal structure to knowledge and its continuous expansion into the world through exposure to new information, experiences, and objects (Chapter Five). Through socio-historical interconnections, the

knowledge-networks in which the models are embedded have translated and continue to translate one another, revealing that they are not ontologically distinct or epistemically opposed. Similar to the social consequences of education during French colonization (Chapter Three), contemporary students in public education are exposed to and begin to appropriate Model 2. But they do so through Model 1 such that there is a clear inverse correlation between length of public education and a personal synthesis of Model 1 and Model 2 (Chapter Five). This trend continues through advanced education, with contemporary USAID WA-WASH employees holding to a strict technoscientific interpretation of the world while engaged in the labor of development even if they personally translate Model 1 through Model 2.

Likewise, Model 1 is continuously exposed to and translates Model 2. Through colonial and national laws that fetishize the role of trees and a technoscientific view of the environment, government offices and foreign development organizations conduct sensibilisations (Chapter Five). Communities, like Tama and Ouegoulega, have been given packets of technoscientific information since the early 1900s. Rather than altering Model 1 to be more technoscientific, community residents have appropriated some information, such as the fetishization of trees in the environment, within the existing knowledge-network. Thus, destructive environmental behaviors like deforestation do not directly affect the functioning of the environment, but anger God who alters natural processes as punishment (Chapter Four).

Through a socio-historical lens, the boundaries between the two knowledge-networks become blurred and are correctly seen as interconnected with one another (Chapter Five). The context of development, however, analytically separates the two knowledge-networks (Chapter Six). The work of purification that those who hold to Model 2 enact through the labor of development precipitates particular constructions of what development is and ought to be. Those

who hold to Model 2 understand development to be a matter of capacity building, which is a catalytic process that is initiated through the insertion of appropriate technologies and appropriate knowledge (Chapter Six). These “ingredients” are defined technoscientifically such that climate change—also understood technoscientifically (Chapter Four)—necessarily has technoscientific solutions. In contrast, those who hold to Model 1 define development as a matter of capital accumulation (Chapter Six). With the uncertainty of reduced rainfall and the unknowability of God’s will (Chapter Four), Tama and Ouegoulega residents desire to increase the economic buffer between themselves and environmental variability through the augmentation of horticultural production. Doing so, however, is dependent on one’s access to groundwater resources. This adds to the literature on the development of West Africa (Chapter Two) by placing development within a wider epistemic framework that leads to a micro-level investigation of power dynamics during project implementation (Chapter Seven).

How Knowledges of Climate Change and Development Influence Action During the Development Moment

These definitions of development, and indirectly the models of the environment and climate change, come into tension during the implementation of the potable water pump, garden pump, and CF projects (Chapter Seven). Not only do residents prefer the installation of potable water and garden pumps in order to increase their economic production, but also residents are uncertain about the viability of CF because it does not immediately offer a buffer against climate variability. Moreover, there is tension between residents and Program staff because staff desire to see more initiative and responsibility from residents because it is *their* development, *their* capacity. In contrast, residents see organizations (as well as the government) as ultimately

responsible for development initiatives because these groups are defined as having the financial capacity (Chapter Six).

Understanding the linkages between climate change and development knowledges are part of a larger contribution to the new ethnographies of development that have explored how development workers are ultimately constrained by institutional and financial apparatuses. This research extends this observation by showing how knowledge, too, can function as a constraint on some actions while facilitating others within the development moment (Chapter Seven).

USAID WA-WASH employees exhibit the marginalization of women, financial disciplining, and the general assertion of their hierarchical positionality in order to guide community residents to accept the various projects as they are designed. This observation builds on discursive and post-structuralist analyses of science (Chapter Two). Residents, on the other hand, employ hidden transcripts and mimicry to acquiesce to certain project particulars while challenging others (Chapter Seven). Additionally, residents use appropriation similar to the historical evidence of Model 1 translating Model 2 (Chapter Five): to incorporate external elements into the existing knowledge-network rather than fundamentally changing the nature of the knowledge-network.

The result is that the social structures of acquisition and range of available tactics contribute to the overall social space in which community residents and Program employees negotiate for their particular truth-value (Chapter Seven). The consequence of two knowledge-networks meeting during the implementation of the potable water pump and garden pump projects is dumb luck development. In short, rather than changing the knowledge-network of Model 1 to resemble the technoscience that the Program believes is inherent in the technology of the pump projects (Chapter Six), the knowledge-network of Model 1 translates both pumps as means for capital accumulation as a buffer against climate uncertainty (Chapter Four, Chapter

Six, and Chapter Seven). Conversely, the meeting of the knowledge-networks in the CF project results in a significantly reduced space for negotiation: whereas residents initially translate CF as a potential means for acquiring chemical fertilizer (Chapter Seven) that can be used to increase both horticultural and agricultural production (Chapter Four), Program employees strictly refuse fertilizer gifts or subsidies (Chapter Seven) in order to avoid development dependency (Chapter Three, Chapter Six). Such tactics are influenced by the content of the knowledges that mobilize action as well as the social structure by which individuals acquire and gain entrance into the respective epistemic community.

The data that have contributed to the answers of the three research questions have precipitated a final theoretical argument. I have shown throughout this study that knowledges are best viewed as networks—as assemblages of epistemic and material objects, values, and meanings—consisting of nodes of information linked together into structures that permit one to understand, interpret, and explain oneself and the world. The network as analytic for understanding knowledge is valuable because it suggests that what one knows is not random or disparate and unrelated packets of information. Rather, information is brought into the knowledge-network as long as there are nodes—other information—that are able to translate it as reasonable or logical. As with Model 1 appropriating technoscientific information (Chapter Five) as well as the two pump projects (Chapter Seven), but on its own terms, the knowledge-network translates and adapts new information, experiences, and objects into a logical whole. This is not to say that the knowledges to which one holds are always without contradiction. As Gabriel and Constance demonstration, one is capable of holding seemingly contradictory information (Chapter Five), but it is likely that such information is interconnected through complex networks of intermediary information, sensations, and experiences. The network as analytic is also

valuable for interconnecting the epistemic with the social as I have shown that knowledge-networks are grounded in social structures as individuals with specific social and epistemic positionalities engage with one another (Chapter Five, Chapter Six, Chapter Seven); for to engage with others is to negotiate knowledge and, thus, power. Understanding knowledge as a network, finally, provides a potential application for this research, for a disagreement over a piece of information is likely a disagreement about how such information is connected within larger knowledge-networks.

Contributions to the Literatures

This study has necessarily engaged a wide range of literatures that are explicated in more detail in Chapter Two. From the anthropological literature on West Africa, as well as on Burkina Faso and the Mossi in particular, to ecological anthropology and STS, and critiques of international development, this study has attempted to address and add to the scholarship in each of these areas. Here I provide a short summary of how this study has contributed to these scholarships.

First, being situated within West Africa, I outlined the research orientations adopted by the Francophone and Anglophone schools, as well as the few who have examined Burkina Faso and the Mossi in particular. I revealed how the French have maintained a strong symbolic orientation with an emphasis on the formation of social solidarity. The British and Americans, however, have turned increasingly towards political economy and the establishment of social stratification and hierarchy. I have not taken these schools as antithetical but have used their combination as a fruitful theoretical base from which to orient this study. Specifically, I have shown that symbolic or abstract thought—such as the processes of climate change—can be a mediating structure through which one apprehends the world. I have also shown that such

knowledges can be used by individuals uniquely to promote social solidarity and/or social stratification. More generally, this study has contributed to the relatively small body of literature—that has taken more political economic approaches—on Burkina Faso and the Mossi.

To explore this position in relation to knowledges of climate change, I covered the literatures of ecological anthropology and STS. While science has become the way the international community has come to know climate change, ecological anthropologists have shown how diverse communities perceive and respond to changes in culturally contingent ways. The main threads within ecological anthropology to have explored these perceptions are symbolic ecology and political ecology. I have wed these approaches in this study by taking from symbolic ecology the importance of knowledge being a symbolic reflection of social life (and not only as mediating agent), and from political ecology that knowledge is never non-neutral and can be highly political. This dovetails with the literature in STS that has explored the political dimensions of knowledge production and dissemination. Joining those scholars who have productively employed the image of the network to imply situatedness, structure, as well as change, I have shown that knowledge is productively theorized as a network. This position helps work through the literature on “experts” and epistemic communities, the latter definition of which I have reworked in this study to include non-Western groups. More importantly, this study has shown that the way epistemic communities use knowledge is contingent upon complex social structures. One does not freely use knowledge; rather knowledge is the production of agency and larger social structures one navigates with improvisation.

Finally, I surveyed the social science critiques of international development. In particular, I situated this study within the new ethnographies of development that have fractured development as monolithic and unidirectional, revealing it to be an emergent process of actors

navigating complex institutional and financial constraints. This study has added to this literature by showing that not only are development agents and community members constrained by the institutional organization (including the historical and political economic components that construct it as such), but that their respective knowledges also function similarly. I have shown that a particular community's knowledge-network facilitates some actions while constraining others. Development practice, in this view, is a subtle negotiation between truth-values that may or may not lead to apparent project success (the alignment of multiple truth-values, or "dumb luck development").

So what?

In addition to the three research questions that oriented data collection, there is a fourth, but nonetheless important, question regarding the applications of this research. Given the data and analyses of different models of climate change, interconnected with definitions of development, and used to assert, resist, or negotiate specific power dynamics in the development moment, how might one facilitate cross-cultural collaboration for climate change adaptation? Since formal education is, in many ways, a process of acculturation (Chapter Three, Chapter Four, and Chapter Five), groups that engage one another with dramatically different educational backgrounds are necessarily speaking across cultures. This is made all too apparent in the lack of collaborative dialogue between West African Program employees and Burkinabè community residents. How might this research aid in the development of a method for working with or even circumventing the social effects of the structures of acquisition and the resultant tactics within the development moment?

APPLICATIONS

What struck me about the gentleman recounted in the opening vignette is not so much that he wanted applications—finding ways my research might aid development operations was always a subsidiary goal. What struck me was that he asked for a specific type of recommendation that I was not, and am still not, willing to provide. The gentleman wanted to know how we change their ideas about development responsibility; how do we get *them* to acquire *our* knowledge that will better facilitate *their* development? The application I developed from the research, in contrast, only secondarily tries to facilitate the transfer of *some* technoscientific knowledge to local communities. However, the primary aim is to invert the hierarchical structure of development and promote a more genuine form of collaboration.

Throughout the fieldwork period, I was given the opportunity to present preliminary findings to various audiences. A stipulation of the Fulbright award that funded this research, I travelled throughout Burkina Faso, presenting findings at the various American Corners, which are established and run by the U.S. Embassy in Burkina Faso. These community centers are small libraries that provide meeting spaces and classes; the majority of audiences at these presentations were local youth who provided me with invaluable feedback and support. A longer, more detailed presentation was given to an audience at the U.S. Embassy in Ouagadougou, which is recounted, in part, in the opening vignette. Many of the students agreed with the representations of Model 1 and Model 2, admitting during the question and answer sessions that their parents still held to Model 1 while they increasingly accepted the truth-value of Model 2. Yet, some of these same students wanted to know how to bring those who accept Model 1 into the epistemic communities of Model 2.

I also had the occasion to make several presentations to USAID development professionals. I gave two presentations to the staff at the USAID WA-WASH regional headquarters, which including Winrock and CARE employees, which were part of the informal agreement I had with the Regional Director in regards to my access to the Program and conducting research on and with them. The first presentation mirrored the previous presentations at the American Corners and U.S. Embassy, but the second presentation began sketching the contours of the problem of cross-cultural dialogue and the epistemic constraints to which both community residents and Program employees are subject in the development moment. I gave a similar presentation, through the generosity of Dr. Ann Dix, director of USAID environment programs for USAID-West Africa, to employees from the Africa and Water bureaus at the USAID offices in Washington, DC. While in nearly all presentations, I was asked how we are to get *them* to take *our* knowledge, the responses from USAID WA-WASH employees—those engaged in the labor of on-the-ground development—focused more on the particulars of cross-cultural collaboration; there was a palpable willingness to adapt operating procedures for more effective engagement with local communities, and an eagerness to learn something new.

Collateral Learning

Before leaving Burkina Faso, I drafted and circulated a white paper entitled “How to Ensure Development Project Success: Tips on Collateral Learning”.⁷⁹ The white paper is a toolkit for development agents to engage with communities in a more collaborative space, uncover local knowledge about the topic being addressed (such as sanitation, food security, etc.), and use this

⁷⁹ A draft of the white paper is provided in Appendix G. The original title was a bit more equivocal in promising development project success, but was changed under recommendations from the Regional Director in order to facilitate the paper’s circulation.

knowledge as the epistemic base for talking about and implementing the project. Essentially, procedures attempt to invert the development hierarchy, while also placing the burden of inversion on the development workers, themselves.

I found in this study that technoscience is *the* episteme of development. I showed in Chapter Five how those within USAID WA-WASH, particularly the Climate Change Coordinator Gabriel, self-edits his knowledge to be more technoscientific when engaged in development activities. No one instructed Gabriel to do this, but he did so based on explicit assumptions and unarticulated epistemic constraints. Importantly, the cooperative agreement between USAID and FIU does not mandate that *only* technoscientific knowledge can be disseminated during project implementation,⁸⁰ which is an invaluable point for my recommendations.

I developed the recommendations from a combination of the research presented in this study and the extant literatures on development participation and cross-cultural learning. I have shown in this study that development operations are constrained by the knowledge-network in which they operate, facilitating a range of possible actions that ultimately structure a hierarchical relationship with the “beneficiary communities,” blocking effective collaboration. Robert Chambers’s writings on Participatory Appraisal (PA) were instructive because they highlight the need for development workers to shift their attitudes and behaviors with community residents (Chambers and Conway 1991, Chambers 2005). I also looked to the budding scholarship of Anticipatory Learning (AL) (see Tschakert 2010). However, it is my contention that the entrenched technoscience of development is best altered by using technoscientific logic: to

⁸⁰ In fact, when I brainstormed this idea with the Deputy Regional Director, she seemed excited about the possibilities and mentioned that some USAID programs in Middle Eastern countries have found success by incorporating local religious leaders to blend religious doctrine with health information and family planning.

appeal to the sense of logic and rationality in order to promote practices that will change organization-community interactions; to operationalize cross-cultural collaboration, so to speak.

The goal of collateral learning is to present to communities the knowledge they already possess but with new information—new nodes—already attached to the network. Here the literature on cross-cultural science education was very insightful because it suggests that education is a “cultural border crossing” (Aikenhead and Jegede 1999) that potentially produces anxiety or ambivalence in those outside of the epistemic community. This was clearly seen in the audience’s reactions to Gabriel’s technoscientific presentation on climate change in Chapter Six. In fact, the term “collateral learning” comes from this scholarship, which shows that individuals are capable of holding multiple models of the world, integrating them to varying degrees, and using them at different times (Jegede 1995, Aikenhead and Jegede 1999), such as Gabriel and Constance and the students at the Lycée de Tanghin-Dassouri (Chapter Five). With the results of this study, my position is that what is needed is not full-frontal technoscientific education, but education that reiterates the local model with pertinent technoscientific information already appropriated within it. In short, one does for the community what the community has already done in the appropriation of technoscientific knowledge into Model 1 (i.e. deforestation and pollution that anger God).

I outline four steps within the white paper provided to USAID WA-WASH; these are: 1. Community Entry, wherein the organization explicitly presents itself and projects to all community organizations, including women’s groups, in order to publicize the activities; 2. Community Integration, which is a collection of rapport-building techniques; 3. Community Data Collection, which is a simplified version of CMA that allows development agents to quickly gather a sketch of the cultural model related to the project (i.e. climate change, sanitation,

food security, etc.); and 4. Knowledge Management and Exchange, wherein the organization synthesizes the need-to-know information related to the project with the local cultural model, presenting it to the community concisely and repeatedly prior to and during project implementation.

The four steps are structured in such a way as to use the hierarchy of the development relationship to the community's advantage. The first two steps—Community Entry and Community Integration—can be taken by development workers to establish a space for community engagement even as they perpetuate the hierarchy between Program and community. Community Entry highlights the need to gather broad community support and acceptance of projects by meeting with various organizations and demographics. The key to this process is to ask for permission and support rather than simply announce projects, potentially disrupting the hierarchical distance between Program and community. Community Integration goes further by explicitly noting the ways that hierarchy is produced and can be reduced during Program-community engagement, by, for instance, suggesting that individuals speak in Mooré or “village” French, rather than in affected Parisian French; suggesting that individuals “dress-down”; and by calling on employees to engage with community members in social visits rather than exclusively for affairs related to project implementation.⁸¹

The last two steps—Community Data Collection and Knowledge Management and Exchange—make up the core of collateral learning, drawing on the anthropological toolkit and

⁸¹ Many of these recommendations are understandably self-evident to ethnographers, but I found that they needed to be stated clearly and directly to development workers. Of course, part of the reason that many workers dress in expensive, Western-style clothes, and affect a particular French accent in some cases, is because that, in part, these are both the rewards and the implicit characteristics for attaining an advanced education and becoming a professional in the city. A few USAID WA-WASH employees expressed surprise that their speech or dress could influence social relations, but nonetheless took my recommendations seriously, which, I take as a sign of genuine concern and desire to facilitate their work.

participatory development literatures. In short, Community Data Collection is a shortened version of CMA that asks employees to spend time compiling demographic information and conducting semi-structured interviews with a more or less representative portion of the population. Interviews are based on the thematic topic of the project—such as local logics of illness and disease for sanitation and hygiene. In the white paper, I suggested that the compilation of community epistemic information can be stored and used as baseline instruction for future programs. While this is certainly guilty of *ex situ* knowledge conservation (Agrawal 1995), I thought it advantageous to appeal to the technoscientific sensibility of compiling and storing data.

Finally, Knowledge Management and Exchange is the means of adapting technoscientific knowledge to community knowledge. The goal in this step is to prioritize community knowledge and to maintain the structure of the knowledge-network uncovered during Community Data Collection. The development agent analyzes this knowledge in order to identify where external technoscientific information can be attached. For instance, in terms of climate change, what is important for rural communities is not that weather is changing due to carbon emissions, but that weather may, in all likelihood, continue to change. The knowledge of technoscientific projects is more important than the knowledge base from which those projections are made. Such information can be easily attached to Model 1 by first recognizing that no one can know the will of God, but that, second, human behaviors will likely continue as they have, highlighting the importance for climate change mitigation and adaptive strategies. Lastly, employees are recommended to present this information informally and repetitively to community groups; a recommendation that was given to me by several residents of Tama and Ouegoulega.⁸²

⁸² Residents also suggested that the presenter be a man when talking to men, and a woman for presentations to women. The presenter ought to speak Mooré, be old enough to be a professional, but not

The white paper is only a modest contribution to the literature on development operations and cross-cultural collaboration. I recognize that improvements can be made with significantly more fieldwork. However, the recommendations strike me as the most appropriate applications given the implications of this research as well as the implications of the vast body of development literature that shows that development agents operate under institutional, financial, temporal, and, of course, epistemic constraints. The white paper is as much of a response to the man in the opening vignette as it is an attempt to change the question being asked, and to promote the validity of local knowledge and local adaptive strategies to climate change within the development context.

PROJECTIONS

There is an interesting irony within the adaptive strategy of Model 1. According to Tanghin-Dassouri residents, climate change is a corrective punishment against those who do ill due to the corrupting influence of money. Increasing capital to adapt to continued climate change only increases one's risk to the corrupting influences of money. I have shown how those who hold to Model 2 see development as an autocatalytic process, but one can imagine a potential autocatalytic process of increasing wealth, increasing poor social behaviors due to the corruption of money, and continued climate change as corrective punishment, necessitating the quest for even more wealth. This is not an irony with which residents seemed overly concerned given that "other people" are responsible for climate change. Nonetheless, the proposed strategy potentially opens residents to risk; a risk they seem willing to take given their perceived limited political economic opportunities and environmental uncertainties.

too young or too old. Residents hinted that a middle aged professional from outside of the community is a means for circumventing the age-hierarchy within the community.

Even without the implementation of the steps for collateral learning, and even without long term development intervention, the residents of Tama and Ouegoulega will likely continue to find adaptive strategies to cope with the changing environment. The current and most popular strategy, increased horticultural production, not only buffers residents from climate change, but also ties them deeper to the local and, thus, global market economy. It is debatable how sustainable this strategy is given the integration of the global economy. Roy Rappaport (1999) has noted that adaptive strategies are only general purpose strategies that do not always account for the integration of environmental and cultural components. Is it possible, then, that inserting themselves deeper into the market economy only drives the global apparatus that initiated climate change? Is it possible that this strategy is maladaptive? Regardless, residents' virtuosity with adaptive strategies and their inclusive definition of development, suggests that they might endure the effects of climate change better than those who hold to strict technoscientific knowledge.

Similar to Model 1, there is an irony embedded within Model 2. Program employees hold that climate change is due to increasing deforestation and industry on the global scale. Yet deforestation and industry are interconnected with one another and the wider capitalist economy, which is based in the continuous development of technological efficiency. To promote "appropriate technology" and "appropriate knowledge" as solutions to climate change is to promote the material and epistemic dimensions that have caused climate change. As with the residents of Tanghin-Dassouri, Program employees are not concerned with this irony, likely due to the promotion of non-carbon-based technologies. Yet the processes of acculturation embedded within the development moment—just as they were embedded within the colonial moment—attempt to perpetuate the epistemic conditions of technoscientific advancement.

Technoscience produces a narrow view of adaptation and of the world, and it's uncertain to what degree USAID WA-WASH employees have, if at all, incorporated my recommendations into their activities. My assistant in Tama, Amadou, informed me recently that Gabriel held a community meeting about climate change to promote the initiation of CF in the community. He delivered the presentation in French but, this time, had one of the lycée students translate for him. The information was purely technoscientific. Even as I wrote the white paper I wondered if the epistemic constraints of technoscience would also exclude the possibility of collateral learning; are the social structures of acquisition for technoscience too steeply hierarchical to invert? Or is the fetishization of technology—the materiality of science—too embedded to consider social and epistemic projects to increase the global capacity to deal with climate change?

There's evidence to suggest that Model 1, and variations on it, is a widespread model of climate change. I spoke informally with rural residents in Ethiopia and Togo, finding that many agriculturalists also report that God is changing the weather due to improper social behaviors. Even the Lutheran World Federation, which met in Geneva in 2009, released the organization's official standpoint on climate change, stating that it is due to social behaviors that have strayed from God's path. Simply writing off these explanations as a form of passive fatalism, defeatism, or irrationality is not only reductionist and misguided thinking, but it occludes the intricate structures of logic that support such conclusion and complicates any meaningful dialogue.

Regardless, this research has shown that by promoting only the technoscientific model of climate change, we silence these perspectives—these knowledges that significant populations hold as truth—and hinder cross-cultural conversation. By promoting only technoscience on the international and local stages, we deny others without the linguistic or epistemic literacy to apprehend vital, potentially adaptive information. But we also deny ourselves the opportunity to

listen to and incorporate equally adaptive information. The international community will likely continue to disagree over the scientific implications of climate change and which nations carry the greatest responsibility, just as separate nations will increasingly implement a patchwork of mitigation policies (Dimitrov 2010, Wolf and Moser 2011). But it is certain that as long as the global community at all levels—from international bodies and national governments, to international organizations and local communities—continues to conceptualize climate change and development as only environmental and economic processes, and not also as epistemic processes, then we all mistranslate the issues as well as one another.

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APPENDIX A: TAMA RESIDENTS' EDUCATION TYPES

Below is a further break down of demographics by education type from the census conducted in Tama. In total 162 individuals, over the age of 18, participated in the census with roughly 100 individuals declining.

**Table A.1: Tama Census
Participants' Education Type**

Familial	103
Koranic	13
Adult Literacy – Mooré	8
Adult Language - French	1
Public School	37
Total	162

Table A.1 lists the numbers of individuals who responded affirmatively for each category. Individuals had the option of choosing more than one education type, reflecting the non-linear educational path many individuals take. For instance, three men and one woman noted that they had attended some or all of the premier cycle in public education, but had more recently attended adult literacy courses in Mooré. Additionally, the individuals listed in each education type did not deny that they received familial education. Rather, the education type listed is supplemental to familial education. Of the 162 individuals who participated in the survey, 103, or 64%, listed that they *only* received familial education. Since, generally, community residents did not distinguish between familial, Koranic, literacy, and French education as significantly dissimilar, the percentage increases to 77%, or 125 individuals, who have not attended formal, public education.

APPENDIX B: MODEL 1 VERIFICATION AND MODIFICATION

The information below lists all propositions used in the verification survey. Affirmative responses are listed as percentages and are broken down by community and total. Propositions were automatically included in the final model if they received 80% or greater agreement (highlighted in bold). Propositions that received between 70% and 80% were modified by respondents and incorporated into the final model.

Table B.1: Model 1 Verification Questionnaire Results. Confirmed propositions are in bold.

Proposition	Tama*	Ouegoulega†	Total
1. The domains of life started to change during the time of our parents.	67	67	67
2. God created all for humans and all the natural processes come from God.	100	100	100
3. Humans cannot know the will of God except through traditions and religious teachings.	98	98	98
4. Humans change the environment by deforestation and bush fires.	72	83	78
5. God changes the rain because of bad behaviors humans commit against humans.	87	88	88
6. Rain will continue to diminish in the future.	18	87	52
7. The changes by God are bigger than the changes humans can make in the environment.	80	93	87
8. The bad acts that displease God are caused by those who do not follow their parents and who do not respect the traditions.	92	78	85
9. The people who do not follow their parents or respect traditions do so because they want money easily.	98	78	88
10. Traditions orient life toward the family so that it may continue.	62	78	70
11. Money is the solution to the lack of rain because one can buy all needs.	23	75	49
12. Work that the majority of people do in the village to gain money depends on groundwater.	77	88	83
13. Rain is a limited resource; groundwater is an unlimited resource.	80	83	82

14. Access to groundwater will increase the development of the village by increasing money in the household.	97	98	98
15. Parents want their children to succeed in school in order to gain good work outside of the village.	100	90	95
16. With public school knowledge, educated children are better adapted for cities and developed countries.	90	87	88
17. The people of the village have knowledge of agriculture but not of the city.	51	95	73
18. Outside of the village is marked by greater access to money.	66	70	68
19. Children who leave the community continue to aid their parents with money.	97	97	95
20. Development is possible with money and knowledge.	98	92	95
21. The responsibility for development projects rests with those who have the capacity.	97	88	93
22. The community lacks the capacity because there isn't money.	66	83	74
23. The government doesn't have the capacity because there are too many villages.	52	33	43
24. Outside organizations have the capacity for development projects.	92	62	77

* n = 55

† n = 59

MODIFIED PROPOSITIONS

All respondents were given the opportunity to modify propositions if they only slightly agreed or disagreed with it. For those propositions between 70% and 80% agreement, the modifications were analyzed to identify if the respondents had modified them in the same way. Often, this was the case. Modified propositions are listed below with very brief discussions.

1. *The domains of life started to change during the time of our parents.*

Proposition 1 is the only exception to the rule of 70% agreement threshold. While there was only 67% agreement, every respondent modified the proposition according to his or her age. Those in

elder age-sets disagreed with the proposition, saying that environmental changes began during their lifetime. Others in younger age-sets also disagreed with the proposition, saying that changes began with the time of their grandparents. Estimating from these modifications, one can roughly locate the start of environmental changes at 50 to 70 years ago. No one denied that changes are happening.

4. Humans change the environment by deforestation and bush fires.

Respondents included burning petrol and/or pollution, generally, as additional activities that can change the environment. Of course, several individuals were adamant that humans do not change the environment through direct action and that only God can change the environment.

10. Traditions orient life toward the family so that it may continue.

Many individuals revealed a very dynamic understanding of traditional and religious teachings. Many stated that traditions orient individuals toward God, toward being humble and respectful. They noted that because of the changes today, children cannot stay in the village and must seek work and livelihoods elsewhere. Yet, children are supposed to continue to follow traditions and religious teachings in order to live a good life no matter where they are.

17. The people of the village have knowledge of agriculture but not of the city.

This proposition is the result of a poor understanding of initial interview responses. Many interviewees stated that they cannot read signs and understand, as they said, “the circulation” of the city. But this does not necessarily mean that they don’t understand the life of the city or how

to navigate themselves in that space. Many individuals stated that with time, the city is knowable even if one cannot read the signs.

22. The community lacks the capacity because there isn't money.

While many agreed with this statement, others suggested that the community also lacks the knowledge and personal resources to initiate development projects they desire such as improved wells, a health clinic, and school. Some respondents were particular in their modifications saying that even if the community had the money to build a school, the community lacks the capacity to petition the government to station and to pay teachers at the new school. Others responded similarly about a health clinic. In short, some respondents argued that more than just money or knowledge are needed for some development projects.

24. Outside organizations have the capacity for development projects.

This proposition was the most difficult to modify. I include it here because, generally speaking, respondents who modified the proposition tended to situate outside organizations within wider socio-political fields. Some suggested that organizations are ultimately constrained from effectively working in the country by corrupt government officials. Others stated that there are too many communities in Burkina Faso for organizations to reach them all. One or two respondents, however, stated that organizations don't have the financial or epistemic resources to implement development projects.

APPENDIX C: MODEL 2 VERIFICATION AND MODIFICATION

The following table presents propositions used in the verification survey of Model 2. As noted in appendix b affirmative responses are listed as percentages and are broken down by community and total. Propositions were automatically included in the final model if they received 80% or greater agreement (highlighted in bold). Propositions that received between 70% and 80% were modified by respondents and incorporated into the final model if the modifications were similar. Unlike with Model 1, this was not often the case, owing, possibly, to the small sample size. It is also possible that there is low agreement because this verification survey targeted secondary cycle students still living in Tama and Ouegoulega, who likely hold more nuanced and personal translations of climate change and therefore development. USAID WA-WASH and Winrock International employees' responses are included in appendix d.

Table C.1: Model 2 Verification Questionnaire Results. Confirmed propositions are in bold.

Proposition	Tama*	Ouegoulega†	Total
1. Trees are the sources of rain.	100	100	100
2. Rain falls for animals and plants; humans profit at the same time.	70	64	67
3. The rain is diminishing and the climate is changing because humans abusively cut trees and burn the bush.	100	82	90
4. People in the village abusively cut wood because of lack of money.	90	91	90
5. The effects of climate change are global.	100	84	90
6. The biggest cause of climate change is large industry and population increase by the greenhouse gas effect.	80	62	71
7. Burkina Faso does not contribute to climate change because it is underdeveloped.	0	27	14
8. Industry and economic power is development.	80	73	76
9. Development is the generation of profits that are shared within the country.	90	64	76
10. All the domains of life are in the process of changing because of education and are tending toward development.	80	91	86

11. Education for their children is the second choice for parents when the farm is not sufficient for the family.	50	73	62
12. At this moment the fields are not sufficient because the rain is diminishing.	90	45	67
13. The lack of education in the village limits the development of agriculture.	100	64	81
14. Education permits children to leave the village for the cities.	80	82	81
15. Development in Burkina is a combination of looking to other countries and trying to meet immediate needs.	90	27	57
16. In the village, people share more.	70	55	62
17. In the city, people do not share like in the village.	70	82	76
18. The responsibility for development rests with the government: national and commune.	80	64	71
19. Development does not arrive in the village because of corrupt officials.	70	73	71
20. Corruption is stealing and keeping money for oneself.	80	82	81

* n = 10

† n = 11

MODIFIED PROPOSITIONS

All respondents were given the opportunity to modify propositions if they only slightly agreed or disagreed with it. For those propositions between 70% and 80% agreement, the modifications were analyzed to identify if the respondents had modified them in the same way. Those propositions without agreement through modification were rejected; these are noted below. However, survey response rates and information of interviews even from rejected propositions still informed subsequent interviews and foci for participant-observation.

2. Rain falls for animals and plants; humans profit at the same time.

Similar to proposition 1 of Model 1, this proposition received below 70% agreement but the modifications were overwhelmingly consistent. Respondents stated that the rain falls *for* humans *as well as* animals and plants. This is a nuance in meaning that was lost in translation. The rain

does not fall strictly for animals and plants, nor does it fall strictly for humans. Rain falls for the benefit of all.

6. The biggest cause of climate change is large industry and population increase by the greenhouse gas effect.

The meaning of this proposition was likely also lost in translation. It was originally meant to convey the idea many interviewees expressed that population increase influences more industry and carbon emitting activities. However, the proposition, as written, suggests that population increase is a direct cause of the greenhouse gas effect, which many respondents denied and corrected.

8. Industry and economic power is development.

Respondents did not similarly modify this proposition and was rejected from the model. It was originally distilled from interviews that initially covered environmental knowledge and climate change. As a stand along propositions, however, respondents wanted to include additional elements in their conceptualization of development. The variability of the definition of development contributed to the development questionnaire discussed in Chapter Six and Appendix F.

9. Development is the generation of profits that are shared within the country.

This proposition was rejected from the final model for reasons similar to proposition 8 above.

17. In the city, people do not share like in the village.

Many interviewees suggested that there is a difference in economic practice between the city and the village that includes the amount and degree to which people share economic and other resources. However, most survey respondents argued that economic practices in the city are varied and that one cannot say that people share resources more in the village or city. This proposition was rejected from the model.

18. The responsibility for development rests with the government: national and commune.

Respondents modified this proposition similarly, stating that responsibility for development rests with the national government as well as communities and the international community.

19. Development does not arrive in the village because of corrupt officials.

Respondents noted multiple reasons for the lack of development in the communities including corrupt officials, the poor economy of the country, and lack of attention from the international community. There was no agreement and this proposition was rejected from the model.

APPENDIX D: LYCÉE STUDENTS' VARYING CLIMATE CHANGE MODELS

This appendix provides questionnaire responses by secondary cycle students at the Lycée de Tanghin-Dassouri. Table D.1 lists the number of students who participated for each grade level. The propositions for the questionnaire are drawn from Model 1 and Model 2 of the environment and climate change. The objective of the survey was to gauge the degree to which students translate between Model 1 and Model 2 knowledge. Students were asked to mark if they agree or disagree with each statement. Students were allowed to mark any and all statements. Results (table D.2) show that students' models of the environment and climate change shifts in relation to the amount of scientific training they receive.

Table D.1: Number of Participating Lycée Students

Grade Level	No. of Participants
6 th	77
5 th	75
4 th	67
3 rd	51
2 nd	38
1 st	54
Term.	35
Total	397

From table D.2, propositions 3 and 11 were used in figure 5.1; and 7, 8, and 10 in figure 5.2 in Chapter Five.

Table D.2: Lycée Students' Models of Climate Change Questionnaire Results

Proposition	Percentages						
	6th	5th	4th	3rd	2nd	1st	Term.
1. Today, the rain is less abundant than in years passed.	91	100	94	80	87	98	94
2. God directly causes the lack of rain.	44	5	33	12	11	11	11
3. God causes the lack of rain to punish human behaviors such as war, killing, theft, and greed.	88	96	76	61	50	59	43
4. People commit acts such as war, killings, theft, and greed because they want to have lots of money without working.	87	100	91	92	92	91	77
5. Today, the rain is less abundant because there are fewer trees.	86	95	94	88	82	94	89
6. Today, the rain is less abundant because there are more people.	42	1	19	12	21	7	14
7. Deforestation directly causes the lack of rain.	74	76	70	69	82	91	91
8. The gases from engines burning petrol directly cause the lack of rain.	65	65	57	45	42	78	83
9. The lack of sacrifices directly causes the lack of rain.	65	11	45	31	18	28	37
10. The gases from large industry directly cause the lack of rain.	53	49	54	41	47	72	86
11. God directly causes the lack of rain because of human behaviors such as deforestation and burning petrol.	91	81	58	41	37	46	57
12. Today, the lack of rain is global.	51	84	63	55	55	74	63
13. Today, the lack of rain is only in Burkina Faso.	10	1	24	10	11	6	3
14. Rainfall will ameliorate in the future.	84	96	63	37	32	35	26
15. Rainfall will ameliorate in the future only if people stop acts such as war, killings, and theft.	94	100	85	61	53	72	49
16. Rainfall will ameliorate in the future if people stop deforestation.	87	99	85	84	66	94	91
17. Rainfall will ameliorate in the future if people stop burning petrol.	56	53	69	47	37	56	63
18. Only God can ameliorate rainfall in the future.	96	96	90	78	74	89	54
19. Rainfall will continue to diminish in the future.	14	5	30	31	32	37	23
20. My parents would respond to these statements as I have.	64	97	64	61	26	48	51

APPENDIX E: USAID WA-WASH AGENTS' CLIMATE CHANGE MODELS

The following table (table E.2) lists the propositions given to USAID WA-WASH Program employees. The propositions are drawn from Model 1 and Model 2 of the environment and climate change. The objective of the questionnaire was to gauge the degree to which Program employees translate between Model 1 and Model 2 knowledges. Employees were asked to mark if they agree or disagree with each statement. Students were allowed to mark any and all statements. Table E.1 lists the number of employees who participated from each organization housed in the Program regional office in Ouagadougou.

Table E.1: Number of Participating Program Employees

Organization	No. of Participants
WA-WASH/FIU	18
Winrock International	6
CARE International	2
Total	26

As explained in Chapter Five, the majority of respondents answered affirmatively to propositions gleaned from Model 2. Others who did not fully agree with certain propositions, such as proposition as propositions 7 and 10, sought me out to explain that neither deforestation or carbon emissions directly cause the lack of rain, but do so indirectly through by contributing to increased global temperatures. These respondents reaffirmed their adherence to technoscientific knowledge and illustrated how scientific knowledge acquisition is a gradual process. From table E.2, propositions 3, 7, 8, 10, and 11 were used in figure 5.3 in Chapter Five.

Table E.2: USAID WA-WASH Employees' Models of Climate Change Questionnaire

Proposition	Percentage
1. Today, the rain is less abundant than in years passed.	81
2. God directly causes the lack of rain.	0
3. God causes the lack of rain to punish human behaviors such as war, killing, theft, and greed.	4
4. People commit acts such as war, killings, theft, and greed because they want to have lots of money without working.	65
5. Today, the rain is less abundant because there are fewer trees.	85
6. Today, the rain is less abundant because there are more people.	27
7. Deforestation directly causes the lack of rain.	81
8. The gases from engines burning petrol directly cause the lack of rain.	77
9. The lack of sacrifices directly causes the lack of rain.	4
10. The gases from large industry directly cause the lack of rain.	65
11. God directly causes the lack of rain because of human behaviors such as deforestation and burning petrol.	0
12. Today, the lack of rain is global.	35
13. Today, the lack of rain is only in Burkina Faso.	0
14. Rainfall will ameliorate in the future.	15
15. Rainfall will ameliorate in the future only if people stop acts such as war, killings, and theft.	0
16. Rainfall will ameliorate in the future if people stop deforestation.	88
17. Rainfall will ameliorate in the future if people stop burning petrol.	54
18. Only God can ameliorate rainfall in the future.	15
19. Rainfall will continue to diminish in the future.	27
20. My parents would respond to these statements as I have.	27

APPENDIX F: ATTRIBUTES OF DEVELOPMENT SURVEY

This appendix includes responses to a questionnaire designed to illicit individuals' attributes of development. The questionnaire was distributed to 28 USAID WA-WASH staff, 7 Winrock staff, and 49 Ouegoulega residents. The first two groups were asked to fill out the questionnaire on their own and raise clarifying questions should they need. The questionnaire was largely administered orally in Mooré to Ouegoulega residents, though a few younger residents insisted on filling out the questionnaire on their own.

From a list of 46 attributes participants were asked to mark all those that they consider part of their definition of development (table F.1). Respondents were then asked to name two projects that would contribute to the development of rural communities (table F.2, table F.3, table F.4). Finally, respondents were asked to identify those groups that have the knowledge, financial means, responsibility, and capacity to implement those projects (table F.5).

Table F.1: Attributes of Development Questionnaire

Transportation	Prog	Wi	Oueg	Farming by machine/tractor	50.0	85.7	95.9
Transport by personal bicycle	7.1	14.3	57.1	Working in an office	14.3	14.3	98.0
Transport by personal car	21.4	0	38.8	Having a lot of money	39.3	42.9	83.7
Infrastructure				The economic system of capitalism	7.1	0	40.8
Mud brick houses	0	0	10.2	The economic system of socialism	3.6	14.3	98.0
Cement houses	35.7	28.6	53.1	Technical knowledge	67.9	100	85.7
Electricity in every house	78.6	85.7	100	Youth employment	85.7	100	87.8
Running water in every house	82.1	100	93.9	National economic force	60.7	71.4	83.7
Environment				Government and Law			
The right of industries to pollute	0	14.3	34.7	Democracy	67.9	57.1	100
Natural resource management	92.9	100	83.7	Dictatorship	0	0	53.1
Religion				National military force	21.4	0	83.7
Islam	7.1	0	44.9	The right to vote	53.6	42.9	57.1
Christianity	7.1	0	75.5	The right to express oneself	78.6	85.7	73.5
Animism	7.1	0	51.0	Elevated criminal rates	0	0	4.1
Education				Weak application of laws	0	0	51.0
The knowledge from grandfathers	28.6	28.6	67.3	Strict application of laws	57.1	57.1	87.8
The knowledge from public school	50.0	57.1	83.7	Social and Health			
High level of public education	85.7	85.7	98.0	Having lots of children	7.1	0	22.4
Women and girls' education	82.1	85.7	71.4	Equality of the sexes	71.4	71.4	51.0
Technology				The rural life	17.9	0	42.9
To own cellular telephones	21.4	14.3	89.8	The urban life	17.9	0	55.1
To own a personal computer	21.4	28.3	51.0	Female circumcision	0	0	4.1
To have a family television	21.4	14.3	75.5	Infant maladies	3.6	14.3	2.0
Economy and Work				Family planning	50.0	57.1	91.8
Animal husbandry	39.9	71.4	98.0	Theoretical			
Gardening	42.9	71.4	93.9	A system of life we develop for ourselves	75.0	71.4	53.1
Farming by hand	0	0	34.7	A system of life developed by the West	3.6	0	81.6

The following three tables aggregate responses to the projects respondents listed that would development the rural sector. Each respondent was asked to list two projects. The tables do not reflect respondents' prioritization of the projects. Table F.2 lists responses from USAID WA-WAS employees. Table F.3 lists responses from Winrock employees. Table F.4 lists responses from Ouégoulega residents.

Table F.2: USAID WA-WASH Employees' List of Projects to Improve the Rural Sector

Project	Frequency
Agricultural Production	10
Education	8
Sanitation and hygiene	8
Micro-credit	4
Electricity	4
Income generation	3
Dry season gardening	3
Health clinic	3
Animal husbandry	3
Irrigation	2
Self-reliance	2
Youth groups	1
Water	1
Reforestation	1
Infrastructure	1

Table F.3: Winrock Employees' List of Projects to Improve the Rural Sector

Project	Frequency
Agricultural Production	4
Education	2
Health clinic	2
Animal husbandry	1
Potable water	1
Food security	1
Sanitation and hygiene	1
Water	1
Energy	1
“Rural activities”	1

Table F.4: Ouegoulega Residents' List of Projects to Improve the Rural Sector

Project	Frequency
Health clinic	40
School (with paid teachers)	37
Water	18
Electricity	4
Community organization	2

Clear from responses is that Program staff and community residents have very different ideas about what projects are most pertinent for rural community development. As explained in Chapter Six, Ouegoulega residents are responding according to the conceptualization of community development, as opposed to individual development. The latter consists of horticultural production, which is facilitated by more reliable groundwater access. Community development, however, is conceptualized in terms of augmenting the health and formal education levels. While WA-WASH and Winrock employees both name formal education as a pertinent need, agricultural production (including intensification) is listed most frequently as the most pertinent project.

Finally, respondents were asked to mark, among the groups most involved in development efforts, the degree to which each has the capacity and responsibility for development (table F.5). Capacity was divided into two categories: knowledge and finances. Capacity-knowledge refers to existing knowledge within the group to, for example, drill a borehole or fabricate a pompe-en-corde. Capacity-Finances refers to the economic capacity to pay for and mobilize human resources. Responses show that Program employees think of communities as having the least amount of capacity, but some of the highest degree of responsibility. Community residents, in contrast, define responsibility in terms of capacity.

Table F.5: Capacity and Responsibility for Development

		WA-WASH	Winrock	Ouegoulega
Government	Capacity-Knowledge	69.7	85.7	91.8
	Capacity-Finances	89.3	100	93.9
	Responsibility	96.4	85.7	95.9
Organizations	Capacity-Knowledge	75	85.7	79.6
	Capacity-Finances	85.7	85.7	82
	Responsibility	50	57.1	85.7
Community	Capacity-Knowledge	32.1	57.1	18.4
	Capacity-Finances	39.3	57.1	16.3
	Responsibility	82.1	85.7	14.3
Other*	Capacity-Knowledge	14.3	14.3	0
	Capacity-Finances	14.3	14.3	0
	Responsibility	17.9	14.3	0

* The group “Other” was left undefined for questionnaire respondents. Community members did not identify another party to be directly involved in development. Several USAID WA-WASH and Winrock employees included some private sector professions, such as engineers, in this group.

APPENDIX G: USAID WA-WASH WHITE PAPER

The following document was submitted to USAID WA-WASH in order to promote more effective cross-cultural collaboration. The white paper was developed from research presented in this study as well as insights drawn from the Participatory Appraisal and Anticipatory Learning literatures. It includes appendices related to the form and style of effective presentation; this information was presented at various times during the fieldwork period as professional development sessions. The white paper is presented here with permission from the Regional Director of USAID WA-WASH.

USAID West Africa Water Supply, Sanitation and Hygiene Program (USAID WA-WASH)

How to Ensure Development Project Success: Tips on Collateral Learning

White Paper by Porter Bourie

October 2013

About the Author

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This white paper has benefited from editing from Dr. Lakhdar Boukerrou and Sara Miner

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Executive Summary

This work was the results of one year of field research conducted by the author in two villages (Weglega and Tama) of the commune of Tanghin-Dassouri where USAID WA-WASH is implementing a number of activities. The commune of Tanghin-Dassouri is located some 15 miles southwest of Ouagadougou, Burkina Faso. The research resulted in a number of recommendations some of which are outlined

This white paper outlines four recommendations that will aid USAID WA-WASH's implementing partners to tailor their projects to local social conditions. At the heart of successful development projects is education. This means that community members in intervention zones must understand and accept how a project functions in order to ensure its long-term sustainability. However, many organizations overlook the fact that community members must also understand and accept why a project is necessary in order to place value in continuing it. To do this, implementing partners must build strong and effective relationships with their communities in order to promote what is known as "collateral learning."

Collateral learning refers to the synthesis of local knowledge with external development knowledge. Such a synthesis is integral to make the new knowledge understandable and acceptable to the community. The four recommendations in this white paper are designed to help implementing partners operationalize collateral learning by building strong and effective relationships with communities. The recommendations are: (1) Community Entry; (2) Community Integration; (3) Community Data Collection; and (4) Knowledge Management and Exchange. For optimal effectiveness the recommendations can be used sequentially. They may also be used individually to strengthen components of project design and implementation.

1. Problem Statement

At the heart of any development project is education. While many programs and organizations focus on delivering technologies that will facilitate a particular task, such as water purification products and systems, recipients must understand how such technologies are used. More importantly, however, recipients must first understand the need for such technologies. When true understanding and comprehension are communicated to beneficiaries, lasting project success is ensured through genuine behavioral change and capacity building.

Within development projects knowledge must be transferred on two interlinked levels. First, knowledge of project context must be effectively communicated so that beneficiaries comprehend the relevance and importance of the proposed project. Second, beneficiaries must understand how the new project functions and their roles in application, continuation, and/or maintenance. When seen in this way knowledge transfer and education comprises the majority of the labor implementing partners must put into a project.

Effective knowledge transfer is not a straightforward or easy process. We often work in and with communities that are very different educationally, technologically, and culturally. Often, educational differences between implementing partners and beneficiary community members translate to profound cultural differences. Even if we are of the same nationality or speak the same language, we should not assume that that is enough to bridge the cultural gap. While project success is contingent upon effective knowledge transfer, the burden of responsibility rests with development agents and organizations to make knowledge accessible to culturally diverse audiences.

Educational researchers have noted that learning new knowledge can amount to a “cultural border crossing” wherein the learner is confronted with a completely new way of thinking about the world. This cultural border crossing can be met with excitement, but it is most often met with anxiety and frustration as it may be construed as a threat to existing modes of thought. Even if beneficiary community members verbally express their willingness to learn the process of knowledge transfer may still provoke anxiety and possibly animosity. Effective teaching reduces anxiety by blending new knowledge with existing knowledge; building on what community members already know. Because development ought not be dictatorial, it is necessary to understand how multiple ways of thought might be productively and sensitively combined in what is known as “collateral learning.”

The underlying principle of collateral learning is that development projects should not directly impose new knowledge, but work with the community to build effective understandings for the need of the project and its continuation. This white paper addresses four points that can be used by implementing partners and individual agents to promote effective collateral learning. They pertain to how agents and organization may begin understanding existing beneficiaries’ knowledge and applying this to project design and implementation.

2. Components of Collateral Learning

Collateral learning refers to the process whereby development organizations take the time to understand beneficiary knowledge regarding the issue to be addressed, such as hand washing, open defecation, or climate sensitive farming. The process involves the understanding and synthesis of local knowledge into project design, and the application of that knowledge in promoting the project and ensuring its continuation and maintenance after the official project completion.

Understanding local knowledge can be a messy process. The following four tips will help operationalize the process for implementing partners. To ensure project success, the four tips are most effectively used together as a toolkit for project design and implementation. However, they may also be used individually to strengthen existing components of partners' operating procedures. The tips are as follows:

1. Community Entry
2. Community Integration
3. Community Data Collection
4. Knowledge Management and Exchange

Tips 1 and 2 include specific recommendations on how best to initially present the organization and project to the community. These recommendations set the stage for collecting reliable information about the community. Moreover, building trusting and strong relationships with the community and individual beneficiaries are an absolute requisite for sharing knowledge later in the project. Tip 3 gives specific instructions on collecting data, including how to decide with whom to speak, and being sure that the data is statistically accurate. The fourth and final tip provides details on how to effectively combine community and organization knowledge and present it to the community for effective collateral learning.

2.1. Community Entry

In order to facilitate full community participation within projects, the implementing partner must make a list of all active groups and organizations within the community. For example, there are often *groupements des femmes* that work in parallel to *Comité Villageois de Développement* (CVD). The community may also contain active youth and student organizations as well as religion-based groups. Once the list is compiled the implementing partner can then establish meetings with each of the groups. With multiple project animators, the partner can meet with both CVD and *groupements des femmes* in separate locations to announce the project, attain their consent, and note all feedback and/or recommendations.

The initial contact meetings between the partner and beneficiaries are crucial for building effective rapport and strong working relationships. Standard operating procedure promoted by USAID WA-WASH asks that implementing partners first introduce themselves and their intended activities first with the mayor of the commune, the community council members (*conseil*), and then to the CVD. These meetings also serve to allow local government and community officials to give their consent and initiate collaboration. In addition, at the national

level, the Regional Office has been very active in promoting the program and keeping in contact with officials from the various ministries and government agencies.

Throughout West Africa, however, local government officials and community leaders are primarily men of a certain age. If an implementing partner works only with these individuals and groups, women and youth⁸³ will be effectively removed from collaborating in project implementation and design. Women and youth comprise roughly 50% to 80% of the population in many communities. This means that more than half of the community will have little to no input into project design and implementation. Such asymmetric participation can later skew data a partner receives during surveys and questionnaires, and other tools for verifying project deliverables and indicators.

Particularly in communities with strong divisions along gender and generational lines this can be particularly important. In one USAID WA-WASH intervention community nearly 90% of interviewed women said that they felt they were unable to approach and speak with agents of the implementing partner. While gender is, and must continue to be, a strong component of every project, excluding women from the initial community contact meetings can prematurely and permanently alter relationships between the partner and community. The implementing partner should not consider the CVD to be the only entry into the community. Working only with the CVD symbolizes that the project—whatever the topic—is meant to be managed and promoted by men, and that the implementing partner will only work with men.

There are four primary benefits to meeting with multiple community groups. First and most importantly, this act will open social space for the active participation of multiple community demographics. Such social space can be immensely empowering for women as they are permitted to engage implementing partners. Second, expanding contacts will publicize the project to the majority of community members and to surrounding communities. Third, these contacts may be beneficial throughout the course of the project in mobilizing community members for different events, subsequent phases of the same project, or new activities. Lastly, by introducing the program, organization, and project to various groups within the community the implementing partner will be creating a catalogue of existing social resources that can be drawn from for future activities, and that can be shared with other partners and the program at large.

Summary

- TIP: Obtain community consent from a variety of groups and individuals
 - Introduce project to local government personnel
 - Commune Mayor
 - Community Council (*Conseil*)
 - Introduce project to all active community groups
 - *Comité Villageois de Développement* (CVD)
 - *Groupements des Femmes*
 - Youth or school organizations
 - Religious groups

⁸³ Youth here is defined as unmarried men and women over the age of 16.

- Benefits:
 - Publicizes project
 - Establishes contacts with a variety of community demographics
 - Creates an empowered space where marginalized groups may participate
 - Strengthens the Partner-Community relationship

2.2. Community Integration

The effective transfer of knowledge during a project is only possible when the implementing partner is able to mobilize the participation of community members. Mobilization is facilitated when implementing partners are integrated into the community and forge social relationships. Genuine relationships can be difficult to establish due to the social distance many community members perceive between outside development organizations and themselves. It is recommended that implementing partners attempt to reduce this distance and break down social barriers in order to build social relationships, mobilize community members, and incorporate them into all phases of project implementation for increased success.

During a yearlong study of one rural community it was found that the overwhelming majority of community members wanted outside development intervention, and would participate in projects regardless if they understood the benefits or agreed with the project. When asked why, respondents said that the inherent social power, wealth and education of organizations and agents necessitated their compliance in projects. In essence, respondents reported that they felt pressured to participate in projects due to the perceived social power of development organizations.

These social dynamics are counterproductive to the end goals of development projects and work against lasting project success, genuine behavior change and capacity building and overall sustainability. However, it should be noted that USAID WA-WASH in many of its activities is promoting direct community involvement by getting the buy-in of community members as well as a vested interest (financial and social) in the activities being promoted.

Generally, perceived differences in social power and wealth are a function of education. Low levels of public education, as shown in Figure 1, mark typical rural communities in West Africa. The community perceives the organization to have what they lack—namely education and wealth—which pressures residents to participate in projects. Importantly, this pressure can cause beneficiaries to censure what they say to development agents in an effort to please them.

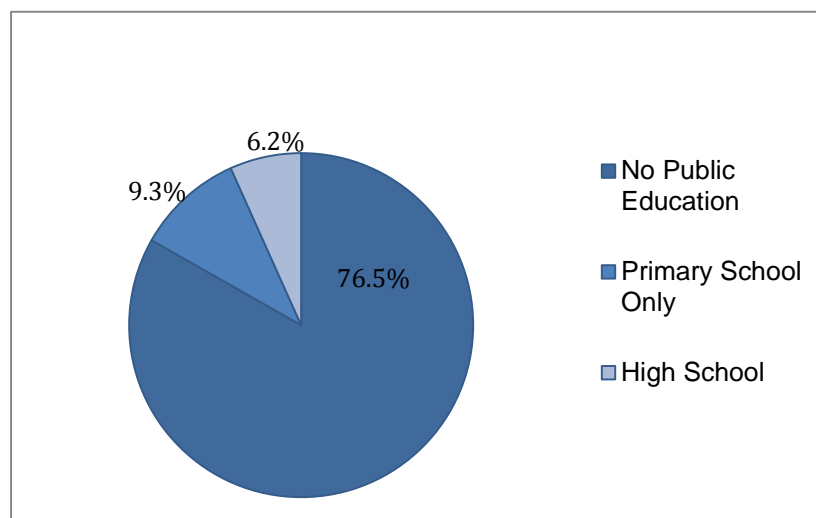


Figure 1. Education levels within one rural community (Central Region, Burkina Faso) currently receiving USAID WA-WASH intervention.

Reducing social distances can be accomplished simply and effectively by spending time in the community unrelated to project business. For instance, partners may place employees to live in and around beneficiary communities as is the case with some of the USAID WA-WASH partners. Bringing in employees to live in or near the beneficiary community has a greater collaborative impact than does using voluntary community participants by keeping the organization and project visible and, more importantly, by reinforcing social relationships between the program and community. Due to the importance of social relationships, partners may also visit and spend time in the community by going to the community or local markets, eating, buying items, and informally socializing with residents. This would increase partner and project visibility while also organically building social relationships that can later be used for project implementation.

Additionally, partners should regularly call and visit community leaders (mayors, etc.) and notables as well as maintain informal contacts made in the process of informal community integration. These calls and visits can be informal, unstructured and casual, strengthening social relationships that can be mobilized during project implementation in order to inform the community of project methods, plans, and goals. Forging genuine social relationships with community members will also help implementing partners gather informal information about the proposed project and potential social and cultural conditions.

Less often recognized by development organizations is how clothes and vehicles signify wealth (or lack thereof) and can increase the social distance between groups. Dressing down is one easy option to reduce distance. Inversely, using newly purchased, large SUVs, for all project-related business in the community, can exacerbate social distance.

A less obvious way social distance is created is through language. For instance, French used in a governmental meeting in Ouagadougou is inappropriate for communicating with community members and explaining project parameters. This is integral when working in

communities with lower levels of education. Local languages should be used whenever possible. This is applicable for official visits by directors and program managers and is a simple yet significant way to reduce social distance and signal to community members that projects are primarily for them. This symbolizes to community members that the project is being designed and implemented for and with them, and helps establishing a good working partnership.

Projects will benefit from this component because it brings both the implementing partner and beneficiaries onto equal footing. This is the cornerstone of collateral learning. When the above measures are taken to build strong relationships with beneficiaries, implementing partners will be reducing the pressure community members feel when entering relationships with others they perceive as more educated and wealthier. This will facilitate communication and allow implementing partners to better understand community dynamics by breaking down social barriers. As a result, implementing partners may be allowed access to more in-depth knowledge about the community than before, allowing them to fine-tune project design.

Summary

- TIP: Reduce social distance between the implementing partner and the community
 - Social distance is marked by education and wealth
 - When working in the community be cognizant of:
 - Language
 - Clothing
 - Behaviors and interactions
 - Other displays of wealth such as vehicles and technology
 - Education and wealth may pressure community members into complying with project parameters even if they do not agree
 - Build organic relationships with community members
 - Spend time in the community unrelated to project business
 - Visit the market
 - Attend mosque or church
 - Pay social visits
 - In person
 - By telephone
- Benefits:
 - Promotes a collaborative relationship between the implementing partner and the community
 - Reduces pressure community members may feel
 - Facilitates communication
 - Increases implementing partner's access to community information
 - Establishes the basis for collateral learning

2.3. Community Data Collection

In order to be able to effectively communicate knowledge of and for a particular project, the implementing partner must first understand what knowledge and behavior already exists within the beneficiary community. It is important that implementing partners uncover local knowledge

relevant to the project and identify variability in that knowledge among demographic groups. To do this the implementing partner should undertake a census of the community and conduct in-depth interviews with individuals from each population group. The information gathered will significantly help: (1) tailor the project to local conditions and (2) build relationships with community members while ensuring long term project success. This recommendation is the most research oriented and potentially time consuming.

As part of initial community surveys the implementing partner should undertake a census. The census may include categories of gender, age, religion, and main income-generating activities but the implementing partner may choose to add or subtract categories based on the project's thematic areas and objectives. From these categories the implementing partner will be able to build a community demographic database from which individuals may be selected for more in-depth interviews and conversations.

For example, in order to research how community members perceive and respond to environmental variability and climate change, a census was first drawn up that grouped residents based on gender, religion, and education since these categories were hypothesized to influence knowledge distribution (Figure 2). The same numbers of interview participants were taken from each of the categories in order to identify variability in climate change knowledge. Censuses can be difficult to conduct effectively but the primary goal is to have an accurate representation of the community from which to build the project.

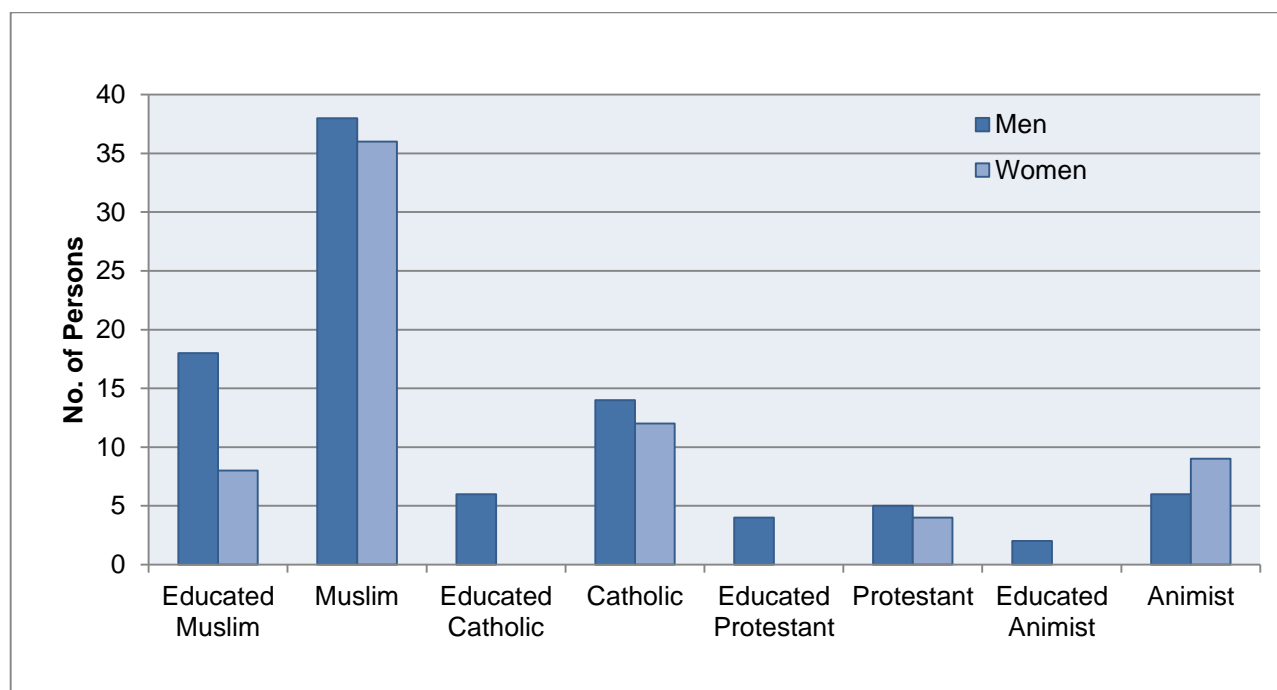


Figure 2. Demographic groups for one intervention community (Central Region, Burkina Faso) combining gender, religion, and education

Many but not all CVDs have produced reports detailing community histories, demographics, territories, and plans for development. This is an excellent place to begin compiling social data. However, even if a CVD report is available, implementing partners can benefit from using recent government censuses and/or conducting their own. Having baseline information about community demographics will ensure that implementing partners have contact with representational individuals from appropriate categories, ensuring that they are receiving the most accurate breadth of information possible.

Censuses can be difficult to conduct since not everyone will be at their homes at the same time. The primary goal is to build an accurate representation of the community so that the implementing partner has an understanding of how individuals self-organize and to whom, if necessary, they must direct their efforts. For example, the data shown in Figure 2 does not represent every individual within the community. Girls and boys under 18 years old were omitted, and due to international research regulations individuals were first asked whether or not they would like to participate in the census. Roughly 50 individuals declined. However, enough individuals were surveyed to build an accurate representation of the community that later guided in-depth interviews.

For a community of roughly 500 adults, the census lasted slightly longer than one month. However, in order to expedite this, in-depth interviews were started with individuals from particular demographic groups before the census was completed.

In-depth interviews provide the most detailed knowledge that can inform project design and implementation. The primary objective is to explore how different demographic groups understand, explain, and behave in relation to the relevant thematic area(s) to be addressed by the project. For example, interviews may explore whether women think about sanitation differently than men. Or one may ask if married men with few children prepare and plan for the healthcare of their family more than married men with many children? Do animists understand and respond to reduced rainfall differently than Christians or Muslims? Is water management stratified along gender or generational divisions? What are the primary economic activities within the community and do these limit the abilities of community members to physically participate in project implementation?

These fundamental questions are essential to ask. Because of cultural and social diversity within and between communities, implementing partners cannot assume that the community is easily “readable;” that is, partners cannot assume that they know the social dynamics or local knowledge of a given group of people. Even if implementing partners are composed of and hire host country nationals, the variability between regions and towns is great enough to make home-community experiences of development agents only marginally similar to local social structures and perspectives.

Having a better understanding of the community will benefit projects by identifying key groups and actors who can aid the project, or those groups that would be most effected by it; it will provide insight into how the community organizes itself so that project implementation can be adapted to community divisions and conflicts, for example, as well as those groups most

socially significant; and it will add to USAID WA-WASH's database such that future projects and programs can benefit from current information and experiences.

Results of such surveys and in-depth interviews can be extremely informative. For example, in the research on climate change it was found that the community members without high school-level education believe that God, discontent with human behaviors, causes climate change. This is the central belief. The background knowledge to this is that God has dominion over all things, acts in the world through natural processes such as temperature and rainfall, and places obstacles in people's lives so that they can correct their behavior. USAID WA-WASH used these findings during the implementation of the adaptation to climate change workshops, community based training, and other climate sensitive activities.

Summary

- TIP: Build a database of community demographics and explore the topic relevant to the project
 - Identify the central question of the project
 - Design a community census
 - The demographic categories are drawn from the project's central question
 - Hold in-depth interviews with individuals from different demographic groups
 - The goal is to understand the existing logic that motivates individuals' and groups' behaviors
 - Aim to identify variability in this knowledge between demographic groups
- Benefits:
 - Identifies key individuals and groups related to the project thematic areas
 - Provides insight into how the community self-organizes
 - Permits the implementing partner to understand how the community perceives the issue that the project is meant to tackle
 - Allows the partner to identify variability in this knowledge across demographic groups
 - Extends USAID WA-WASH's database that will benefit future projects and programs
 - Identifies similarities and differences between partner knowledge and community knowledge, which begins the process of collateral learning

2.4. Knowledge Sharing and Management

This recommendation is the most integral to effective collateral learning and long-term project success. Understanding community demographics and social dynamics will allow the implementing partner to understand what knowledge already exists within the community and how people act on that knowledge. This recommendation provides a way for the implementing partner to work with the knowledge that already exists, to adapt the message they would like the community to learn, and to effectively communicate that message.

The central point of this recommendation is that the implementing partner must adapt the message of the project—that is, the knowledge the community would need to accept to continue the project on their own—to the local knowledge that is already present in the

community. This task will be made much easier if the implementing partner has followed the first three recommendations outlined above. At the very least, the partner should conduct in-depth interviews to have a general sense of local knowledge. A worksheet is provided in Appendix 1 to help the implementing partner design and tailor project message(s) to the community, and provides tips on how to present the information.

The most important step in this process is defining the goals within the issue. What key message do the implementing partner want the community to understand and accept? Try condensing this goal into 15 words. This will help orient the project. The next step is to outline the knowledge necessary for the community to understand and accept the key message. This is the background knowledge; this is the knowledge that makes the key message “correct” in the minds of those who accept it.

For example, in contrast to the beliefs of climate change found in the community mentioned above, the scientific model of climate change states that humans cause climate change through greenhouse gas emissions. This is the central point. The background knowledge is that engines run on fossil fuels, which release carbon gases when burned. The gases enter the ozone, trapping more of the sun’s radiation in the atmosphere.

Recommendation 3, above, outlines the process for understanding the local knowledge the community possesses and how they act on that knowledge. This information is vital for adapting the key message to local conditions and ultimately promoting collateral learning. There is no set operation for combining community local knowledge with project background knowledge. This operation is highly contextual to the knowledge being handled and the overall objective of the project. By comparing the local knowledge within the community with the background knowledge of the key message the implementing partner must examine where the sets of knowledge overlap, where they differ, and to what degree.

Rather than rejecting local community knowledge in favor of project background knowledge, the implementing partner must strive to bring project knowledge into line with local community knowledge. This process involves editing project knowledge so that it incorporates elements from local community knowledge. Where possible, the implementing partner should favor local community knowledge. This is essential for the process of collateral learning. By favoring community knowledge the implementing partner reduces the strangeness of the new knowledge, thus reducing the stress and anxiety associated with learning new information. Working with a local community homologue will make this process more effective because of the knowledge they bring.

Integral here is for the implementing partner to avoid assuming that all knowledge related to the project is absolute and necessary for completing the project. Because of the asymmetric relationship inherent in the development process, the responsibility is on the project and implementing partner to adapt and respond to local conditions. By editing project background knowledge to fit local conditions the implementing partner will be facilitating community acceptance of the project and increasing the possibility for a more genuine grassroots continuation and long-term sustainability of the project.

To continue with the climate change example, a significant area of overlap is that community members, while believing that God causes climate change, also believe that deforestation can also influence rainfall. Respondents said that climate change will continue because people in the world will continue to misbehave. If an implementing partner were to recommend climate sensitive farming or reforestation for example, it would be valuable to avoid talking about carbon gases and the ozone layer. It would be better to focus on how certain tree species can be used to increase farm productivity by emphasizing how trees are a part of the natural process of rainfall, and that while behaviors in the rest of the world may influence rainfall elsewhere, residents have the ability to influence local natural processes by pleasing God.

This potential framework for merging both local and developmental knowledge does not deny the actions of God in the world, or preference scientific knowledge. It does not include all background information and attempts to bring in as much local knowledge as possible.

The next step is presenting the knowledge to the community. If the process of synthesizing the local knowledge and project knowledge is done effectively, the community audience will recognize elements they already know. This is the essence of collateral learning. Being presented with knowledge that is already known will make the new information more relatable. In short, the implementing partner will be adding new knowledge to an existing framework.

The presentation and communication of this new knowledge is just as important as synthesizing local and project knowledge. While PowerPoint presentations are appropriate for professional audiences this is not feasible in rural areas. Appendix 2 includes tips to remember when developing a presentation. Many tips pertain to developing an effective PowerPoint but others will be useful in multiple contexts.

Above all others, this recommendation will be the most valuable in ensuring the long-term success of the development project.

Summary

- TIP: Adapt project knowledge to local knowledge within the community to reduce anxiety of learning and promote genuine collateral learning
 - Identify the key message that the implementing partner wants the community to learn
 - Simplify this into 15 words or less
 - List the background knowledge that makes the key message “correct”
 - Rank this knowledge in order of importance
 - Avoid thinking that all project knowledge is essential for the key message to be accepted
 - Compare project knowledge with local knowledge uncovered during in-depth interviews
 - Identify points of overlap and dissimilarity
 - Adapt project knowledge and bring it more into line with local knowledge
 - Favor local knowledge in issues of dissimilarity
 - Work with local organizations if possible
 - Present this knowledge adaptation to the community

- See Appendix 1
- Benefits:
 - Clarifies project message and goals
 - Distills project knowledge into a handful of essential points
 - Increases the potential that the community will understand and accept the partner's key message
 - Facilitates collateral learning
 - Promotes long-term project success by changing local knowledge that influences behavior

3. Conclusion

Education is the heart of development. The long-term success of any project, even if it is to deliver a particular technology or product to the community, necessitates that the community first understand why the new technology or product is necessary and, secondly, how it can be used and maintained. The first level of understanding is the most difficult to achieve but if done effectively, promotes genuine behavioral change and capacity building through the process of collateral learning.

Collateral learning first involves building relationships within the community. These relationships facilitate understanding of community social structures and dynamics that will allow the implementing partner to better adapt the knowledge necessary for the project to local conditions and existing knowledge. This makes the knowledge seem less foreign to the community and reduces barriers that may inhibit genuine understanding, acceptance, and, thus, long-term project success.

Adapting project knowledge to local contexts places the burden of responsibility on the implementing partner to make project knowledge relevant and appropriate to the local context. In short, the implementing partner will be combining what the community already knows with new knowledge. Ultimately this increases the ability of the community to accept the new knowledge, which will in turn influence behaviors that build capacity and ensure the long-term success of the project.

While the recommendations outlined above can be used individually to strengthen program components, if taken together implementing partners will have an intensive and effective development toolkit. In short, implementing partners must keep in mind that strong relationships facilitate knowledge exchange; knowledge exchange is the heart of development; and effective knowledge exchange is only possible when barriers between the groups are significantly reduced.

Appendix 1: Knowledge Management and Exchange Worksheet

Worksheet Instructions

Introduction: The following sections are to be followed in order. To help organize your information open a new Word document and create a numbered list with the following:

- 1. Logistics**
- 2. The Audience**
- 3. The Issue**
- 4. Community Information**
- 5. Community Knowledge**
- 6. The Presentation**
- 7. The Evaluation**

As you move through this worksheet enter the information directly into the document. Revisit sections often making sure you have all required information. Share this worksheet with others working in similar domains to increase efficiency, reduce costs and preparation times.

Worksheet:

Step 1. Logistics

Begin with the basics. List in this section the amount of money you have to work with and what costs you are expecting. Enter the date for the presentation and the date when the presentation will be completed (Step 6). Divide the total time into manageable goals: list the date when Step 2 will be completed, Step 3, etc. Fill out this information on your Word document and mark the dates on your work calendar.

Begin thinking about the space that will be used for the presentation. How many persons will be in attendance? What space will be large enough to accommodate everyone comfortably while they will still be able to see and hear the presentation? Pay attention to details: Is there enough seating? How does your voice carry? Will noise from outside distract the audience? Does the room have adequate lighting? Is there reliable electricity or will a generator be necessary? Will you need to bring your own projector and screen?

Step 2. The Audience

This is the first step in developing the presentation or workshop and the most important. In the space provided write down the number and types of people who will be attending your presentation. Are they government officials, farmers, teachers, university students, etc.? Will the audience consist of men and women, elders and youth? How many will be in attendance? This information will inform the development of your presentation.

Think about the dynamics within the group. If you are presenting on gender sensitive issues is it better to present to the men and women separately? Think about the most effective ways in which your key message will be understood and accepted by the audience.

Step 3. The Issue

In this space you will define and refine the information or key message you wish to convey during your presentation or workshop. In the space provided, first list the overarching information or theme that is the goal of the presentation. What is the big goal of the event? Limit this to 15 words.

Second, write down how you would like the audience to apply the information into their own work. Make this connection explicit. State the ways in which audience members will take this information and incorporate it into their projects. Will it be at the policy level, informing why projects are necessary? Is the information to be directly conveyed to other parties or groups? Now, list the elements or logical steps that you plan to convey so that the audience arrives at the overarching goal?

Fourth, star the elements or steps that are absolutely essential. Think critically about each one. Is it really necessary that it be included in the presentation or workshop? Should it be given emphasis in your presentation? Can it be incorporated into another key element or step with little emphasis?

Finally, write these steps and goal in different ways: imagine you're conveying this to a specialist in your field. How would you write it? What about a rural community member with little to no education? Pay attention to what is needed in communicating this information. Can you use the same words? This part of the step is essential in helping you think about new ways to present your information based on audience and participant composition.

Step 4. Community Information

In this section "community" refers to your audience. Refer to Step 2. For this step gather demographic information about your proposed audience. You don't have to ask each person you plan to invite to the presentation to gather this information. If they are members of a professional community what is the average education level? Do they all have experience in the topic you are planning to cover? If so, in what capacity? If you are reaching out to community groups, whether urban or rural, you should gather demographic information. What are the statistics on age, gender, religion, education type and level, and primary sources of income? This information will allow you to better understand your audience and will prepare you for Step 5, tailoring your presentation for effective communication.

Step 5. Community Knowledge

This step will be the most time consuming, but do not allow it to discourage you. Collecting information about what the proposed audience members already know will allow your own presentation to grow by leaps and bounds! It is imperative that you do not rely on your

assumptions about what the audience members already know or do not know about the topic of your presentation. There is often a large gap between what we think we know and reality.

Gathering information on what people know about your proposed topic will help strengthen your presentation by making the information relevant (i.e. you are not presenting something the audience already knows) and manageable (i.e. the audience will be able to understand and apply the information into their own work). It will also increase your ability to work with diverse individuals and add sophistication to your own knowledge.

Spend the time needed to gather this information and reflect on it in relation to the knowledge you want the audience to learn. Think critically about your own knowledge to determine whether or not it is absolutely necessary for the audience.

Step 6. The Presentation

The objective is to present information that is a synthesis of what the audience already knows with new information that you are bringing to them. This is what's known as collateral learning. To do this effectively, you must synthesize the information gathered in Step 5 with the outline of the audience in Step 2.

Begin by presenting the knowledge that the audience already knows. This will allow the audience to ground their learning in the familiar information. This information will also act as a base on which the audience can build or add on the new information you want them to learn.

The delivery of this knowledge is just as important. Consider your audience's language skills. Do you need an interpreter? Would it be more effective to give a talk or to promote a discussion? Would a skit enhance your key message? There are multiple ways of presenting the knowledge. Thinking about your audience and the key message together will help you determine the most effective means.

Step 7. The Evaluation

This step is integral in order to gauge the overall effectiveness and impact of the project. In particular the objective is to gauge how many individuals within the beneficiary community have understood, accepted, and incorporated the knowledge of and for the project.

Questionnaires and in-depth interviews are the most effective tools for evaluation. Ideally, you should use the census developed in Step 2.3 Community Data Collection to engage in in-depth interviews with representative individuals in the community. You should take care not to ask lead-in questions, or questions that implicitly suggest the answer you hope to receive. From these interviews a questionnaire can be developed using interviewees' own colloquialisms, words and phrases, which can be administered to a larger number of community residents.

Additionally, the questionnaires and in-depth interviews should be combined with observed behavior. For instance, if the project is concerned with promoting latrine use, evaluation should include spending time within the community and noting the number of individuals within a

given timeframe who use the latrine. Similar tactics can be used for hand-washing stations and climate smart farming techniques. Be sure to pay attention to the demographics of the individuals you observe exhibiting these behaviors.

Appendix 2: Tips for a Successful Presentation

Introduction: The following tips are suggestions to help you develop an effective and clear presentation. This list is not comprehensive. Creating and delivering a presentation and engaging in public speaking are talents that grow over time.

1. The Preparation

Tip	Explanation
Specify the objective of the presentation	<p>Draft the goal or overall objective of the presentation. What is the central point you want to convey to the audience? The central point must be simple and concise. Write this out in 15 words maximum.</p> <p>If you are able to explain your subject and goal in a clear and concise manner, you will facilitate the conception and structure of your presentation.</p>
Determine your audience	<p>While preparing your presentation, determine the level of education or prior experience with the presentation subject. Repeating a lot of information with which your audience is already familiar will bore them and lose their attention.</p> <p>Additionally, knowing your audience will help you to avoid technical jargon and deliver an appropriate presentation.</p>
Prepare the technology and tools for the presentation	<p>Once you have determined the goal of the presentation, determine the most appropriate and effective method for delivering the information. Is it best to deliver the information through a speech, a sketch, or perhaps a conference? Do you need visual aides or equipment?</p> <p>After deciding how to present the information, be sure that you are able to access all necessary technology and tools. Prepare the tools for the presentation prior to the presentation itself in case there are any difficulties.</p>
Practice, practice, practice!	<p>Take the time to evaluate and revise your presentation. Practice delivering the information in front of colleagues. Ask for opinions from colleagues regarding the clarity of the information, PowerPoint slides, the structure of the presentation, and even your speaking style.</p> <p>Practice in front of the mirror paying attention to gestures and body movements. Body language is just as important to delivering</p>

	information.
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4. The PowerPoint

A PowerPoint is not always necessary or appropriate. Determine if and how a PowerPoint will increase the effectiveness of your presentation. If so, the following points will help you develop effective and attractive PowerPoint slides.

You control the PowerPoint	Always remember that PowerPoint is only an aide or tool. It is not the presentation itself. You want the attention of the audience to remain on you, not the screen. Simply use the PowerPoint to highlight your objective and key points.
Use the minimum amount of slides	Too many slides can diminish the clarity of your information as well as reduce the attention and interest of your audience.
Use a plain white or light-colored background	If the PowerPoint theme includes a background that is too busy—with bright, multiple colors or shapes—your audience will not be able to read the information on the slides.
Use a simple and clear font	<p>Chose a simple font such as Helvetica or Ariel. Avoid fonts that are difficult to read at a distance such as Ariel Narrow or Times.</p> <p>Be sure to use the same font throughout the entire presentation!</p> <p>Do not write text in a small font size. Use capital letters only for the first letters of a phrase. Do not write in all caps.</p>
Clarify your overall object and key points with bullet points and short phrases	<p>The job of the audience is to listen to the information that you present, rather than to read the information directly from the screen.</p> <p>Text on slides must be limited to <u>key points and short phrases</u>. Condensing information into key points will strengthen your message and facilitate the audience's comprehension.</p> <p>Try to place each point or phrase on a single line. Keep the number of key points to <u>6 maximum</u> for each slide.</p>
Strengthen your message with illustrations	<p>Use illustrations (photos, graphics, and icons) to reinforce your key points and overall message. When used appropriately, illustrations increase the effectiveness of the presentation.</p> <p>Particularly with graphics, the legend or key must be readable. They should also be simple with distinct colors and without additional</p>

	<p>embellishments.</p> <p>Adjust the size of graphics and photos; do not place multiple within the same slide. Be sure that the source of the photo or graphic (if not your own) is included below the image.</p>
Avoid animations and sounds	<p>In general, animations and sounds are not necessary and seriously detract your audience.</p> <p>Animations should be used only in rare cases. Ask yourself if they clarify your message. In such a case keep animations simple. Sounds are often only necessary when showing video clips.</p>

3. The Presentation

Structure the presentation like a report or a story	<p>The presentation must include an introduction, which outlines the parameters of the presentation. The introduction may outline a research problem that must then be supported by evidence and a conclusion.</p> <p>A useful method is to see the presentation like a story or a voyage along which you lead the audience.</p> <p>At the beginning, briefly outline the plan of the presentation. Tell the audience what you want them to know by the end of the presentation.</p>
Find a hook to engage the audience	<p>A hook is the key problem, question or situation that you will cover in the presentation. The introduction is your opportunity to trap the attention of the audience and explain why the presentation is necessary and important for you audience. This justifies the presentation.</p>
Build the story with your information and results	<p>Your information and results together form the path along which you lead the audience from the introduction to the conclusion. Each bit of information and conclusion must be necessary and align together logically.</p> <p>Be aware: Every result that you have may not be necessary to deliver to your audience. Only provide what they need to know.</p>
Reinforce your overall objective with the conclusion	<p>At the end of the presentation, use three to five minutes to synthesize and recap your message, goal, or objective. Repeat the central point that you would like the audience to take away from the presentation.</p>

	In the introduction you told the audience what you wanted them to know. Through the information you give them specifics of what they should know. The conclusion reiterates what they should have learned from the presentation.
Speak <u>with</u> (not at) your audience	Remember that you are a guide, leading the audience through the presentation. The PowerPoint is only a tool to aide you in guiding the audience. This means that the main interaction is between you and the audience. Thus, do not speak directly into the screen if using a projector. Face your audience and engage with them.
Prepare notes ahead of time	In order to stay facing your audience, prepare notes with key points and topics to cover. If you are using a PowerPoint presentation, you can use your computer screen to remind you what is on your slides as well as to advance through the presentation.
Speak strongly and clearly	<p>Even if you use a microphone or a sound system, speak strongly and with confidence. Your speech is the most important part of the presentation; it is the first tool to communicate your information.</p> <p>Do not speak too rapidly or too slowly. Give enough time for your audience to understand your points and information. With this in mind, you can use pauses effectively to provide time to the audience and to help yourself organize your thoughts.</p>
Maintain eye contact with your audience	Do not keep your eyes only on your notes or on the projector and computer screens. Continue to hold the attention of your audience by directly holding their gazes. Look around the room and individuals; do not only look at two or three particular persons.
Relax!	The most dynamic presenters are those who are relaxed and enjoy themselves while presenting.

The tips for a successful presentation were developed by the following:

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