# Exploring Knowledge of Climate Variability in Bangladesh

## *A Cultural Psychological Inquiry into Processes of Knowing*

Madeleine Brørs Midtgaard

Master of Philosophy in Psychology

UNIVERSITY OF OSLO

October 2015

II

**Exploring Knowledge of Climate Variability in Bangladesh**

A Cultural Psychological Inquiry

2015

Exploring Knowledge on Climate Variability in Bangladesh: A Cultural Psychological Inquiry into Processes of Knowing

Madeleine Brørs Midtgaard

Abstract

Author: Madeleine Brørs Midtgaard

Title: Exploring Knowledge on Climate Variability in Bangladesh: A Cultural Psychological Inquiry into Processes of Knowing

Supervisor: Ole Jacob Madsen

A growing body of research documents the effects of climate change on human systems, and highlights the importance of developing mitigation and adaptation strategies. To understand the effects of climate change on human systems, we need to gain insight into the human experience of climate change, or indeed climate variability; the fickle weather we live with. This paper presents an independent empirical study that was undertaken as part of the interdisciplinary research project TRACKS (Transforming Climate Knowledge with and for Society) that looks at the impact of climate variability on communities in northeast Bangladesh. The present study investigates the construction of climate knowledge in the context of rural Bangladeshi culture, looking particularly at *processes of knowing*. The study applies a cultural psychological approach to narrative-based interviews with community actors gathered by the TRACKS project. The study's findings revealed that personal experiences with weather was the most common avenue for knowing. Existing knowledge systems, such as the seasonal calendar aided participants in reasoning and sense making about changes, and elders, media outlets and science formed the most trusted sources of climate information. The study's result were viewed in light of cultural psychological theory: thereby the cultural triad and help illustrate the need to look at cultural and contextual factors when investigating how people come to construct and build climate knowledge. Participants also expressed a need for additional information, and possible limitations of local knowledge systems are discussed. This study aims to exemplify how interdisciplinary research on climate change may be necessary to solve multifaceted climate challenges and the very important role research on human systems have in mitigation and adaptation to climate change.

*Keywords:* climate knowledge, personal epistemology, cultural psychology, Bangladesh,

**Table of Contents**

**Introduction**

Events associated with climate change are increasingly disturbing human life. Climate change is already affecting a large part of the world's population, and in 2013, natural disasters caused the displacement of three times as many people as war (The Norwegian Refugee Council, 2013). Scientists argue that the predicted increase in average global temperature will set in motion "widespread and irreversible impacts" to the climate system (The Intergovernmental Panel on Climate Change, 2014), and therefore stress the need for mitigation and adaptations strategies in order to limit its effects.

Climate change will in particular place pressure on human systems. Swim et al. (2011) define human systems as systems of "cultural, economic, political and social" nature pertaining to the human domain. Centrally situated within the realm of human systems, is the discipline of psychology. Psychological research on climate change has until recently been scarce in comparison to other sciences such as sociology and human geography, but has the potential to be an important contributor to solving issues related to human responses and adaptation to climate change (Swim et al. 2011). The American Psychological Association (APA) addressed the potential role of psychological research in combatting climate change in their Task Force on the Interface between Psychology and Global Climate Change (2011). The association identified among others, investigating how people perceive and understand climate change as an important contribution to future adaptation (Swim et al., 2011).

Looking at how people make sense and build knowledge on climate change within the context of their lived reality can provide insight into how climate change affects communities exposed to climate threats, as well as how communities are able to respond to these challenges (Boissière, Locatelli, Sheil, Padmanaba, & Sadjudin, 2013). Exploring these types of perspectives are especially useful for climate research, but can also be valuable to the discipline of psychology, bringing light to the different psychological dimensions of climate change (Swim et al., 2011).

One such dimension is the way people come to know and are familiarized with the reality of climate change. The way people come to possess climate knowledge, also referred in this paper as *processes of knowing* (or personal epistemology) are important processes to investigate within the discipline of climate research. It may not only teach us about the subjective and personal ways knowledge on climate change come to be constructed, but the ways they are connected to larger knowledge systems that dictate and circulate knowledge on climate change within communities and nations.

**A Brief Demarcation of Knowledge Concepts**

How we are to define what counts as knowledge lies at the heart of epistemology, with most "modern" treatment devoted to the epistemology of science. The epistemology of science looks at how different scientific disciplines decide on how we can study our existence, and what can count as "knowledge" or "truths" (Mason, 2002,p.16). However, the way scientists come to know and produce knowledge about reality is different from what Hofer and Pintrich (2002, p.3) define as personal epistemology: the *individual* processes of knowing and belief about knowledge. In this paper, when referring to processes of knowing, the reference is to the psychological discipline of personal epistemology.

Defining knowledge is a significant conceptual challenge (also evident within climate research) with terms such as "perceptions", "understanding", "beliefs" and "views" all being used to describe various facets of knowledge (Bar-Tal & Kruglanski, 1988, p.3). Within social psychology, knowledge can be divided into two different types: procedural and declarative knowledge (Chiu & Hong, 2006, p. 105). These two types of knowledge correspond closely with tacit and explicit knowledge coined by Polanyi (1967). Significant effort has been made to understand and differentiate these two concepts, and the literature has generally agreed on the usefulness of Ryle (1949) definition to demarcate between "knowing how" (procedural knowledge) and "knowing that" (declarative knowledge) (Chiu & Hong, 2006, p. 102; Davies, 2001; Ryle, 1949, p. 27). Procedural knowledge is the knowledge individuals possess, but are unable to explicitly state, commonly associated with imitation and skill learning, made available during cognitive processes such as perception and attention (Chiu & Hong, 2006, p. 105). This type of knowledge is often temporarily available and used with little cognitive effort – such as the tying of a shoelace (Davies, 2001). Declarative knowledge relies on representations, and these representations help describe and explain concepts. This type of knowledge includes the knowledge individuals can provide through explicit statements such as facts (Chiu & Hong, 2006, p.102).

Some scholars argue that defining knowledge as a value-neutral concept (as defined above), produces a gap between the processes of acquiring knowledge, and the subsequent use of that knowledge. McLellan (1996, p. 20) suggests that the view of knowledge as "bodies of knowledge" conflicts with the social and contextual nature of knowledge construction. That instead, personal epistemology needs to look at knowledge as "situated cognition" where knowledge is both produced by "activity, culture and context" and navigated by the use of human agency and intention (McLellan, 1996, p.6).

2

**Situating Personal Epistemology in a Cultural Context**

McLellan's argument (1996) points at the difficulty personal epistemology has with integrating the processes of knowledge construction: whether they are inside or outside the mind. The field has recently been a victim to one of the same points of criticisms as general psychology, namely a positivist focus with an overreliance on college students as a participant pool and basis for theoretical assumptions (Heine & Norenzayan, 2006). Though these populations may be relevant to the study of learning (which has been the focal point of the discipline), if the discipline is to show its relevance outside the classroom and into the realms of general psychological science, it needs to be able to gather a stronger foundation on the variety of processes humans draw knowledge from. Hofer (2008, p. 16) points at skewed representation as a major flaw in bringing the discipline forward.

An increasing body of research outlines that culture has the ability to influence even core processes of human cognition, such as perception  (Henrich, Heine, & Norenzayan, 2010). In terms of knowledge, people from different cultures may in fact vary in the sources they draw from, how they conceptualize knowledge and whom they consider to be esteemed holders of knowledge (Thomas, 2001). The theoretical models of personal epistemology in psychology have tended to be individualistic, and may therefore present weaknesses in local (or illiterate) populations where knowledge tends to be defined communally, and transmitted by oral and social practices (Atran, Medin, & Ross, 2005; Thomas, 2001).

Hofer (2008, p. 16) outlines some areas where the study of personal epistemology across cultures may shed light on understudied aspects of processes of knowing in psychology. For instance, Hofer (2008, p.17) argues for more attention spent on the role of social sharing and social processes of knowledge construction. Looking at how people "come to know" in a variety of cultural settings may contribute to more robust theoretical models of knowing, as it encapsulates a wider range of processes than those traditionally studied within personal epistemology (Hofer, 2008, p. 16).

**Laypeople and Scientific Knowledge on Climate Change**

As the section above aimed to illustrate, knowledge and knowledge production can be challenging for researchers to define and as a result, understand. In respect to climate change, the problem has been the opposite: as laypeople have struggled with understanding scientific knowledge on climate change (Gifford, 2011; Swim et al., 2011). Climate research on the knowledge of laypeople has mainly been categorized within the Public Understanding of Science perspective (PUS), aiming to understand how laypeople themselves come to assimilate, and make sense of scientific knowledge on climate change.

3

Initially, the "knowledge deficit model" suggested that the public's lack of knowledge serve as the main barrier to meaningful behavior change (Nerlich, Koteyko, & Brown, 2010). In recent years, a new conceptual understanding of laypeople's perception of climate change has swept the field of PUS. This research suggests that people in many instances possess a variety of information on climate change, yet often struggle with what action to take with the information they possess (Gifford, 2011; Lorenzoni & Pidgeon, 2006).

The representation of climate change as an abstract concept in the West, has also been blamed for widespread apathy and denial of the concept, despite public acceptance of anthropogenic climate change (Gifford, 2011). In a study on the Norwegian response in particular, Norgaard (2011) refers to a "public silence" on the topic, where people possess a clear understanding of the threat of climate change, yet take surprisingly few steps towards climate mitigation (Norgaard, 2011, p. 179). The difficulty people have with transforming knowledge into action, has among other reasons been attributed to the dissonance people experience between their knowledge of anthropogenic climate change and the lack of environmental cues to support their knowledge (Gifford, 2011).

**The West vs. "The Rest"**

One point of contention within the field of climate research is what many understand as a power gap between the West, and "the rest" and subsequently, the scientific efforts aimed overwhelmingly on Western populations. This points at an additional problem in climate research: the disparity between the areas producing science on mitigation and climate action, and the areas most severely affected by climate change. When looking at impacts, developing nations of the Global South are especially vulnerable, yet a majority of scientific studies have been aimed at the Western understanding of climate change (Lorenzoni & Pidgeon, 2006; Swim et al., 2011; The Intergovernmental Panel on Climate Change, 2014; Weber & Stern, 2011). Rural communities in developing nations are in particular danger, as the uncertain future of traditional subsistence strategies place food security under pressure (Bryan, Deressa, Gbetibouo, & Ringler, 2009). In order to create sustainable solutions to the variety of ways climate change may impact different parts of the world, the investigation of vulnerable and underrepresented populations is essential. This means incorporating the perception, views and knowledge of laypeople globally, in order to understand the different ways communities may be affected and the unique set of adaptation strategies that may be necessary.

Within the scholarship of public knowledge of climate change, the literature is overwhelmingly interested in how people perceive and understand climate change, but place

little emphasis on how processes of knowing and acquiring knowledge may influence how we in turn perceive and understand changes in climate. I see this as a concrete gap in the research on climate change, that this study helps address. In addition, the skewed research focus within the literature of public understanding of climate change (as well as personal epistemology) gives precedence to Western populations, therefore knowledge on climate change in other populations are consequently overlooked. We still know little on the properties of personal epistemology outside the west, and the call for insight into the different (or similar) processes people use in attaining knowledge, is therefore relevant to both personal epistemology, and climate research.

**Bangladesh at Risk**

One country in particular threat by climate change is Bangladesh. The country has experienced 234 natural disasters, where cyclones and storms have been the most destructive (PreventionWeb, 2014). It experiences one of the highest incidences of hazardous weather events in the world, making it particularly vulnerable to changes to the intensity and magnitude of weather events. Bangladesh is a climate victim due to flood vulnerability as the world's largest delta, situated between major river systems such as the Brahmaputra and the Ganges, as well as the ice deposits found in the Himalayan mountain range (Dewan, 2015)(Dewan, 2015)(Dewan, 2015)(Dewan, 2015)(Dewan, 2015)(Dewan, 2015)(Dewan, 2015)(Dewan, 2015)Choudhury et al. (2006); (Dewan, 2015). Its placement between major water deposits of the region, and being a low lying country, makes it vulnerable both to changes in weather patterns annually (climate variability) as well as in future sea-rise (Shameem, Momtaz, & Kiem, 2015). These factors contribute to positioning Bangladesh as a country where climate research is both crucial and urgent.

**This Study**

This study aims to explore *processes of knowing* of climate variability and change in Bangladesh. It focuses more particularly on the different ways climate knowledge is constructed within a local and rural Bangladeshi sample. The study draws it material from interviews conducted with rural populations in Sylhet Division, Bangladesh. This study is an independent research study that has worked in collaboration with the larger research project, Transforming Climate Knowledge with and for Society (TRACKS). The TRACKS project is a three-year long interdisciplinary research project focused on "how communities in northeast Bangladesh can produce high quality knowledge in support of local climate change adaptation" (Transforming Climate Knowledge with and for Society, 2015). The project is a collaboration between Norwegian, Bangladeshi and other international partners, in which my

study represents only one aspect of the many uses of the material. Altogether, the project will analyze 235 qualitative interviews and organize several peer community workshops, which will function as avenues for community stakeholders to share and bring light to existing local knowledge on climate variability and change.

**My role.** The collaboration with TRACKS did not only supply me with the data material for the study, but also allowed me to follow and observe a large part of their research process. Since I entered the project in an early stage, I was able to engage with the project in an applied manner through observing and partaking in important research processes such as designing the interview framework and observing fieldwork and data collection.

## Research Question

The overarching research question in this study is focused on the processes of knowing that take place in a sample of participants from a rural Bangladeshi area. I understand these processes of knowing as important processes in the construction of local climate knowledge. One general research question guided the research: How is knowledge on climate variability produced within a local Bangladeshi setting? In order to attend to the different important factors included in this research question (processes of knowing, culture and climate change) this thesis used an interdisciplinary focus, also drawing from areas outside of psychology.

## Thesis structure

First, a brief clarification of climate terms is provided in order to familiarize the reader with the most frequently used terminology in the thesis. In addressing the study's research question, this thesis will first give insight into the relevant literature on local experiences of climate change that informed the empirical background. Subsequently, the cultural psychological theory and social constructionist epistemology is presented, which formed the remaining theoretical framework. Thereafter follows an explanation of the study's qualitative research methodology and approach. The method section provides an account of the study's steps in gathering data material, as a part of the TRACKS' data collection. The reader is then acquainted with the analytical framework and procedure, where thematic analysis and cultural psychological theory aided in guiding the process. Reflections on the validity and reliability of the study and research process follows. The results of the analytical procedure culminates in the analysis, where local processes of knowing are understood in light of the cultural triad. A conclusion is then provided, including lessons from the study.

**Climate Change vs. Climate Variability**

Making scientific knowledge understandable for laypeople has been, and is arguably still, a major challenge for climate researchers (Gifford, 2011). With this in mind, I wish to produce clarity on the use of climate terms within this thesis and thereby bring attention toward the conceptualization and use of two commonly used terms: climate change and climate variability. Climate science differentiates between the concepts *climate change* and *climate variability* as they refer to different climatic scenarios. However, they both allude to changes in weather, and therefore may easily be confused.

Climate is essentially about weather, as the typical weather in an area over a period of time is defined as climate (The Intergovernmental Panel of Climate Change, 1995). Any area's climate allows a certain amount of deviance from the norm. These deviations from the typical weather can happen naturally, and are defined as climate variability (IPCC, 1995). In contrast, climate change is the appearance of a long-term change in weather (i.e. global warming will lead to an increase in an average global temperature) which is a scientific calculation of averages. As opposed to science, humans are not able to "experience" an average or range, as our experiences of weather generally revolve around our perceptions of weather from a day-to-day or within a season.

For this reason, the TRACKS project has made an explicit choice to focus on how Bangladeshi communities mobilize knowledge around "climate variability", as distinct from the arguably more abstract study of "climate change". The participants' knowledge of weather change were as a result of this explicit choice, understood as experiences of climate variability. Jasanoff (2010) have argued that if we are to address knowledge of climate as extending beyond the science, we must first shift from concepts of climate change to climate variability.

**Theoretical Framework**

The theoretical framework of the study is comprised of what I see as three distinctive parts: the literature informing the empirical background, the cultural psychological theory establishing the study's theoretical perspective (and thereby also its social constructionist epistemology), and lastly the qualitative approach which guided the analytical procedure.

**Literature on the Experience of Climate Change in Rural Populations**

What follows is a brief overview of the literature that informed the empirical background of study. Within this outline, I will refer to climate change due to its use in the literature, though this study looks more closely on experiences of weather change, and therefore climate variability.

Within the domain of climate research, rural populations in the Global South have only recently become a topic of interest, and within psychological research on climate change, they are poorly represented (Swim et al., 2011). As a result, I drew from social science research on local experiences of climate change to inform the study's empirical background. More specifically, I sought out literature on rural populations in the Global South, due to contextual similarities with the study's participant group. This literature was later used to inform the analysis.

**Perceptions, perspectives or knowledge?** One immediate observation from the literature was the apparent difficulty of researchers conceptualizing and defining local knowledge. The literature often dealt with perceptions of change, or local knowledge of change, yet drew very few connections between the two. Instead, the local experience of climate change was discussed by employing a range of different terms that would allude at a similar meaning. As a result, what constituted as knowledge or knowledge processes, remained an elusive concept. Within only a small sample of research articles, a variety of approaches and conceptualizations were prevalent, from "local perceptions on climate change" (Basannagari & Kala, 2013), "rural perspectives on climate change" (Moghariya & Smardon, 2012) and "local knowledge on climate change" (Gamble et al., 2010). In addition, the visual nature of processes of knowing were characterized intermittingly as "observations" (Basannagari & Kala, 2013) , "perceptual knowledge" (Becken, Lama, & Espiner, 2013) and "perceptions" (Shameem et al., 2015).

In an attempt to avoid such confusion, within the space of this thesis, I will refer to knowledge as encapsulated in the McLallan (1996, p.6) definition of knowledge in the introduction ("situated cognition"), and make use of the term local in reference to the understanding of knowledge systems as situated in histories, narratives and ecological contexts. In comparison to "rural", a "local" context can be defined as a space and place-bound concept rather than a purely geographical. In this sense, any place can be a locality, but a locality itself is bound together by a common history, ecology and context that situates the locality as different from other localities (Roncoli, Ingram, & Kirshen, 2002). The term

"local" therefore corresponds closely with the cultural psychological understanding of context (Schweder, 1991) as environments comprised by different social, cultural and physical properties, which diverse interactions contributes to the construction of unique local place identities.

**Shared properties of local knowledge systems.** Research on local knowledge on climate change suggests that local knowledge systems share some common properties. The reliance on observational (Ruddle, 2000) and experience-based knowledge sustained by cultural transmission practices stand out as a particular characteristic (Akerlof, Maibach, Fitzgerald, Cedeno, & Neuman, 2013). Perceptions and observations have been suggested as the basis for understanding climate change, and a large part of literature on local experience of climate change has as a result focused on the perception of change (Becken et al., 2013; Boillat & Berkes, 2013; Boissière et al., 2013). A study on the perception of climate change among Apple farmers in the Indian Himalayas found that the majority of local changes detected were based on visual perception, in contrast to other senses (Vedwan & Rhoades, 2001). It is perhaps not so surprising that a large part of our understanding of change comes from what changes we are able to actually observe with our own eyes. Though the literature (perhaps rightly) highlights the role of perception, it also emphasizes that observations take place in the context of personal experiences with weather. Local populations are often situated in areas where interacting with the environment are a natural part of daily life or an inherent part of people's occupations and livelihoods (Berkes, 2009). In the study by Vedwan and Rhoades (2001), it was people's perception of change viewed through the lens as farmers, which formed the basis for local understanding and perception of climate irregularity. The proposed connection between rural occupations and local climate knowledge have been attributed to chronic interactions between humans and nature. The use of subsistence strategies in particular, embeds local knowledge into regular activities and practices, whereby it becomes a part of the local body of knowledge (Ruddle, 2000). In this process of knowledge construction, personal experience is a central process of knowing, and therefore also central to the personal epistemology of local knowledge (Becken et al.,2013;Thomas, 2001).

The body of research on local understanding of change (both perceptions and knowledge) suggests that, unlike the scientific tools used to measure climate change, people are not objective entities, but experience weather through pre-existing conceptions and understandings about how they view reality. The experiences of weather are therefore filtered

through frameworks of beliefs and knowledge, such as religious/spiritual beliefs, and existing knowledge about climate as well as schemas to understand weather (Boissière et al., 2013; Byg & Salick, 2009; Moghariya & Smardon, 2012).

Studies indicate that local knowledge on climate may also be influenced by existing belief systems, and religious beliefs have been proposed as a way people make sense of climate events (Boillat & Berkes, 2013). Though religiosity is founded on belief systems, therefore significantly different from both perception and knowledge, studies indicate that belief systems may serve to navigate local understandings of climate in a similar manner to knowledge systems. In a study of Bolivian Quechua farmers' perception and understanding of occurring weather changes, locals interpreted the changing of weather patterns as evidence for existing beliefs such as the Inca belief of the world's cyclic nature and Christian doomsday prophecies (Boillat & Berkes, 2013). In a similar manner did locals of Eastern Tibet interpret the onset of climate irregularities through traditional spiritual beliefs, claiming the changes to step from unappeased weather deities (Byg & Salick, 2009). This is an example of how local belief systems can be a framework people employ to understand the abstract concept of climate change within their already available and understandable framework.

The literature on local climate knowledge emphasizes the holistic ways people tend to understand and build knowledge on climate change. Changing weather patterns impacts a variety of aspects of life, and are often interpreted alongside other considerable changes happening in the community. Alongside religion and historical influences, the Quechua people of Boillat and Berkes' (2013) study came to understand the changing climate in the context of other major changes happening in the locality and region. Climate change was treated in same way as many of the other regional or local changes occurring and was constructed and conceptualized as being a part of a larger change within the community This suggested that knowledge about the world, as McLellan (1996) accounts, should not only be seen as "bodies of knowledge", but in fact "situated cognition" where knowledge construction takes place in connection to the setting it is created in. The next section will explore these questions further, by explaining the use of cultural psychological theory to form the theoretical perspective.

**A Cultural Psychological Inquiry**

A cultural psychological framework forms the basis for the study's theoretical perspective. The reason for making use of cultural psychology as the theoretical basis for the study is founded on what I view as a widespread, de-contextualized manner of research,

prevalent in general psychology and psychological research on climate change. I contend that culture-based and context based approaches have a unique opportunity in producing holistic accounts of intricate and urgent climate challenges.

There are two main theoretical assumptions that guide this research project. First, the idea of the human mind and behavior as inseparable from its socio-cultural context (Schweder, 1991). Second, that culture is a major influence on human psychology, and may best be understood by making use of a wide definition of culture that is able to capture the deep and historic role culture has played in human history (as conceptualized in Chiu and Hong, 2006, p.15).

One of the key concepts in cultural psychology is mutual constitution. Mutual constitution as a principle posits that we do not live outside of our contexts. It emphasizes the way humans both are created and create their surroundings (Markus & Hamedani, 2007, p.7; Schweder, 1991).  As Schweder (1991)  theorized, humans interact not only with and through each other, but through the environment itself by use of intentionality. This means that we as humans, are not only affected by the world around us, but are actively engaged with constructing what we understand and perceive as reality. Reality as we observe it is in this view seen as one of human activity and construction, filled with symbolic meaning that in turn guides the way we navigate it. From this perspective, the existence of cultural variety manifests itself as a multitude of psychologies.

Cultural psychology emerged as a counter-movement to what many psychologists believed as a psychology that removed humans from their natural context. The emergence of the cognitive revolution in the 1960s marked a turning point in modern psychology, where the discipline saw a strong shift in both status and identity. One of the cognitive revolution's most pronounced legacies to contemporary psychology has been the idea of universality. Cultural psychology's main argument has traditionally been around the rejection of universalistic conceptions of human psychology. However, cultural psychologists ironically do not reject the existence of universal human propensities or behaviors (Markus & Hamedani, 2007, p. 88). In fact, they believe the only way of establishing the existence of a universal human tendency, would be to study the human mind and its relationship with culture. It is however, the *search* for universal tendencies they believe contributes to the reproduction of fallacies about human nature (Markus & Hamedani, 2007, p. 88; Miller, 1999, Schweder, 1991).

**Defining culture.** Culture is often described within the social psychology of culture as a system or stock of shared knowledge, beliefs, ideas and practices (Chiu & Hong, 2006, p.16). However agreeing upon this definition of culture is an area of great debate in cultural psychology, to the point where it has generally agreed to disagree, dispersing into several directions (for a better review see Kitayama & Cohen, 2007) where the symbolic direction founded by Schweder (1991) has served as the main focal point. Twenty years after Schweder's introduction of cultural psychology, the field is still unable to gather around a unified definition of culture, and coming up with an encapsulating definition of culture presents itself as a headache for researchers of culture in psychology, and across disciplines (Atran et al., 2005; Patterson, 2014).

I argue here for the use of a wide definition of culture goes beyond traditional conceptualizations, which have tended to draw the boundaries of culture based on nationality or ethnicity. Though national and ethnic definitions of culture has provided a valuable platform to understand differences in the manifestation of psychological phenomena globally, it has also reproduced East/West dichotomies within cultural research, such as the overwhelming focus on individualism/collectivism as an important cultural expression (Chiu & Hong, 2006, p. 16). Despite of a robust body of science documenting the cultural differences between East and West populations, this persistent view of culture may reinforce stereotypes and the belief of psychological divergences based on cultural groups. Instead of viewing these differences as a result of group differences, one may view these findings as the result of a variety of adaptive responses culture has contributed to create, whereas some has yielded different psychological understandings (collectivism/individualism) and some have yielded similar responses (theory of mind) (Heine & Norenzayan, 2006; Henrich et al., 2010). In this study, I have attempted to work around such contentions within the discipline by the use of the wide conceptualization of culture, found within the social psychology of culture, as the cultural triad.

**The cultural triad: subjective, social and material aspects of culture.** This study's approach to culture looks at it as a triad, consisting of the subjective, social and material (Chiu & Hong, 2006, p. 9). The view of culture as a triad is characterized by nuance, and incorporates the many levels of culture, exemplified by Chiu & Hong (2006):

In response to ecology, human beings develop different subsistence strategies, technology and other aspects of material culture. To coordinate social activities in collective living, various aspects of social culture are invented. Finally, aspects of subjective culture are constructed to give meaning to people's experiences and subjective life (Chiu & Hong, 2006,p.15).

The view of culture as a triad is both holistic and specific. It allows for an investigation of culture and climate knowledge that encompasses the possibility of a variety of cultural processes. The strength of this model is its ability to be able to concretely define which aspects of culture are at play and their different impact on human activity, while also taking into account the variations in culture based on local and ecological differences.

In line with much of cultural psychology's social constructionist conceptions of reality, keenly interested in the way people both influence and are influenced by their surroundings, this study takes a similar approach to the nature of knowing about knowledge construction.

**Epistemology**

This thesis explores the local production of knowledge of climate variability and attempts to gain insight into the way people come to not only understand phenomena such as climate variability and change, but how they actively engage in constructing the meaning and understanding of the phenomenon itself. It views knowledge as a social and cultural production, in contrast to the view as knowledge as "uncovering of facts", and therefore mirrors the constructionist movement within psychology and neighboring social sciences (Mudege, 2008).

Local knowledge of climate, which fit into a larger picture of local knowledge construction, is viewed in this study as a labor of the intentionality of human activity. Here, the knowledge production process is an active process, that includes both the way people come to subjectively understand the world by the means of cognitive tools such as representations, as well as how people actively engage with available social and cultural meanings and ideas (Mudege, 2008). This approach underscores the understanding of the layperson as a "knower", equipped with agency and influence and argues for a view of knowledge production that is not intrinsically tied with positivist scientific paradigms. Instead, it allows us to look at the ways particular knowledge and thereby also "knowers" are validated and acknowledged over others. Mudege (2008) calls this process the "social

selection of knowledge". Within this view, one must acknowledge the competing views that exists of what can be defined as knowledge, or even "good" or "useful" knowledge, and that these views are connected to social, local and cultural values and ideas.

One criticism towards social constructionism and the constructionist movement within the social sciences, has been what many have coined as a failure to incorporate the existence of the natural and physical world (Nightingale & Cromby, 1999). When looking at the way humans construct and attach meaning to natural phenomena such as anthropogenic climate change, the relationship between humans and nature is essential. By categorizing facts as constructed, and truth as subjectivities, it avoids the discussion about how we are to position ourselves in relation to the natural world and its influence on human systems. Weather and nature forms the backdrop of human existence, and has throughout human history been an important influence on the formation and evolution of human culture. Greider and Gorkovich (1994) argue that "natural phenomena are also sociocultural phenomena" as they are formed and shaped from the mold of social interaction and cultural systems.

In a discussion on the understanding and construction of concepts such as "the environment", "nature" and "climate change", a discussion on how people relate and view their natural surroundings should be treated as a vital part of the discussion. This thesis argues that to be able to understand the way culture and knowledge on climate variability intersect, we need to incorporate the way people also place symbolic meaning of nature into the production and processes of knowing.

## Methodology

### Qualitative Research Approach

In this thesis, qualitative psychology was used to frame the study's approach to the construction of climate knowledge in Bangladesh. Mason (2002, p. 3) defines qualitative research as a discipline "concerned with how the social world is interpreted, understood, experienced, produced or constituted". Qualitative research attempts not only to explain the workings of the mind, but wishes to explore deeper into the very fabrics that constitute the human experience.

In this study, the sensitivity to the socio-cultural context is an important part of the research focus, which demands an approach that is able to attend to people's "background noise" in order to see how people construct knowledge on climate variability. Descriptions and stories about weather are more detailed than surveys and questionnaires about weather,

therefore may be better suited when attempting to understand how people themselves experience and build knowledge on the weather they are exposed to.

**Interviews**

The main source for data in the study is qualitative interviews with participants from the TRACKS project in rural NE Bangladesh. TRACKS sought to elicit knowledge on climate variability from different actors within Bangladeshi communities through the use of narrative-based interviews (TRACKS, 2015). This was a deliberate strategy that departed from asking questions to elicit an "answer" towards asking questions to elicit a "story". These narrative-based interviews demanded both open questioning, as well as providing interviewees with "hooks" to hang their anecdotes or narratives. This research design was based on the narrative strengths in eliciting stories that give insight into how events are understood and socially produced (Murray, 2000).

**The interview as a construction site**. The qualitative interview is in this study understood as a collaborative and constructed enterprise, where it becomes a construction site for both meaning and knowledge (Kvale & Brinkmann, 2009, p. 54).

Murray (2000) highlight four levels of the interview process that have significant implications on the construction of the story of interviewees. Though I do not look at the role of the narrative in this study (such as Murray, 2000), the levels are relevant to the understanding of the many factors that may influence the knowledge the interview format produces.

Murray's (2000) first level looks at the role of the participant. Within paradigms outside social constructionism, this would arguably be the only level the researcher attends to. It is the story of the interviewee, his or her subjective meaning of the story (Murray, 2000). The second level, called the interpersonal level, looks at the interview process as an effort between both the interviewer and the interviewee. This level requires careful reflection of the researcher and being critical of the possible ways the researcher may have influenced the knowledge production unintentionally. The third level differs from the second as it does not only look at the interview setting itself, but more directly at what the people in the interview bring to the interview in the form of "invisible" factors, such as social status and gender (Murray, 2000). The last level is the ideological level - this level looks at meta-narratives existing in society, and how they may influence the interview. The levels of Murray (2000) help exemplify all the different effects that have the power to influence the interview setting

apart from the interviewee (this will be elaborated on in the chapter on Reflexivity and Reflections).

Another consideration to keep in mind is what Bruner (1991) coined as hermeneutic composability. This is a "gap" produced by the distance between what the participant is attempting to convey, and what the researcher is able to infer or interpret of the participant's story. Bruner (1991) here highlights the limitation in any interviewer's ability to reproduce the stories and knowledge of the participant, and that the "truth" a researcher claims to profess on behalf of the participant will always be "veri similitude", meaning the researcher's understanding of what is the truth (Bruner, 1991).

In this thesis, I have not questioned the legitimacy of the participants accounts of the "normal" or what can scientifically be established as the "normal" weather within the area. I have neither been able to assert its legitimacy and it is it not of my concern to do so. I treat the constructions, stories and accounts of the participants as "real" in the sense that they represent the reality of the participants, and that my role as a researcher can only be to "reproduce" these constructed realities, cognizant of the impact I as a research have in contributing to their construction (Guba & Lincoln, 1994).

## Ethics

This study makes use of the data material belonging to the TRACKS project, which received ethics approval from The Norwegian Social Science Data Services (NSD) on the 1st of December 2014 (see appendix A).

## Method

### Data material

The selected data materials for the study are nine semi-structured interviews, gathered during data collection for the TRACKS project in November 2014. Out of the nine participants, six were male and three were female. Four were farmers (three male, one female), two were boatmen (two males), two were teachers (two females) and one stated their occupations as both farmer and teacher (one male). Three of the participants were between ages 26-35, two were between ages 36-45, two were above 55, and for two of the participants their age was stated as N/A. One explicitly identified as Hindu, one explicitly identified as Muslim, while the rest of the participants did not include explicit information about their religion.

**Location**

The study draws from the stories and material that came forward in interviews gathered with local community members within the Barlekha Upazila in Maulvibazaar District, in the Sylhet Division of Bangladesh. Barlekha is a mainly rural area with a population of 257,620, where the literacy rate is approximately 52 percent (Bangladesh Bureau of Statistics, 2013). The area is known for its tea production, as Sylhet Division produces the majority of tea in Bangladesh. Agriculture forms the basis of the area's economy, while fishing and day laboring is also prevalent. The Hakaluki Haor is situated within the sample area, and is the largest Haor (wetland) in Bangladesh, and among the largest in South Asia (Ahmed, Deaton, Sarker, & Virani, 2008). The Hakaluki Haor is central to both fishing and agriculture in the area, as it provides sedimentation for crops, and supplies the area with fish during flood season. The majority of the area's rainfall happen during monsoon season, which lasts from the middle of June to the middle of August (Dewan, 2015; Paul, 1997).

Figure 1.
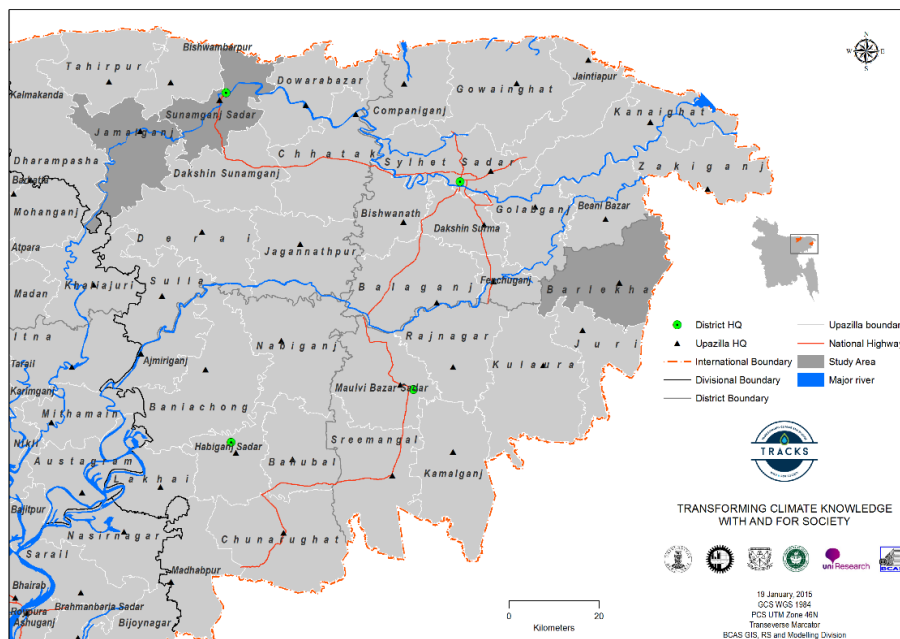


Map of TRACKS field sites. Barlekha situated in the NE corner of Sylhet, on the border to Assam, India. Property of the TRACKS project. Reprinted with permission.

**Designing the interview**

An interdisciplinary group of TRACKS researchers consisting of climate scientists, meteorologists and social scientists (including myself) contributed to the design of the interview during a two-week workshop.

The interview was structured and formed based on the project's objective to "describe, analyse and explore the relationships between local narratives of climate variability and its impacts in northeast Bangladesh" (TRACKS, 2015). This objective culminated in four main research questions oriented around how local Bangladeshis perceive, understand and experience weather within the context of their communities. The interview questions were then constructed based on the research questions and formed three focus areas: perceptions of impacts according to season, major weather events and their impacts and the third on sources of weather information and trust (Appendix B).

The project's interdisciplinary team allowed for the inclusion of multiple understandings of science and epistemology to be discussed and problematized during the designing of the interview. The project's Bangladeshi partners from BCAS (Bangladeshi Centre for Advanced Studies) were also a key part of the construction of the interview framework. The research and cultural knowledge they supplied to the process were an essential tool and resource during discussions of the cultural validity of the questions.

As I was present during the interview workshop, this gave me valuable insight into the process of developing the research questions, as well as the theoretical assumptions behind them, which served particularly valuable during the later fieldwork in Bangladesh. One of the major weaknesses of joining an external research project can be the loss of agency and control over the research process, as a different researcher or research group are responsible for the construction of the interview and data collection. The experience from the workshop also factored into my understanding of the transcripts, as I was able to reflect on the quality of the transcripts in relation to the interview guide and data collection. Being able to contribute to the project myself, thereby gathering a more complex understanding of its aims and objectives was vital in order to understand the material and the participants themselves.

**Pilots**

To establish the validity of the interview guide, the TRACKS research team completed two pilot studies prior to data collection. One small pilot interview was performed with Norwegian-Bangladeshis in Bergen in August 2014, and another set of nine pilot interviews were conducted with the research team in the field sites in Bangladesh, in September 2014. None of the interviews from the pilots were featured as a part of the data

material, but the pilots served as measure of validity and trustworthiness of the interview guide.

**Procedure**

  **Sampling.** The TRACKS project created quotas of knowledge stakeholders by performing "stakeholder mapping", which aided in identifying interview participants in the field. These stakeholders were then approached at the field sites. My sample was influenced by the objective of gathering perspectives of laypeople, as a means to investigating local processes of knowing. For this reason, the majority of the participants are from rural parts of Barlekha. In this study, one goal of sampling was to gain a data material that represented a variety of experiences and understandings, despite being a small sample. In order to obtain a diverse set of understandings, participants were not only selected by their knowledge of climate variability (through stakeholder mapping), but also in respects to gender, occupation and religious affiliation.

  **Data collection.** For the nine interviews used in this study, I joined as an observer along with two members of the Bangladeshi research team. The possible effects of this are discussed during the section on Reflexivity and Reflections. During the interview I assessed the interview setting, taking notes on body language, and what I considered to be important information about the interview setting. One interviewer and note taker from the Bangladeshi research team conducted the interview, which were held in Bangla. The interview was recorded for later transcription and translation.

  The interviews were conducted in a setting that participants agreed to be comfortable, mostly in their homes or close to their homes. Before the interview started, the participants were read a consent statement, ensuring the participant of their right in refusing to answer questions or pulling out of the interview if they at any time did not feel comfortable. As the interview started, the participants were asked a series of questions related to the seasonal weather patterns (its changes and impacts), where a seasonal template was used to fill in the participant responses. After this, interviewees were asked about nature signs, then asked to recall a significant weather event (or more) and its impacts. The last interview questions asked about which sources of information they used and trusted. Prompts and follow up questions were used throughout the interview to elicit more elaborate responses from participants. The interview was concluded by filling out the participants' demographic information. After the interview, the participant was given a small gift as a measure of gratitude for their participation, either a t-shirt for the male participants or a mug for the

female participants. A debrief between the interviewing research team was held for each of the interviews. Here the research team and I discussed the participant replies and addressed possible questions or challenges.

## Analytical Framework and Procedure

### Change of Research Focus

My initial interest was in the role of trust in the construction of local climate knowledge. However, I found difficulties with building a thesis on trust alone, as I did not feel there was sufficient information on how people employed trust and therefore opted to look at how people constructed and possessed knowledge on climate variability more generally. For this purpose, I created a new overlying research question to guide my research focus: How do people come to construct knowledge on climate variability and change within a rural Bangladeshi sample?

### Analytical Framework

Braun and Clarke's (2006) six steps for thematic analysis guided the analysis. Braun and Clarke (2006) define thematic analysis as "a method for identifying, analyzing and reporting patterns within data". Their framework for thematic analysis includes a sequential step-by-step guide that include: getting to know the data, constructing codes, identifying themes, reviewing themes, defining themes and writing up the analysis (Braun & Clarke, 2006). The themes extracted through the thematic analysis were investigated in light of existing literature in cultural psychology. In this manner, the theoretical framework steered my attention specifically towards the different ways culture may impact on personal epistemology.

The analytic procedure aligns well with epistemological understandings that fall under social constructionism, and can therefore be considered a suitable analytical method for this study (Braun & Clarke, 2006). With a larger sample, the narrative method could have been an interesting choice, perhaps shedding light on cultural influences and understanding as a part of the narrative self (as narratives are a way of understanding the way the self relates to other parts of social and cultural landscape) (Murray, 2000). However, my primary reason for not employing such an analytical procedure during this study was what I understood as a lack of "stories" in the material, encountering too "few" narratives to establish any sense of person.

In the following section I will provide an explanation of how the analytical procedure was employed to develop the study's results and findings.

**Analytical Procedure**

As a starting point, I read and reread the material many times. I both read participants' responses individually; and collectively; actively searching for common traits within the material. Thematic analysis provided me with a flexible framework for understanding the participant's responses, and the freedom to be able to look at a variety of topics and themes within the data. Even though I remained open towards the significance of the whole data set, I did lean more heavily on the deductive approach, also referred by Braun and Clarke (2006) as "top-down" approach, and I was particularly sensitive to themes I understood to deal with how people come to encounter, conceptualize and know about climate variability. I also was also attentive to statements concerning cultural information as a result of the theoretical perspective.

I used the qualitative data research software Nvivo to help categorize the material during the coding process. Coding was a continuous process, and the original codes that resulted from the Nvivo extraction stood as a foundation throughout the analytical process. This step included reading through the material, attempting to tease out interesting concepts or features about the data that could be categorized as codes. Codes were created by grouping participant responses based on conceptual features I found to be interesting, relevant or prevalent in the material, or relevant to the overlying research question. Examples of coding was "They (village people) can guess the upcoming flood by observing dark cloud in sky before 2 or 3 days" as "environmental cues", or "We do hear or read or see through TV, radio, newspaper" as "media".

Step three through five (searching, reviewing and defining themes) were a fluid process where relevant codes were connected together, which marked the emergence of a picture of interconnected processes of knowing. Some codes and themes were discarded during this process as I zoomed in on what I found to be recurring themes that I found interesting and reflected in the data. During this process, I constantly had to question the validity of my assumptions and findings, and therefore relied on the empirical background of local perception and knowledge to compare the reliability of my findings.

Looking at the findings from a cultural psychological angle meant I had to converge two important conceptual ideas: how does culture influence peoples decisions, and how do people come to know about the natural world and climate. At this point, I actively looked at the role of culture, not only based on the material but from cultural psychological theory as well as my own understanding, looking back to experiences during the field. The cultural

psychological model of the cultural triad was here used to conceptualize and organize the cultural effects I found in the material. I went "back and forth" not only within the material, but between material and literature to be able to see if there were areas or concepts I might have missed in previous readings and coding. In this sense, the analysis shares commonalities with what Kvale and Brinkmann (2009, p.235) refer to as "theoretical reading" as results were continually influenced by and seen in the light of existing empirical studies.

The analytical procedure culminated in the final organization of the material by the use of two overlying topic areas: getting to know about climate variability and knowledge distribution and sharing. These two topic areas include the themes of personal experiences with weather, use of existing knowledge, social sharing and information seeking.

## Reflexivity and Reflections

Willig (2008, p.158) argues that the "qualitative approach does not supply the researcher with certainty" and therefore requires the researcher to have "realistic expectations on what a qualitative study can and cannot deliver". Cultural and cross-cultural studies bring with them a variety of challenges to the construction, completion and analysis of research (Gotschi, Freyer, Delve, 2008). In this study, I therefore did not only have to be open towards how I might have influenced the study as a researcher, but also as a cultural outsider. Reflexivity then becomes a vital tool to bring light to contextual effects and researcher effects (Borman, LeCompte, & Goetz, 1986). In the section below I have attempted to make use of reflexivity to bring attention to the many possible influences on the material and analysis, as a means to shed light on the study's validity and reliability.

**Accessing Data: Challenges During Fieldwork in Bangladesh**

**Power and privilege.** Central to my research experience in Bangladesh was the understanding of the different treatment I got as white foreign female researcher. People were naturally curious to me and displayed particular interest to my presence as a foreign researcher. I see both benefits and limitations with my presence during interviews and fieldwork.

As a foreign researcher, blending in is not an option in the Bangladeshi countryside. One benefit of this is the additional participants the study may have received due to an increased interest in the project as a result of my presence. As the research team expressed, this was a great help in reaching their quota of participants for the research project. However, the appearance of foreign researchers in the community may carry symbolic meaning that extends beyond the intentions of the study. Participants may make inferences about the impact

of the study, extending further than what the study is able to deliver. I encountered one such situation during a courtesy visit to and administrative office in Barlekha, where a community elder asked me if I could permit the building of more flood shelters. This experience highlights structures of dependency found in rural and poor Bangladeshi populations. It calls for awareness around the power divide that exists not only within the location of the study, but the economic and social differences between the researchers and the researched. With this in mind, one may also argue that many studies on Bangladeshi populations are performed with a power divide present. This question of ethics is problematic in most research on vulnerable populations. In Bangladesh, a country with a large population under the poverty limit (Bangladesh Bureau of Statistics, 2013), it is difficult to avoid significant differences in power and being aware of the implications of this, may be helpful when attempting to understand the way researchers have influenced the data.

**Female respondents.** Getting respondents for the study was one of the main challenges in the data collection process. Particularly, the recruitment of women was a challenge, as women often were busy with chores or other types of work, or reluctant to participate. As two teachers and one female poultry farmer make up the female respondents of the sample, these women represent a particular strand of female respondents. These women are employed women whom have opportunities to exercise agency within the context of their community. These women may therefore also have access to information or social networks whom less privileged women do not. This may have influenced the specific processes of knowing these women bring into the study.

**The village setting.** The village setting as a natural field site poses challenges to the research that might not arise in laboratory or more controlled interview setting. The interview setting was often bustling with noise and people, posing challenges for both recording and note-taking as well as gathering information from the participants without influence from others. Single participant interviewing was not always possible in this setting and highlights the cultural difference in the way people share knowledge socially. It was not uncommon that other people would answer the question. Sometimes the participants themselves would start asking other locals present about advice, which could lead to the people on the interview site to start discussing questions in a group. As climate variability, as well as climate change affects the whole community, many may feel they have an experience to add. One participant also reported in an interview that group discussions were a common practice in the community.

To counter these challenges, people whom were understood as disrupting participants' ability to speak, were politely asked to wait until the interview had ended to add something to the interview. In most cases, these simple reminders functioned well, giving the participants the opportunity to answer the question themselves. The single participant interview worked best with participants of significant local status, such as an elder or respected community member as the culture of respect towards high-status individuals would contribute to curbing the amount of outside contributors to the interview.

**Interview framework and process.** Perhaps one of the greatest challenges of having an "outsiders" perspective within the research team was that my definition on what qualified as valuable or "good" participant knowledge sometimes differed from the research teams. In the early stages of data collection the research teams expressed a certain degree of disappointment in participant responses, at times describing participants as "without knowledge" on the matter, or finding accounts as uninteresting and "common sense". This shows how topics and subjects that we as researchers find interesting can sometimes seem trivial and obvious for the interviewing staff as well as the respondents themselves. It may also imply a difference in what types of knowledge are valued, not only between cultures, but also between disciplines, as the knowledge a psychologist is interested in differs from that of a natural scientist. It is therefore not unlikely that this was a result of the difference within the research teams due to the mix of scientific background. I would however contend that this also could be a result of the social acceptance and validation of scientific knowledge above local knowledge within the larger hierarchy of knowledge in society.

It also became apparent during the interviewing process that one or more questions did not pose any particular meaning towards the respondents, or did not apply well to their understanding of weather change. This highlights the difficulty in producing questions that are relevant to participants, when the researcher is disconnected from the context of the study (Berger, 2015). Though an interdisciplinary, cross-cultural team that included Bangladeshi scientists produced the interview framework, they were still created by individuals whom understanding of climate variability was undoubtedly different from many of the participants in the study. This gap between the knowledge of the scientists and the knowledge of the local populations meant that some questions might elicit different responses than those the questions may have implied to elicit.

An effect I was later introduced to in the analysis, but in reality took place during the interview processes, was the use of leading questions by the research teams. One such

example was one interviewer posing the question "tell us something about seasonal change due to climate change", even though the interview itself did not mention climate change as a concept. Such structuring may have led the participants to answer about "climate change" when in reality, the experiences they mentioned was that of climate variability. This may also serve to perpetuate certain ideas of what climate change is to the participants, additionally blurring their understanding of scientific concepts.

My inability attend to such interviewing errors points at another limitation of being a cultural (and thereby lingual) outsider. Though the research teams had received training on interviewing, the narrative is a challenging interview method that demands specific skill by the interviewer, and a method the team arguably was not familiar with from before. This was an effect I had to pay particular attention to during the later analysis, being careful to understand the answers not only by themselves, but what Kvale and Brinkman (2009, p.171) understand as reading the replies in relation to the questions asked.

**Interpretation and Analysis**

   **Limitations of data material.** As illustrated previously in the thesis, interviewing and gathering data from rural populations in a culturally different sample brings with it unique challenges to the interpretation of the interview data, as well as affecting the quality of the material itself. My particular material can in one respect be described as "qualitatively scarce", as replies from participants were often short, and participants seldom took part in analytical or reflective thought processes around the effects of climate. I saw this as a limitation when treating the data.

   There may be different reasons for these participant replies. It may be a result of the interviewers, as argued by Murray (2000) and their presence may have influenced the direction of the interview in specific ways (as mentioned above). More specifically, they might have followed the interview guide too rigidly, not giving the participant enough time, "thinking pauses" or prompts. The short responses may also be a direct or indirect result of the participants' level of education. They may not believe their knowledge is valuable and actually confused by the perceived "more knowledgeable" researcher's interest in their accounts. The interview method may also not be a familiar conversational style for them.

   In some instances where the material is scarce and a prompt has been used one must weigh up the benefits of additional probing. The interviewer continuing to question the participant may possibly cause a problem of ethics, not adhering to limitations of the participants' willingness to talk (Kvale & Brinkmann, 2009, p. 173). Though the project

(including myself) wanted to explore local knowledge on climate variability, there are limits to the freedoms of a research project before it becomes invasive towards the local population.

**Translations**. Temple and Young (2004) argue the need for reflexivity to go beyond the realm of the researcher, especially in studies that employ research assistants, interpreters and translators. Many cultural researchers are aware of this and employ several techniques to maintain rigor, such as back-translations, or translations by a translator who is either a professional translator or particularly skilled in understanding the context in question (Temple & Young, 2004).

There were two main limitations to the translation of the material, namely what I found to be "translation errors" and a "translator's perspective". The translation errors could make reading, coding and analyzing more challenging at times. Countering this limitation consisted of extensive reading and re-reading sentences, as some sentences could be vague in terms of whom the participant was talking about (for example use of the pronouns he, she and they used within the same sentence to describe the same subject).

The second limitation of the data was what can be understood as a "translator's perspective". When I encountered the material for the first time, it had already received a transcription in Bangla, and then later been translated into English by an interpreter. What I perceived as a translator effect was the altering of original statements due to unsuited translations, such as the use of words such as "depression" to describe low air pressure, or obvious editing of the original statements (adding "etc."). Translations are a difficult methodological challenge to balance in cultural studies, and highlight the difficulty between finding the "right" or "most true' version of a participant's statement. Studies on translations on the same source illustrate the near impossible task of interpreting a text in a manner that will heed a general consensus (Wong & Poon, 2010). Temple and Young (2004) argue that "there is no single correct translation of a text", suggesting that, it is in fact impossible to reach a mirroring account, even with several methods for rigor being used. Despite this limitation of using translated material, it is understood as a necessary "evil" in order to gain access to the local understandings of climate variability (Squires, 2009).

The reflections above point at the manner errors made in one stage of the study carry through and subsequently affect other areas of the study. This is especially obvious during the analytical stage (referred to above as interpretation and analysis) where the actions of interviewers, transcribers and translators significantly contributed to shaping the participant responses.

**Validity and Reliability**

As I have attempted to exemplify above, an important question in any research project is how one should position oneself towards the trustworthiness of the study.

First, I want to address reliability. Since this study feature a small sample, it cannot make far reaching psychological generalizations based on the findings. In addition, many of the participants had been identified beforehand, and therefore represent a particular type of "knower" and thereby also processes of knowing. If the goal of the research was to be able to make statements about how people in Barlekha, and Bangladesh more generally come to know about climate change, a larger variety of participants would be needed, and significantly more time within the culture to become more familiar with the diverse cultures (apart from national culture) that exists in Bangladesh.

In terms of the study's validity, I have highlighted some areas (above) that may have influenced the findings of the study. The largest weakness in terms of quality of the study presumably lies in the interview and translation process. With a better understanding of the narrative method, and the particular artistry that is involved in the quality interview, the research teams may have been able to avoid the errors of the interview process (Kvale & Brinkmann, 2009, p. 17.) However, still without extensive stories provided by participants, the material gave room for understanding participants understanding, through focusing more on the content, than meaning or stories.

## Analysis

The analysis explores the construction of local knowledge of climate variability by exploring what I have termed as *processes of knowing,* also referred to as personal epistemology. It explores the different ways people come to know and possess knowledge on climate variability, and how these processes connect to culture, by the use of cultural psychology. The analysis covers two aspects of knowledge construction: the different ways people come to know and reason around climate variability and the way climate knowledge is shared within the community.

In this paper, for the purpose of clarity, I separate the processes of acquiring (often individual) and transmitting knowledge (often social). In reality, these are often fluid (shared knowledge guides psychological processes such as representations) and interconnected (social settings are a place of both learning and distribution).

**Getting to Know (and Make Sense) of Climate Variability**

Collectively, the participants exhibited a wide range of knowledge on climate variability, drawing from multiple sources available in the community. The actual changes that affected the participants differed individually, but as a whole, the participants recorded changes and disruption to perceived "normal" rainfall and temperature, and what they understood as an increasingly unstable weather pattern (climate variability). Some participants also referred to long-term changes in weather, such as a generally drier climate characterized by less rainfall in compared to previous years. Their knowledge on climate variability was constructed both individually, and socially, however, their personal experiences with weather remained a central theme for all participants. These personal interactions form the basis of their knowledge, and is their foremost process of knowing about changes to the weather patterns.

**Personal experiences with weather.** Generally, participants' first encounters with climate variability was through personal interactions with weather. Experienced-based knowledge, through observing and interacting with the weather personally, was therefore one of the most important ways participants came to know about climate variability. When questioning the participants about weather events, all could recall one or more significantly disruptive event. These events affected them in a range of ways: such as influencing their health, livelihood, livestock and/or crops, as well as affecting them collectively, contributing to loss and damages to the community.

*Livelihood as framework*. For participants that interacted with nature on a daily basis, such as the farmers and boatmen in the sample, one persistent theme in their interviews were stories about the impact of weather changes on their livelihood. For these participants, their livelihood and the environment is difficult to separate. This underscores the important role subsistence strategies have within rural communities when discussing climate change. It emphasizes the role of material culture in shaping and structuring our understanding of the world, as material culture plays a role in creating the components of our context.

Within this sample, occupations with a close relationship to nature, particularly exposed participants to nature events, which contributed to the formation of their knowledge on changes in climate. One farmer-come-boatman asserts: "I used to cultivate my fields, but river erosion has swallowed all of my fields. [Now] I [have to earn] my food by doing some small business and boating" (Boatman 1). As this (now) boatman highlights, his previous dependency on subsistence strategies such as agriculture made him particularly vulnerable to

changes in climate. As a farmer is dependent on his fields, as well as attentive to them, his knowledge on what changes are happening are filtered through his own experience with the weather.

Another boatman also expressed how his livelihood had become affected. He came to see these impacts as a testimony to the occurrence of weather change:

> We can use our boat from Jaisthta to Ashar- Shrabon [three months]. But [a] few years back it was six months. We get less fish and cannot use boats in the other nine months. Before, we could ride the boat for six months, but now that duration has reduced to three months (Boatman 2).

These two accounts help depict the significant disruption many of the participants referred to when they were questioned about the impact of weather changes on their community. It is also clear, that their personal experiences with weather informs their knowledge on the topic. Personal experiences with nature (as exemplified in these two quotes) was the most common process of knowing about the weather and therefore also the climate. These findings match local perceptions of climate change found in rural areas of Bolivia, Nepal and India (Boillat & Berkes, 2013; Moghariya & Smardon, 2012; Vedwan & Rhoades, 2001). Literature on small scale societies suggest that living in close proximity with nature has significant impacts on how people perceive and view the environment around them (Henrich et al., 2010). These "sensitivities" to the behavior of nature has been linked to the natural patterns of dependency and resource use that exist among populations whose survival largely depends on their ability to benefit from the subsistence strategies that exists within the locality (Berkes, 2009).

The knowledge the participants expressed from their personal experience with weather was commonly accessed through repeated observation of weather due to their chronic exposure to nature. Their knowledge on climate variability was therefore accessed through the continued observation of nature in the context of their occupations. Hence not connected to nature by chance, but specifically oriented towards the category of weather that had the most influence on their. In the case of the two boatmen, their livelihoods become a lens to view weather change, which is an example of the influence of subsistence strategies on the processes of knowing. Though this section highlighted the boatmen in particular, and therefore also highlighted their knowledge on climate variability, the farmers also exhibited a very similar tendency of "sensitivity" to the weather in regards to their crops, comparable to

the study of Indian apple farmers by Vedwan and Rhoades (2001). This helps exemplify how peoples livelihoods "contextualizes" the person by both physically situating them in particular environments, as well as exposing them to a "reality" that is not only a product of the local environment, but the subsequent role they play in that environment. Such embedded experiences may be important to look at in personal epistemology, and is from a cultural psychological viewpoint, an essential part of understanding how people come to understand the world.

*Experiences with dramatic weather events*. All participants reported having experienced one or more major weather event during their lifetime. These findings reflect the often hazardous nature of Bangladeshi weather patterns, situating Bangladesh as a country at particular risk. Most remembered large cyclones or floods that had happened within the last 15 years, such as Sidr (2007), the most severe cyclone in Bangladesh in recent years. Despite the presence of such readily available memories (as they were often produced during questioning about weather events), experiences with weather on a day-to-day basis also helped frame participant stories of weather change.

When describing the occurrence of such experiences, the participants often conceptualized climate variability as weather that stood apart from "normal" weather due to its erratic behavior. One farmer told the team about a time he experienced a heavy rainstorm that caused a flashflood: "Normally rainfall is limited here, but sudden rainfall within one hour caused a landslide that blocked, roads, disrupted normal life and three people died. [When it was happening] it seemed like someone poured water heavily from a pot" (Farmer and Teacher). As the participant describes, the flash flood caught both the farmer and the community by surprise, as they were not able to mobilize for the event, causing the death of three people. This is an example of how participants conceptualized the dramatic nature of climate variability as a means of separating it from "regular" weather. Such categorization may also have led to more "chronic accessibility" of such weather memories, and therefore easily accessible evidence for climate variability, when asked about changes to weather (Chiu & Hong, 2006, p.213).

Though significant weather events formed the majority of participant's responses, some participants also conceptualized climate variability within the framework of more seemingly ordinary weather fluctuations. One teacher recounts the story of how she experienced a rainstorm while leaving work:

In 2012, [a] heavy rainstorm occurred [when] I was returning from school. I had gotten news that the weather was getting rough. I started [to go to my house], from the school as I thought I could make it to my house. But suddenly [a] hailstorm attacked with [a] stormy wind and it almost blew me away (Female Teacher 1).

The short story of the unforeseen hailstorm helps illustrate how the experienced and perceived changes in weather also happen in the context of daily life, more comparable to the definitions of climate variability as a both natural and commonly occurring scenario.

These two participants' interactions with weather show that participants also build knowledge based on a single encounter. Not all local and personal processes of knowing are a result of repeated interactions, or due to the connection between local peoples and ecology. As the teacher describes, the single interaction, happening unexpectedly and to anyone, can serve as an avenue for knowledge construction. Again, the observations noted by the participants when becoming familiar with climate variability formed the basis of their knowledge. As with the Farmer/boatman who perceived the heavy hailstorm as especially "dramatic", the teacher's perception of the weather event is also seemingly of a "dramatic" nature, and therefore different from "normal" weather.

In this case, a seemingly ordinary, but dramatic weather event becomes a result of "climate variability". In this manner, participants partake in the construction of the concept that takes them beyond the process of knowing, framing climate variability through their personal understanding of what climate variability represents. In these cases, perception was instrumental in framing their observations, making certain observations more readily available and therefore more commonly represented in participants' knowledge on climate variability. This point at the almost impossible task for participants to differentiate between "unnatural" and "natural" climate variability, as climate variability (though common and normal) represents the behavior of weather when it deviates from normal. Separating between the "normal" and "deviant" weather was also done by employing existing knowledge of the climate.

**The use of existing knowledge systems: Applying local culture to climate variability.**

*The seasonal calendar.* Almost all participants mentioned that they had experienced disruption in the seasonal weather patterns. What people talked of as unnatural changes or irregularity of weather (decrease/increase of rain, storms, fog, fluctuations of temperature, and major weather events), often conceptualized in terms of what they found to be "normal"

weather. These processes of knowledge construction happed simultaneously with participant's use of the seasonal calendar. The seasonal calendar is understood through the theoretical framework of the cultural triad as a part of subjective culture, and in this way represents a manifestation of what Schweder (1991) points at as mutual constitution: a construct in which humans both engage in creating, and are shaped by.

Many participants had noticed differences in temperature from the perceived normal temperatures. Participants formulated this in different ways, but these formulations generally revolved around an expectancy of a particular pattern or temperature range. This was sometimes formulated as wrong intensity, i.e. "too" hot or cold as one of the teachers describes it: "Temperature remains too high in Vadro. Few years back the temperature was quite normal though. If there is cold it is too cold, and if hot, it is too hot."(Female Teacher 1). She perceives there to be a significant deviance in temperature range, in light of her prior knowledge on the expected temperature in Vadro. These attributions were common in the participants' detection of climate variability, and though literature on perceptions are often founded on the perception of change, the role of existing knowledge and experience on the formation of new knowledge on climate variability is rarely discussed explicitly in the literature.

Participant's expectations of weather also revolved around the onset of seasons. These responses were sometimes formulated as wrong timing of weather patterns, which is seen as one of the main factors of weather disruptions for participants. One farmer noted what he perceived as a later onset of monsoon rains: "The first rainfall of the monsoon used to occur in Magh, but now it comes at the beginning of Chaitra" (Farmer and Teacher). His idea of the normal monsoon onset is rooted in his expectancy of when it is "supposed" to happen, based on when it has happened previously ("used to occur"). As he expects this occurrence to happen in Magh, the new onset of the monsoon does not fit with his understanding of the normative trajectory of the seasonal calendar.

The seasonal calendar was also a way for community members, such as farmers to organize their agricultural activities along a predictable framework. As one farmer pointed out in response to the seasonal calendar: "Jaisthta is a month of crop", "Ashar is a month of rainfall", "Vadro is month of Aush harvesting" (Farmer 2). This shows how the calendar also contributes to the establishment of local patterns of subsistence, illustrating that the months have particular meanings not only in terms of climate, but also in terms of local culture.

32

This exemplifies that knowledge on climate variability is constructed not only through personal experiences, but also by the aid of established frameworks. These frameworks help the participants identify areas the weather deviates from their expected weather on specific parameters, such as intensity and timing. These experienced changes (as the participants often looked at them as a collected set of changes) led to some participants forming the understanding of the whole climate as disrupted: "Changing of seasons are not distinct. Number of seasons has decreased to three from six."(Farmer and Teacher). This emphasizes that even though weather is experienced day to day, and in specific events, their collected representations form the basis of more sweeping judgments, such as the claim about the behavior of a season.

The commonality behind these statements is that they all use the calendar as a primary organizing principle to understand the irregularity of weather. Seasonal calendars are cultural constructions, defined around climate and geography, but produced and constructed in sociocultural contexts (Greider & Garkovich, 1994). The seasonal calendar acts as both a source of knowing, as well as a construct that enables sense making around the changing weather and climate. For the participants, their previous knowledge of the typical weather patterns is a constant source of information as they try to make sense of the "new normal". Knowledge of the seasonal calendar is in this sample and context therefore an essential part of the participants' construction of the changing climate. These findings highlight the importance of looking at personal epistemologies in relation to the established local and cultural bodies of knowledge.

*Local knowledge.* The specific local knowledge many participants possessed also played a role in supplying a knowledge frame to understand changes in weather. A large part of the knowledge that the participants exhibited in their interviews, was local knowledge, founded on the local variations and ecology that exists. As with the example of the seasonal calendar, existing knowledge on climate and its behavior stands as an important way participants incorporated and conceptualized the meaning and effects of the changes in climate. These local and cultural bodies of knowledge therefore served as sources of knowledge in themselves, in addition to sense making processes. Sometimes, the participants would exhibit knowledge that was of a particularly "local" nature, meaning it was built around the specific conditions of the area. One farmer explained what he understood as a delay in the onset of rainfall in the pre-monsoon season by its impact on local ecosystems:

> "Late rainfall [in Boishakh] delayed the reproduction of natural fish. If there is not enough rainfall at the beginning of the monsoon, the proper spawning of fish does not happen in time as the rain of the Boishakh and rainy season do not mix with each other, and that harms the breeding of the fish. As a result, the amount of fish in the haor[1] has decreased at an alarming rate" (Farmer and Teacher).

The farmer/teacher describes the impact of disruptions to rainfall on the surrounding ecosystems, connecting the effects of climate variability with its toll on the local fish population. It shares many similarities to what Ruddle (2000) characterizes as defining features of local knowledge systems: "adapted specifically to local conditions", "detailed" and "focuses on important resource types and species" (Ruddle, 2000). These knowledge systems are constituted by observational, experience-based knowledge that travel through generations, accumulating over time. This cultural knowledge transmission is important to rural and small-scale societies as they provide communities with knowledge tailored to the particular conditions of the locality (Ruddle, 2000).

These local knowledge systems also allowed for complex analysis of the effects of climate change that may be difficult without possessing knowledge on the "typical" behavior of the nature and surrounding ecosystems. This knowledge presents itself as valuable as it specifically helped the participant in understanding the effects of climate variability. Though it did not always supply strategies for adaptation, they build a firm basis to create adaptation strategies.

*Nature as forecasting system.* Apart from local bodies of knowledge that aided the participants in understanding perceived changes, existing knowledge and information of the behavior of the nature, was also a knowledge source by itself.

Those who mentioned environmental cues as a means of forecasting can be categorized into two groups. Some remained descriptive, sharing knowledge about how these techniques were used by community members, and some told stories of how they themselves employed nature to predict weather changes or events. These ways of forecasting mostly focused on observing or "reading" the activity of weather and nature. For instance, participants told of ways one could read the activity of the sky by looking for "stormy wind, lightning" (Hindu farmer) or "dark cloud[s]" (Female Poultry Farmer). Making use of nature for forecasting is also seen in a study by Roncoli, Ingram and Kirshen (2002) where rural

---

[1] The Hakaluki Haor

agriculturalists in Burkina Faso made use of the activity of wildlife to forecast weather (Roncoli et al., 2002).

One farmer explained how he made use of environmental signs to predict Boishakh storms: "In Chaitra-Boishakh, if there is cloud in North-West side of the sky, that's a sign of Kal-Boishakhi" (Hindu Farmer). *Kal-Boishakhi* is the local term for the yearly pre-monsoon storms that occur in the beginning of Boishakh, that though expected, due to their temperamental nature, can cause major destruction and death. In 2015, Kalboishkhi storms caused the death of almost 40 people in Bangladesh and swept away houses and infrastructure ("35 Killed in Bangladesh Storms," 2015; Angwin, 2014) This example implies that local people may be accustomed to predict the onset of regular weather events through use of observation. It also shows how weather phenomena become incorporated into the seasonal calendar (Kal-Boishakhi*)* which helps establish them as regular, predictable phenomena. In this way, natural phenomena become sociocultural phenomena (Greider & Garkovich, 1994) and through observation and experience become a part of local knowledge systems.

*Credibility of nature signs.* Out of the environmental cues the participants mentioned, two weather signs recurred several times in the material. Initially, it could seem that these two weather signs were established ways of predicting weather, however, when one of the participants rejected the validity of one of these signs, it suggested that there were differences in how people viewed the legitimacy of natural signs. It is important to distinguish beliefs about climate from the knowledge on climate. One of the definitional characteristics of beliefs in comparisons to knowledge is that belief systems are negotiable, and therefore often exists an explicit awareness of the existence of differing beliefs (Abelson, 1979).

Two recurring weather signs: the passing of a snake, and the appearance of a dragonfly, helps shed some light on differences between belief and knowledge systems. Several of the participants mentioned these two signs as ways to predict a flood or disaster. A female poultry farmer described that "if a snake passes through the yard of the house, it is considered a sign of flood". Another rice farmer echoed the same sentiment. In Bangladesh, snakes have a strong significance to the appearance of floods. Second to drowning, snake bites are the leading cause of death during major flooding in Bangladesh (Dewan, 2015). As floods inundate the majority of the landscape during floods, people and wildlife are often forced into common areas of shelter, leading to interactions between people and wildlife.

In the same respect as the snake, the activity of the dragonfly, whether it flew high or low, was considered an omen of bad weather. One farmer explained it as: "If [the] dragonfly

flies low, near to the ground, then it is going to rain hard" (Farmer 3). In another interview a second participant also referred to the dragonfly: "when the dragonfly flies high it mean it is a sign of drought." (Boatman 2). However, the participant continued by saying: "But we do not believe in such proverbs" (Boatman 2). Though the boatman acknowledges the existence of the belief that the activity of the dragonfly has the ability to predict floods and droughts, he explicitly positions it as a belief by defining it outside the realm of knowledge ("proverb" or similar meaning). By defining it as a saying, he questions its legitimacy. The negotiable nature of this concept, even within the community itself, helps illustrate difficulty with separating local belief systems from knowledge systems, especially for those observing the culture from the outside.

*The role of religion.* Religion belongs to the group of subjective culture (Chiu & Hong, 2006, p.13) Within the Barlekha Upazila most people identify as religious, where the majority of these are Muslim (84%), with a minority of Hindus (15%) and Christians (approx. 1%) (Bangladesh Bureau of Statistics, 2013).

Religion did not play an extensive role in the general understanding of climate variability among the participants, but for some participants, their religion formed one of their main schemas of understanding. A farmer received the question of which source of climate information he thought of as the most trustworthy, and said, "I only believe in Allah." (Farmer, 3). The use of religion as a framework or source in the construction of climate knowledge represents the inclusion of another layer within the cultural triad: namely subjective culture. In this case, the religious beliefs of the farmer guides his processes of knowing by restricting his knowledge sources, as he stated he did not actively seek out any information about the weather.

In the responses of other participant who included religion within his testimony about climate, the expression of religion manifested somewhat differently. Instead of limiting his sources of knowledge, the farmer who identified as Hindu admitted to using a variety of sources, including nature signs. He admitted to using TV, radio and other weather forecasts as well as the *Panjika* (Hindu year calendar), which he stated to "believe in 100%". He used the Panjika alongside other sources of knowledge and his set of sources was the most diverse within the sample. His use of the Hindu calendar exemplifies how religion (subjective culture) also contributes to the production of cultural products (Panjika) (Chiu & Hong, 2006, p 19).

Belief systems contribute to the subjective understanding of reality, and may therefore serve to guide local processes of knowing. The use of belief systems alone (Muslim Farmer),

as well as a combination of belief and knowledge systems (Hindu Farmer), illustrates the diversity of employed personal epistemologies that can exist in local communities. It shows that even though localities are connected by common properties such as culture, history and ecology; local processes of knowing are not necessarily homogenous processes.

When attempting to understand the integration of such processes on the processes of knowing, cultural psychological theory provided frameworks to steer the attention towards the influence of cultural aspects (such as religion) which may not have been previously looked at within personal epistemology.

As exemplified above, cultural diversity exists within the locality, both around which sources individuals are the most influenced by; and understand as most credible. Issues of credibility of knowledge, and how this connects to personal epistemology is discussed in the next chapter, where the discussion on personal epistemology is extended through the inclusion of social processes of sharing and distribution as important processes of knowing.

**Social Processes of Knowing: Knowledge Distribution and Sharing**

Participants drew a large part of their knowledge from personal experience and existing knowledge systems, and thus individual processes of knowing. However, in terms of responding to the changes, social sharing as well as information seeking can be viewed as important ways they built knowledge and informed themselves about changes in weather.

In contrast to participants' stories of local weather change, which relied heavily on personal experiences and cultural and local knowledge systems, when the participants were asked the question of where they went to receive weather information, many relied on media outlets and local community members to gain information about weather. Despite possessing a variety of knowledge on how the weather changes and ways of reading and foreseeing the weather themselves, participants were also generally dependent on external sources to give them information on weather. The TV, radio, internet or mobile phones were the most popular sources of weather information, but the participants also described the use of competence-based social sources to gain information within the community (community leaders, elders, government offices), and discussing it with close relations such as neighbors, colleagues and family members (social sharing).

**Social sharing: the role of proximity and closeness.** In the interviews, the participants described the use of what can be considered as a varied set of social sources: family members, colleagues and community members. A large part of the participant pool mentioned elders as a validated source of information, and therefore take part in validating

elders as a legitimate source for knowledge. Out of the social sources people employed to discuss and share climate knowledge and information, the most frequently mentioned source was neighbors (four out of nine), family members and colleagues ( three out of nine), one discussed with local government, and one man stated he did not discuss with anyone. Many talked about how they would discuss climate variability in group-discussions. Some people said they talked to seniors, one woman also mentioned that people talk to elders, and some said they just talked about it with their family.

As suggested by Dynamic Social Impact theory in the social psychology of culture, people are more likely to engage and share knowledge between individuals whom they share close proximity; such as neighbors or family members (Chiu & Hong, 2006, p.122). Though the participants did not disclose on the frequency or commonality of social sharing of climate knowledge, all participants except one expressed social sharing as an important process of both acquiring and distributing knowledge on climate variability.

**Trust as a process in information seeking.** In addition to the use of existing knowledge, participants were also active in attaining new knowledge and information on weather and forecasting. Though many of these processes could be individual; such as viewing a TV forecast, I chose in the analysis to conceptualize their use of media, whether individual or collective, as a part of the knowledge distribution that took place in the community.

That participants trusted the knowledge source was found to be imperative for them making use of it, and matches the findings of Atran et al. (2005), identifying trust and credibility as important aspects of the use of climate knowledge within their sample of indigenous groups across six localities. As Weber (2011) states: "people pay attention to information about climate phenomena, and incorporate it into their decisions and actions if it comes from a trusted source". The trust literature is too wide to be represented within this analysis, but I will supply a brief definition of the concepts of trust and trustworthiness, for the discussion on trust and knowledge that follows below.

The definition of trust is debated, but is within the literature generally viewed as a "willingness to be vulnerable", resulting in a "leap of faith", as uncertainty is understood as a core property of trust (Mayer, Davis, & Schoorman, 1995). A key element of trust is therefore risk. In order to reduce risk, we judge situations and people on their relative trustworthiness. Trustworthiness can be considered characteristics that diminish possible losses, and therefore, the more markers of trustworthiness that are involved when deciding to trust, the more secure

we can be that we will avoid betrayal. Past experiences and previous knowledge of the person, known as knowledge-based trust, seem to be one of the most common determinants of future trust (Lewicki & Bunker, 1996, Lewicki & Gillespie, 2006;). People also tend to more readily trust people that they share an affiliation with (identification- based trust) as well as people whose ability or competence is above oneself in a relevant matter (competence-based trust) (Cherasky, 1992; Lewicki & Bunker, 1996).

In the sample, the participants often explained their use of media due to its perceived trustworthiness. Participants expressed that being able to personally bear witness to information presented on the TV was an important reason for why they found it trustworthy. As one participant described it: "We believe the TV the most because we can observe it by our own eyes" (Hindu Farmer). Again, observing becomes an important avenue for knowing, and the participants statement can lead one to believe that the credibility of the TV is partly due to the ability of establishing its trustworthiness oneself. One reason for this "seeing is believing" statement can be due to the high levels of illiteracy present in local populations, and therefore also the sample. Pictures and images are particularly valuable to illiterate people as they are dependent on images to be able to understand the context of newscasts.

Especially, participants leaned on the concept of accuracy when explaining why it was trustworthy. One of the boatmen argued that the radio was a trustworthy medium as he had experienced it being accurate before:

> Once two men drowned in [the Hakaluki] haor but there was no previous sign. A sudden storm came and two men [were] lost. I did not get the news from radio before the storm but other people of the village heard it and I heard the news from them later. That has made me realize that predictions made by radio are true (Boatman, 2).

The view that the TV and the radio were trustworthy sources because they often corresponded with the occurrence of weather events was a prominent belief between those who cited media outlets as their primary source of weather information. The boatman's story of the accuracy of the radio was echoed by another participant, as also her previous experiences of weather events had been reported by the media beforehand: "The news comes from the TV has become real several times, like Sidr, Aila and other disasters" (Female Teacher 1). People placed their trust in sources such as the TV, because they themselves had experiences of the forecasting being accurate. These findings show that the participants drew knowledge on the

trustworthiness of a source on the basis of past experiences, also suggested to be a key determinant of trustworthiness by trust literature (Lewicki, Tomlinson, & Gillespie, 2006; Sutter & Kocher, 2007).

*The effects of social culture on trust in knowledge sources.* One of the expressions of social culture is the perceived or institutionalized difference in power between people. Therefore, power distance is a central aspect of social culture. Chiu and Hong (2006, p.11) argue that "in every society, some categories of people enjoy higher status than other categories of people", claiming that a relative power distance is a natural part of the fabric of culture. These power distances may become even more pronounced during times when climate knowledge is in high demand, as those without knowledge become more dependent on those with the validated possession of climate knowledge.

Most research on trust assumes the existence of equal power difference between the parts. However, in this sample, many of the participants were rural poor whom did not explicitly state, but often seem to convey implicitly that their own knowledge was not as valuable as that of scientists or science institutions. In such cases, participants were eager in highlighting their approval of scientific knowledge: "Foreign nature scientists should be given full freedom to work and the information they collect that would be something I want to know" (Farmer and Teacher). By showing approval of scientists, participants thereby also partook in the positioning scientific knowledge as a valuable and credible source. As one farmer replied when he was asked why he trusted TV the most: "The news comes directly from the weather forecasting department" (Hindu Farmer). Here, it is not only the source (TV), but the institution behind the information: the forecasting department, that contributes to the understanding of the source as trustworthy. Such statements correspond with literature on competence-based trust, which allows us to trust a source if we perceive it to be competent in a relevant issue. The farmer continued to explain his choice for trusting the weather forecasting department: "we cannot guess the situation, so we believe them" (Hindu Farmer). These reflections on the reason to trust sheds light on both the real and perceived limitations (believing your knowledge is less valuable) for laypeople in being able to predict weather changes. Because laypeople have little ability to determine the trustworthiness of expert judgements, it leads them to have "blind trust" in areas where their knowledge comes short (Li, 2012).

**Shared Perspectives Among the Participants: A Glimpse of Local Culture**

The main purpose of this study was to explore how climate knowledge is produced within the setting of a *rural and local Bangladeshi context*. To be able to investigate these pathways of construction, the cultural properties of the local setting are vital for the study's results and relevance.  As a study interested in the role of culture, particular attention was paid to what Patterson (2014) refers to culture in its most essential form: "shared meanings of the world". My purpose is here to give insight into some of what I considered to be valuable aspects of the local culture in the sample. It is worth noting, that these aspects of culture are not only a result of the material itself, but also a result of the research focus, and the role of the researcher. In addition, the available cultural information in the material represents only fragments of the whole body of knowledge and culture that exists within the locality. What was considered important in this study may not be considered important by a different researcher, with a different research focus. The understanding of what was relevant and "interesting" cultural influences during the construction of climate knowledge was based primarily on my own experience during fieldwork and interactions with Bangladeshi partners. As a result, the study cannot evade the influence of my own cultural understanding of the Bangladeshi context.

**Subjective culture: providing frameworks of knowledge**. Subjective culture involves the "widely held beliefs, cultural values and shared behavioural scripts" which guides peoples understanding of their own reality (Chiu & Hong, 2006, p.11). In this study, aspects of subjective culture that emerged from the material was the participant's use of the seasonal calendar, local knowledge and religion as a framework to situate the knowledge on climate they come to learn and possess. These aspects of subjective culture emphasize the role of culture as both in and outside the mind, forming structures of mutual constitution, that both provide people with conceptual understandings and frameworks for action, as well as being shared and used practically between people, constantly evolving as a result of human intentionality (Schweder, 1991).

**The impact of social culture in questions of knowledge: the role of the wise.** The structure and organization of social relations is categorized as social culture (Chiu &Hong, 2006, p.9). Though participants on a whole made use of a variety of knowledge sources, and therefore also processes of knowing, use of sources were closely connected to the existing social culture. Social systems such as hierarchy can be instrumental in the way it also structures the organization of knowledge within a community. Not only does it structure the

social relationships and therefore contribute to the way different types of knowledge are validated on the basis of hierarchy, but it may also determine how people come to attain knowledge (Berkes, Colding, & Folke, 2000).

As Thomas (2001) posits, cultures may differ in their understanding of what qualifies as valuable knowledge, and who possess this knowledge. When participants found themselves in doubt or without knowledge, they made use of competence-based resources available in the community. In search of information, some participants highlighted the importance of "expert knowledge" and the role of elders/seniors, scientist and media as credible transmitters of such information.

**Material culture as a factor in the construction of diverse and common epistemologies.** In the sample, people's livelihoods were a part of "contextualizing" their reality, as it exposed people to specific versions of the world through the lens of their occupations. Participants who were not farmers themselves also emphasized the importance of crop production and agriculture. This helps exemplify the availability and application of knowledge on agricultural practices and their consequent position within the community. This is a part of their "lifeworld" or "habitus" and is therefore an important part of how they both see the world and their own context in it. As a community that is largely depending farming, this affects the community and contributes to the creating of place identity, or the shared understanding of what it means to be living in that particular community. Though role of cultural influences, such as material culture (subsistence culture in this study) has not been extensively studied within personal epistemology, many of the participants understood climate variability in terms of agriculture, and were sensitive to the changes brought to crop production. This was a part of their body of climate knowledge, and therefore a relevant aspect of their personal epistemology of climate knowledge.

**The Limitations of Local Knowledge**

One problem associated with local knowledge systems is that they are usually created on the background of somewhat stable weather patterns and climate, and therefore may be incompatible with the unpredictability of an increasingly unstable weather pattern as a result of climate change. Some of the participants expressed distress and helplessness in the face of climate variability, illustrating that local knowledge systems may not be sufficient in themselves to provide rural communities with strategies for climate mitigation. In essence, laypeople's knowledge of weather does not have the same predictive ability as technological forecasting systems. Despite many of the participants' detailed knowledge of the local

seasons and weather, the participants called for more and better technology to be able to foresee those changes that did not follow their perception of "normal weather patterns". This illustrates that even though local communities may have many ways of constructing and understanding knowledge on climate variability, these processes face major challenges. Climate variability upsets the predictability of experience-based local knowledge, and questions its applicability as rural communities face climate adversities. To hail local knowledge as the end-all solution to contemporary climate challenges may be counter-productive as it fails to acknowledge that the persistence of local knowledge structures may in part also remain because of differences in social and economic development, which preserves the need for local knowledge in lieu of available technology and forecasting systems. However, this should not serve to discredit the relevance, need and value of local knowledge systems in addressing place-bound and local weather changes and impacts.

## Conclusion

This study aimed at answering the question: How is knowledge on climate variability produced within a local Bangladeshi setting? In short, the participants drew from a variety of sources, thereby using both personal and social processes of knowing, where personal experience was the most important process of coming to know about the weather. The participants' stories aid in exemplifying that we do not simply observe the weather, but we experience it. In this sense, the participants processes of knowing were embedded in the local context, oriented towards the local changes and effects. Their experiences with weather were filtered through existing knowledge structures, such as the seasonal calendar, which seemed to function as a helpful tool for sense making and reasoning about weather change. Even though I have conceptualized many of the responses of change in weather patterns as climate variability, the participants also did record changes happening more long term. These long-term observations can be understood as the participants sensing changes that can be attributed to climate change.

This study employed an interdisciplinary focus, which has brought many aspects of processes of knowing into one picture. In order to be able to treat topics of social, cultural and natural dimensions, the cultural psychological framework and theory served as a helpful lens to be able to look at the processes both separately, and integrated, and functioned as a holistic perspective that gave an overview of the influences of the different processes.

Though the participants drew from many different knowledge sources, they also expressed the need for more and better information. By expressing this, they imply that there are limitations to local knowledge. I would however argue that these limitations should not only be viewed as the possible lack of practical applicability of local knowledge systems, but that the limitations of local knowledge systems also have to do with how people themselves come to view the value of their own knowledge. Within personal epistemology, there are two main categories: processes of knowing and beliefs about knowledge (Hofer & Pintrich, 1997) Though this study did not focus on what beliefs people had about knowledge, it is still of great relevance to the study. One person's beliefs about their own knowledge are not necessarily connected to themselves as a person, but to larger structures of power and knowledge in society. One may think of this as a hierarchy of knowledge where some types of knowledge becomes more valuable than other types. The ideas around the value of knowledge produced through the "social selection of knowledge" can then in turn influence how we position the knowledge that we possess ourselves (Mudege, 2008). When navigating available knowledge, we therefore do not look at random; but look for knowledge that is socially validated within our society or context (Atran et al., 2005). The sample helped exemplify how such a similar selection and validation of knowledge take place at a small scale, within communities, as certain types of people become more valuable knowledge holders (such as elders).

Even though the participants possessed a variety of knowledge on climate variability, they did not provide suggestions as how to use that knowledge. Or more specifically, how that knowledge could perhaps be a resource in the creation of adaptation strategies of the community. Instead, the participants brought forward the value of scientific knowledge, and the need for better and more forecasting systems. The suggestions that they did make however, were almost exclusively based on scientific notions of climate change. In doing so, it can seem like the participants are in fact partaking in the devaluing of their own knowledge in relations to scientific knowledge. Much like the Norwegian people of Norgaard (2011) study, they become passive in the face of climate change.

This highlights how adaptation should perhaps not only be looked at as an issue of lack/ presence of socioeconomic resources, but also perceived resources, and thereby perceived adaptability (Grothmann & Patt, 2005). One's positioning of one's knowledge as "lesser" than others becomes an expression of perceived adaptability, as the presence of resources may be there, but not actively employed as a result of the perception that it is not

44

valuable or applicable. In light of adaptability, both development and empowerment may be important factors, making people less vulnerable in terms of both socio-economic resilience, as well as building psychological resilience as a measure against hopelessness and defeatism towards climate change. It also serves to create awareness around the interplay of psychological, social and economic restrictions that impede on people's ability to adapt.

**Lessons**

There are some lessons for cultural psychology from this study. Traditionally, cultural psychology has focused on the interface between the social and the cultural, emphasizing how our existence as social beings take part in constructing culture, and that culture in turn guides our experience of reality. What was missing here however, which the study of human side of climate change illustrates, is the symbolic value of nature. While the discipline has tended to focus on the symbolic value of our culture, the symbolic value of nature has been left undiscussed. What some scholars had said previously, and this study looks to emphasize, is that nature can also be a form of culture, in the way that it becomes embedded into our sociocultural context and therefore also become sociocultural phenomena (Greider & Garkovich, 1994). By the example of the seasonal calendar, and other systems of cultural and local knowledge, this thesis has attempted to explain the important role culture has in shaping our processes of knowing, and that our processes of knowing is in turn shaped by our culture and context.

For climate research it has the opposite lesson: it places culture (and arguably personal epistemology) within the context of nature and climate research. By exploring processes of knowing in a cultural setting, this study has been interested in the construction of climate knowledge as inherently connected to the local and cultural context people experience weather within, and thereby the cultural framework they use to attach meaning to weather.

This study, which draws from relevant knowledge in the fields of personal epistemology, cultural psychology, and climate research, has attempted to exemplify that climate change research should not only be about climate, but should also incorporate human systems, as the responsibility of solving climate change ultimately, begins and ends with us.

References

35 Killed in Bangladesh Storms. (2015). *NDTV*. Retrieved from http://www.ndtv.com/world-news/35-killed-in-bangladesh-storms-752548

Abelson, R., P. (1979). Difference between belief systems and knowledge systems. *Cognitive Science, 3*, 355-366. doi: 10.1207/s15516709cog0304_4

Ahmed, I., Deaton, B. J., Sarker, R., & Virani, T. (2008). Wetland ownership and management in a common property resource setting: A case study of Hakaluki Haor in Bangladesh. *Ecological Economics, 68*(1–2), 429-436. doi: http://dx.doi.org/10.1016/j.ecolecon.2008.04.016

Akerlof, K., Maibach, E. W., Fitzgerald, D., Cedeno, A. Y., & Neuman, A. (2013). Do people "personally experience" global warming, and if so how, and does it matter? *Global Environmental Change, 23*(1), 81-91. doi: http://dx.doi.org/10.1016/j.gloenvcha.2012.07.006

Angwin, R. (2014). Kalboishakhis - Bangladesh's Deadly Storms. *Al-Jazeera,*. Retrieved from http://www.aljazeera.com/weather/2014/04/kalboishakhis-bangladesh-deadly-storms-20144298655771842.html

Atran, S., Medin, D. L., & Ross, N. O. (2005). The Cultural Mind: Environmental Decision Making and Cultural Modeling Within and Across Populations. *Psychological Review, 112*(4), 744-776. doi: 10.1037/0033-295X.112.4.744

Bangladesh Bureau of Statistics. (2013). *District Statistics: Moulvibazaar 2011*. Dhaka, Bangladesh.

Bar-Tal, D., & Kruglanski, A. W. (1988). *The Social Psychology of Knowledge*: Editions De La Maison des Sciences De L'Homme.

Basannagari, B., & Kala, C. P. (2013). Climate Change and Apple Farming in Indian Himalayas: A Study of Local Perceptions and Responses. *PLoS One, 8*(10). doi: 10.1371/journal.pone.0077976

Becken, S., Lama, A. K., & Espiner, S. (2013). The cultural context of climate change impacts: Perceptions among community members in the Annapurna Conservation Area, Nepal. *Environmental Development, 8*, 22-37. doi: http://dx.doi.org/10.1016/j.envdev.2013.05.007

Berger, R. (2015). Now I see it, now I don't: researcher's position and reflexivity in qualitative research. *Qualitative Research, 15*(2), 219-234. doi: 10.1177/1468794112468475

Berkes, F. (2009). Indigenous ways of knowing and the study of environmental change. *Journal of the Royal Society of New Zealand, 39*(4), 151-156. doi: 10.1080/03014220909510568

Berkes, F., Colding, J., & Folke, C. (2000). Rediscovery of traditional ecological knowledge as adaptive management. *Ecological Applications, 10*(5), 1251-1262. doi: 10.1890/1051-0761(2000)010[1251:ROTEKA]2.0.CO;2

Boillat, S., & Berkes, F. (2013). Perception and Interpretation of Climate Change among Quechua Farmers of Bolivia: Indigenous Knowledge as a Resource for Adaptive Capacity. *Ecology and Society, 18*(4). doi: 10.5751/es-05894-180421

Boissière, M., Locatelli, B., Sheil, D., Padmanaba, M., & Sadjudin, E. (2013). Local Perceptions of Climate Variability and Change in Tropical Forests of Papua, Indonesia. *Ecology and Society, 18*(4). doi: 10.5751/es-05822-180413

Borman, K. M., LeCompte, M. D., & Goetz, J. P. (1986). Ethnographic and Qualitative Research Design and Why It Doesn't Work. *American Behavioral Scientist, 30*(1), 42-57. doi: 10.1177/000276486030001006

Bruner, J. (1991). The Narrative Construction of Reality. *Critical Inquiry, 18*(1), 1-21. doi: 10.1086/448619

Bryan, E., Deressa, T. T., Gbetibouo, G. A., & Ringler, C. (2009). Adaptation to climate change in Ethiopia and South Africa: options and constraints. *Environmental Science & Policy, 12*(4), 413-426. doi: http://dx.doi.org/10.1016/j.envsci.2008.11.002

Byg, A., & Salick, J. (2009). Local perspectives on a global phenomenon—Climate change in Eastern Tibetan villages. *Global Environmental Change, 19*(2), 156-166. doi: 10.1016/j.gloenvcha.2009.01.010

Chiu, C.-y., & Hong, Y.-y. (2006). *Social psychology of culture*. New York: Psychology Press.

Choudhury, W. A., Quraishi, F. A., & Haque, Z. (2006). Mental health and psychosocial aspects of disaster preparedness in Bangladesh. *International Review of Psychiatry, 18*(6), 529-535. doi: 10.1080/09540260601037896

Davies, M. (2001). Explicit and implicit knowledge: Philosophical aspects. In N. J. Smelser & P. B. Baltes (Eds.), *International Encyclopedia of the Social and Behavioral Sciences*: Amsterdam: Elsevier Science Ltd.

Dewan, T. H. (2015). Societal impacts and vulnerability to floods in Bangladesh and Nepal. *Weather and Climate Extremes, 7*, 36-42. doi: 10.1016/j.wace.2014.11.001

Gamble, D. W., Campbell, D., Allen, T. L., Barker, D., Curtis, S., McGregor, D., & Popke, J. (2010). Climate Change, Drought, and Jamaican Agriculture: Local Knowledge and the Climate Record. *Annals of the Association of American Geographers, 100*(4), 880-893. doi: 10.1080/00045608.2010.497122

Gifford, R. (2011). The dragons of inaction: psychological barriers that limit climate change mitigation and adaptation. *Am Psychol, 66*(4), 290-302. doi: 10.1037/a0023566

Greider, T., & Garkovich, L. (1994). Landscapes: The Social Construction of Nature and the Environment. *Rural Sociology, 59*(1), 1-24. doi: 10.1111/j.1549-0831.1994.tb00519.x

Grothmann, T., & Patt, A. (2005). Adaptive capacity and human cognition: The process of individual adaptation to climate change. *Global Environmental Change, 15*(3), 199-213. doi: 10.1016/j.gloenvcha.2005.01.002

Guba, E. G., & Lincoln, Y. S. (1994). Competing paradigms in qualitative research. *Handbook of qualitative research, 2*(163-194).

Heine, S. J., & Norenzayan, A. (2006). Toward a Psychological Science for a Cultural Species. *Perspectives on Psychological Science, 1*(3), 251-269. doi: 10.1111/j.1745-6916.2006.00015.x

Henrich, J., Heine, S. J., & Norenzayan, A. (2010). The weirdest people in the world? *Behav Brain Sci, 33*(2-3), 61-83; discussion 83-135. doi: 10.1017/S0140525X0999152X

Hofer, B. K. (2008). Personal Epistemology and Culture. In M. S. Khine (Ed.), *Knowing, Knowledge and Beliefs* (pp. 3-22): Springer Netherlands.

Hofer, B. K., & Pintrich, P. R. (1997). The Development of Epistemological Theories: Beliefs About Knowledge and Knowing and Their Relation to Learning. *Review of Educational Research, 67*(1), 88-140. doi: 10.3102/00346543067001088

Hofer, B. K., & Pintrich, P. R. (2002). *Personal Epistemology: The Psychology of Beliefs about Knowledge and Knowing*: L. Erlbaum Associates.

Jasanoff, S. (2010). A new climate for society. *Theory, Culture & Society, 27*(2-3), 233-253. doi: 10.1177/0263276409361497

Kitayama, S., & Cohen, D. (2007). *Handbook of Cultural Psychology* New York, NY, USA.: The Guilford Press.

Lewicki, R. J., Tomlinson, E. C., & Gillespie, N. (2006). Models of Interpersonal Trust Development: Theoretical Approaches, Empirical Evidence, and Future Directions. *Journal of Management, 32*(6), 991-1022. doi: 10.1177/0149206306294405

Li, P. P. (2012). When trust matters the most: The imperatives for contextualising trust research. *Journal of Trust Research, 2*(2), 101-106. doi: 10.1080/21515581.2012.708494

Lorenzoni, L., & Pidgeon, N. F. (2006). Public Views on Climate Change: European and USA Perspectives. *Climatic Change, 77*(1-2), 73-95. doi: 10.1007/s10584-006-9072-z

Mason, J. (2002). *Qualitative Researching*: SAGE Publications.

Mayer, R. C., Davis, J. H., & Schoorman, F. D. (1995). An Integrative Model of Organizational Trust. *The Academy of Management Review, 20*(3), 709-734. doi: 10.2307/258792

McLellan, H. (1996). *Situated Learning Perspectives*: Educational Technology Publications.

Moghariya, D. P., & Smardon, R. C. (2012). Rural perspectives of climate change: A study from Saurastra and Kutch of Western India. *Public Underst Sci, 23*(6), 660-677. doi: 10.1177/0963662512465698

Mudege, N. N. (2008). *An Ethnography of Knowledge: The Production of Knowledge in Mupfurudzi Resettlement Scheme, Zimbabwe*: Brill.

Murray, M. (2000). Levels of narrative analysis in health psychology. *J Health Psychol, 5*(3), 337-347. doi: 10.1177/135910530000500305

Nerlich, B., Koteyko, N., & Brown, B. (2010). Theory and language of climate change communication. *Wiley Interdisciplinary Reviews: Climate Change, 1*(1), 97-110. doi: 10.1002/wcc.002

Nightingale, D., & Cromby, J. (1999). *Social constructionist psychology: A critical analysis of theory and practice*: McGraw-Hill Education (UK).

Norgaard, K. M. (2011). *Living in Denial: Climate Change, Emotions, and Everyday Life*: MIT Press.

Patterson, O. (2014). Making Sense of Culture. *Annual Review of Sociology, 40*(1), 1-30. doi: doi:10.1146/annurev-soc-071913-043123

Paul, B. K. (1997). Flood Research in Bangladesh in Retrospect and Prospect: a Review. *Geoforum, 28*(2), 121-131. doi: http://dx.doi.org/10.1016/S0016-7185(97)00004-3

Polanyi, M. (1967). *The tacit dimension*. Garden City, N.Y.: Anchor Books.

PreventionWeb. Bangladesh: Disaster Statistics.   Retrieved September 20th, 2014, from http://www.preventionweb.net/english/countries/statistics/?cid=14

Roncoli, C., Ingram, K., & Kirshen, P. (2002). Reading the Rains: Local Knowledge and Rainfall Forecasting in Burkina Faso. *Society & Natural Resources, 15*(5), 409-427. doi: 10.1080/08941920252866774

Ruddle, K. (2000). Systems of Knowledge: Dialogue, Relationships and Process. *Environment, Development and Sustainability, 2*(3-4), 277-304.

Ryle, G. (1949). *The concept of mind*. London ; New York Hutchinson's University Library.

Schweder, R. A. (1991). Cultural psychology - What is it? *Thinking Through Cultures: Expeditions in Cultural Psychology*. Cambridge, Massachussets, and London, England: Harvard University Press.

Shameem, M., Md., Momtaz, S., & Kiem, A. S. (2015). Local perceptions of and adaptation to climate variability and change: the case of shrimp farming communities in the coastal region of Bangladesh. *Climatic Change*, 1-14. doi: 10.1007/s10584-015-1470-7

Squires, A. (2009). Methodological challenges in cross-language qualitative research: a research review. *Int J Nurs Stud, 46*(2), 277-287. doi: 10.1016/j.ijnurstu.2008.08.006

Sutter, M., & Kocher, M. G. (2007). Trust and trustworthiness across different age groups. *Games and Economic Behavior, 59*(2), 364-382. doi: 10.1016/j.geb.2006.07.006

Swim, J. K., Stern, P. C., Doherty, T. J., Clayton, S., Reser, J. S., Weber, E. U., . . . Howard, G. S. (2011). Psychology's contributions to understanding and addressing global climate change. *American Psychologist, 66*(4), 241-250. doi: 10.1037/a0023220

Temple, B., & Young, A. (2004). Qualitative Research and Translation Dilemmas. *Qualitative Research, 4*(2), 161-178. doi: 10.1177/1468794104044430

The Intergovernmental Panel on Climate Change. (1995). Climate Change 1995: The Science of Climate Change.  Contribution of Working Group I to the Second Assessment Report of the Intergovernmental Panel on Climate Change In J. T. Houghton, L. G. Meira Filho, B. A. Callander, N. Harris, A. Kattenberg & K. Maskell (Eds.), (pp. 572). Cambridge, United Kingdom and NY, New York, USA.

The Intergovernmental Panel on Climate Change. (2014). Climate Change 2014  Synthesis Report: Summary for Policymakers *The Fifth Assessment Report (AR5)* IPCC.

The Norwegian Refugee Council. (2013). Global estimates: People displaced by disaster. Geneve.

Thomas, R., M. . (2001). *Knowing. Folk Psychologies across Cultures. SAGE Publications, Inc*. Thousand Oaks, CA: SAGE Publications, Inc.

Transforming Climate Knowledge with and for Society. (2015). About TRACKS.  Retrieved Oct 1,  2015, from http://projecttracks.net/about/

Vedwan, N., & Rhoades, R. E. (2001). Climate change in the Western Himalayas of India: a study of local perception and response. *Climate Research, 15*, 109-117. doi: 10.3354/cr019109

Weber, E. U., & Stern, P. C. (2011). Public understanding of climate change in the United States. *Am Psychol, 66*(4), 315-328. doi: 10.1037/a0023253

Willig, C. (2008). *Introducing qualitative research in psychology*: McGraw-Hill Education (UK).

Wong, J. P.-H., & Poon, M. K.-L. (2010). Bringing Translation Out of the Shadows: Translation as an Issue of Methodological Significance in Cross-Cultural Qualitative Research. *Journal of Transcultural Nursing, 21*(2), 151-158. doi: 10.1177/1043659609357637

# Appendix

## Appendix A: NSD approval

Printed with permission.

**Norsk samfunnsvitenskapelig datatjeneste AS**
NORWEGIAN SOCIAL SCIENCE DATA SERVICES

Scott Bremer
Senter for vitenskapsteori Universitetet i Bergen
Boks 7805
5020 BERGEN

Vår dato: 05.12.2014          Vår ref: 40514 / 3 / KH          Deres dato:          Deres ref:

### TILBAKEMELDING PÅ MELDING OM BEHANDLING AV PERSONOPPLYSNINGER

Vi viser til melding om behandling av personopplysninger, mottatt 29.10.2014. Meldingen gjelder prosjektet:

| 40514 | *Transforming Climate Knowledge with and for Society (TRACKS): Mobilising high-quality knowledge on climate variability with communities in northeast Bangladesh* |
| Behandlingsansvarlig | *Universitetet i Bergen, ved institusjonens øverste leder* |
| Daglig ansvarlig | *Scott Bremer* |

Personvernombudet har vurdert prosjektet, og finner at behandlingen av personopplysninger vil være regulert av § 7-27 i personopplysningsforskriften. Personvernombudet tilrår at prosjektet gjennomføres.

Personvernombudets tilråding forutsetter at prosjektet gjennomføres i tråd med opplysningene gitt i meldeskjemaet, korrespondanse med ombudet, ombudets kommentarer samt personopplysningsloven og helseregisterloven med forskrifter. Behandlingen av personopplysninger kan settes i gang.

Det gjøres oppmerksom på at det skal gis ny melding dersom behandlingen endres i forhold til de opplysninger som ligger til grunn for personvernombudets vurdering. Endringsmeldinger gis via et eget skjema, http://www.nsd.uib.no/personvern/meldeplikt/skjema.html. Det skal også gis melding etter tre år dersom prosjektet fortsatt pågår. Meldinger skal skje skriftlig til ombudet.

Personvernombudet har lagt ut opplysninger om prosjektet i en offentlig database, http://pvo.nsd.no/prosjekt.

Personvernombudet vil ved prosjektets avslutning, 01.06.2019, rette en henvendelse angående status for behandlingen av personopplysninger.

Vennlig hilsen

Katrine Utaaker Segadal

Kjersti Haugstvedt

Kontaktperson: Kjersti Haugstvedt tlf: 55 58 29 53
Vedlegg: Prosjektvurdering

*Dokumentet er elektronisk produsert og godkjent ved NSDs rutiner for elektronisk godkjenning.*

**Appendix B: Interview guide**

Printed with permission.


**Interview framework – Final Version**

**Refined framework following the pilot tests in Bergen and Sylhet Division**


1.  **Presenting the objectives of the interviews to the respondents, and motivations for participation**

Hello. Do you have one hour to talk to us?

My name is _____ and I'm a student at [the University of…].

We are conducting a research project about the weather in this region of Bangladesh. Can we ask first how long you have been living in [Sunamganj or Beani Bazar]?

On this project we're cooperating with researchers in Norway and the United States. The project manager is Professor Matthias Kaiser at the University of Bergen, Norway.

We would like to hear your thoughts about how the weather affects your life around the year. This interview gives you a voice to help support planning processes in government, and learning processes in universities, schools and your community.

Would you be able to help us by answering a few questions?


2.  **Informed consent and ethical statement**

You have agreed to participate in an interview within the TRACKS project, on the weather and its impacts in your region.

*This means that you accept these conditions:*

*   Your participation to the interview is voluntary and you will not be paid for your participation.
*   Notes will be written during the interview. An audio tape of the interview will be made.
*   Anything you contribute within the interview may be used only by the TRACKS project, and will not be used by others.

*Your rights as interviewee are as follow:*

*   Your identity will remain anonymous within the project. Nothing that you tell us can be linked to you, so you can feel free to talk about individuals or groups, and they will never find out what you have said.
*   You are free to exit the interview at any time you choose, or withdraw your information from the project whenever you want.
*   All material collected as part of the interview will be kept confidential and destroyed within two years of the end of the TRACKS project (by June 2019).
*   We will endeavor to share the relevant findings of the TRACKS project with you.

Are you happy with these conditions? If you have any questions about this interview, you may contact [BCAS – NAME – MOBLIE PHONE].

[Following the pilot, it was agreed that this long introduction and ethical statement will not be read. Rather, the interviewer gives their own short introduction of themselves and the TRACKS project, before noting: (i) this research is anonymous; and (ii) if you do not want to answer a question, you do not have to. Afterwards, respondents are given a piece of paper with the full translated ethical statement, and contact details for BCAS.]

### 3. Personal details of respondents

3.1. Name

3.2. Mobile number

3.3. GPS location of interview (waypoint and x and y value)

3.4. Gender [don't ask this just take note]

3.5. Age [ask for the age and tick the box for the age range]

| <18 | 18-25 | 25-35 | 35-45 | 45-55 | 55+ |
|-----|-------|-------|-------|-------|-----|
|     |       |       |       |       |     |

3.6. What is your occupation? [don't read out the categories but tick the appropriate box, and write the occupation on the last line. If the respondent has several jobs, tick all relevant boxes and note all jobs.]
- o  Agriculture
- o  Day labour
- o  Business
- o  Government
- o  Service
- o  Household work
- o  Fishing
- o  Education
- o  Other
- o  Write their occupation here: _____

3.7. Highest level of education [don't read out the categories but tick the appropriate box]
- o  Primary school
- o  Secondary school
- o  Higher secondary school
- o  University
- o  None

3.8. Family structure – Are you married or unmarried?
[don't read out the categories but tick the appropriate box]
- o  Married
- o  Unmarried
- o  Divorced
- o  Widow(er)
- o  How many family members are there living in your household? _____

3.9. Religion [don't read out the categories but tick the appropriate box]
- o  Muslim
- o  Hindu
- o  Christian

54

        o   Other

3.10.         How long have you lived in the area? [Only interview people who have lived in the area for at least two years]


## 4.  Open, narrative questions and prompts


[At this point the interviewer produces a Bangladeshi calendar, which is used to guide the discussion around the open narrative questions. This calendar is on A3 paper in 'landscape format' and resembles a table, with the months and seasons down the left side, followed by two columns. The first column is labelled ' Weather events', and the second column is 'Impacts of weather events'.]

4.1    Can you explain how the weather changes with the seasons in this area over a typical year?

    a)  Think about a typical year from your younger years, or when you first moved to this area.
    b)  Think about a typical year since 2010. Have you seen any changes in the seasons and the weather compared to your younger years?
    [Record the typical years in the first column of the calendar. Relative to the 'typical year in your younger years', make a note of what period in time is being discussed]

    o   [If the respondent doesn't know where to start] You could begin in Boishak and describe the changes in the weather from then on, over the year.
    o   [If the respondent still doesn't know where to start] Imagine you are explaining the changing seasons to a visitor in your area.
    o   [We will get very different answers from different respondents, and this is interesting!]

4.2    Looking at recent years, which weather events that you have mentioned over the year have the biggest impact on your life, and why? [Show the calendar, and write down the events listed by the respondent at the appropriate place in the second column, together with why they have a high impact. Tell the respondent: these can be good or bad events for you]

    a)  [Depending on how many events mentioned, ask the respondent to choose the events that have the biggest impacts for them] Can you give an example of a time when you experienced these impacts? [Interviewers point at the impacts written in the second column while the respondent is talking about them. Ask about as many impacts as the interview timing allows]

4.3    Looking at these impacts [showing the calendar], what signs do you use to know that this weather is coming?  [We are looking for indicators (= signs) here, it is an important question! Can we add a third column to the calendar to write in signs that correspond to weather events and impacts?]

    a)     Do you use TV or radio forecasts? Can you give me an example?
    b)     Do you discuss weather with family or friends? Can you give me an example?
    c)     Do you use natural signs? Can you give an example?

4.4 Looking at these impacts [showing the calendar], how do you prepare for this weather, and how do you deal with the impacts afterwards? Can you give examples of a time when you prepared for this weather, and what you did after it hit you?

4.5 Who or what do you trust for giving you weather information, and why?

   a)   What about weather forecasts on the TV or radio?
   b)   What about your friends and family?
   c)   What about your observation of natural signs?

4.6 Who do you discuss the weather with? Do you know how other people in the area share information about the weather?

4.7 Looking back on these impacts [show the calendar again to the respondent], which weather information would be useful for you?

   a)   What about weather forecasts for the short-term and long-term future?
   b)   What about information on the impacts of weather?
   c)   Who would you like to get this information from and how?

4.8 What is your idea of the worst weather event that could happen to you, and why is it the worst? [The respondent can imagine the worst weather for him/her, even if he/she has not experienced it her/himself]

   a)   [If they ask what is 'worst'] Worst for: your family, your livelihood, your community.

## 5. Closing questions

5.1 Is there anything else you would like to tell us that might help our project?

5.2 Who else do you think would have a very interesting perspective on the weather and its impacts on the community here?

5.3 Would you be interested in participating further in this project, and attending a workshop next year?