POLITICAL ECOLOGY OF CORDYCEPS IN THE GARHWAL HIMALAYA OF NORTHERN INDIA

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POLITICAL ECOLOGY OF CORDYCEPS IN THE GARHWAL HIMALAYA OF NORTHERN INDIA

By

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In the Garhwal, Indian Himalaya, rural mountain people labor to piece together their livelihoods in an ever changing world. One particular group, the Bhotiya (an ethnically and culturally distinct tribal group) were historically engaged in seasonal migration (i.e. transhumance) to take advantage of scarce mountain resources and trade relations with Tibet. This livelihood practice has all but disappeared; however, today one way the Bhotiya are adapting to these changing circumstances is by engaging in the collection and sale of a valuable alpine medicinal fungus locally known as keera jari, and commonly called the caterpillar fungus or cordyceps (Ophiocordyceps sinensis). The Bhotiyas’ historic relationship with alpine meadows where cordyceps are found, uniquely positions them to access “the world’s most expensive biological resource” (Shrestha and Bawa 2013:514).

This dissertation interrogates the geographic, social, economic, political and ecological aspects of the collection and sale of cordyceps as an emerging livelihood activity in the Garhwal. The objectives of this research are designed to address: 1) the socio-spatial geography of cordyceps collection 2) the opportunities to access cordyceps meadows and markets and 3) the commodity relations in which cordyceps are embedded. The guiding research questions of the dissertation are as follows: What is the geography of cordyceps in areas where it is widely collected? How are opportunities of individuals, households, and communities to access cordyceps influenced by location and social categories of difference? What are the commodity relations in which cordyceps are embedded?

This research is significant as there are gaps in the scientific literature that pertain to the geography of cordyceps collection, access to cordyceps markets and meadows, and commodity chains. This dissertation helps to fill these gaps with an analysis of the policies which enable and constrain access to cordyceps meadows and markets, a rich description of the geography of cordyceps collection and sale as a new livelihood activity, and a critical investigation of the commodity chains of cordyceps, including a focus on who is able to benefit from this lucrative trade.
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CHAPTER 1 INTRODUCTION

The forest guards come asking, ‘Why are your children going up to get keera jari?’ Had we had good jobs, if we were wealthy, then we wouldn't go up there into that difficult terrain to get keera jari. But we're doing it because we have no other alternatives... We have spent our lives, and we are fine with it, but there is nothing for our new generation. They have no jobs, they have no access to the forests – something which belongs to us – and there is no source of income. So how are they going to survive? You know?

Bhotiya woman in her village, Garhwal Himalaya, India (2010)¹

Alpine resources have long been at the center of mountain people’s livelihoods in the Indian Himalaya. Access to these alpine resources, however, has changed over time, and as such the livelihood activities that are contingent upon these alpine resources have also changed. This dissertation investigates the ways in which a particular group of mountain people residing in the Indian Himalaya are accessing a relatively new and highly valuable alpine resource in order to improve their livelihoods.

In the Garhwal of northern India, the Bhotiya, an ethnically and culturally distinct tribal group, have historically engaged in a livelihood system of transhumance which entailed seasonal migration with sheep and goats to take advantage of scarce mountain resources at varying elevations. This transhumance system was spatially expansive and facilitated the perpetuation of culturally and economically significant trade and commercial relations with Tibetan communities to the north and down-country villages to the south (Negi 2007). Today, transhumance as a central livelihood practice in the Indian Himalaya has all but disappeared largely owing to the

¹ I, along with Leah Webb, was part of a research project focused on environmental health in the Niti Valley in 2010. This quote came from that study.
1962 closure of the Indo-Tibetan border as well as other nation-state policies which restrict the mobility of the Bhotiya (Dangwal 2009). The result of border closures and other spatial constraints on mobility and access to alpine resources has drastically altered the way of life of the Bhotiya (Negi 2007). Today, one way the Bhotiya are adapting to these changing circumstances is by engaging in the collection and sale of a valuable alpine medicinal fungus commonly called cordyceps (*Ophiocordyceps sinensis*) and known locally in the region as *keera jari*. As evident from the Bhotiya woman’s words above, the collection and sale of *keera jari* is emerging as an important livelihood strategy in the Garhwal Himalaya given the lack of alternatives for sustaining families and communities.

Though the Bhotiyas’ livelihoods have been drastically altered, their historic relationship with alpine meadows where cordyceps are found uniquely positions them to access “the world’s most expensive biological resource” (Shrestha and Bawa 2013:514). Some rural households in the Himalaya earn as much as two-thirds of their household income via cordyceps collection and trade, and in other parts of the Himalaya there are concerns regarding the sustainability of cordyceps due to its over exploitation (Cannon et al. 2009). Given this reality the paucity of literature on the ecological, social, and economic aspects of the cordyceps trade for Garhwalis is surprising. The current literature is deficient in understanding how people navigate the socio-spatial dimensions associated with accessing cordyceps meadows, how people access and capitalize on local and distant cordyceps markets, and the ways in which categories of social difference and location shape access.

In this dissertation I attempt to help fill these gaps in the literature by delving into the social, economic, and geographic realities of the collection and sale of *keera jari* in the Garhwal
Himalaya. More specifically, I look to address these gaps in the literature with a focus on the following: 1) the socio-spatial geography of cordyceps collection in high elevation alpine zones; 2) the factors that shape opportunities to access local cordyceps meadows and markets; and 3) the commodity relations in which cordyceps are embedded.

In the following sections of this introduction I will provide a geographical orientation to the Garhwal Himalaya and a brief background on keera jari. I will also elaborate the research problems that are addressed within this dissertation. I will then situate my research questions within the context of relevant literature to establish the linkages between theory and practice that are driving this dissertation project. Finally, I end this introduction by outlining the structure and organization of the dissertation.

**Locating the Garhwal**

The Garhwal is one of two regions in the Indian state of Uttarakhand. In the southeast of Uttarakhand is Kumaon and in the northwest is Garhwal. The state of Uttarakhand was recently created when Uttarakhand separated from the larger state of Uttar Pradesh in 2001. This jurisdictional separation was a locally-driven attempt to gain better representation and political voice of the mountain populations by separating and distinguishing their needs, priorities and concerns from the dominance of the more heavily populated plains of Uttar Pradesh. In Uttarakhand 0.3% of the population is recognized as members of what is designated by the Indian government as a “scheduled tribe.” The Bhotiya represent one of five recognized scheduled tribes in Uttarakhand and are reported to have a population of 36,438 (Bhatt 2012).
The Garhwal is a geographically and geopolitically strategic region along the border between India and China (Bergmann et al. 2008). The geography of the Garhwal ranges from the foothills and junction with the plains to deep within the high Himalaya Mountains. The study area of focus in this dissertation is located in the most mountainous part of the Garhwal. The landscape is dominated by steep mountains and raging rivers, which are part of the upper watershed of the Ganges, India’s most sacred river. Villages are rural in nature and seemingly hang from the steep mountain sides. The Bhotiyas primarily reside in eight of these high mountain valleys in the Garhwal and Kumaon (Bergmann et al. 2008).

The Bhotiya practice subsistence agriculture, and most of the villages in this area are surrounded by agricultural fields. Villages range drastically in size, but in the study area most villages are made up of between 5 and 80 families. The total population of the Garhwal in 2011 was 3,724,588 (Indian Census, 2011). The research presented herein is located in the Chamoli district, with a population in 2011 of 391,605 and a population density of 49 people per square kilometer (Indian Census, 2011).
The Garhwal and the territory contained in Uttarakhand are known as the “abode of the gods” for their beauty and the presence of a number of different religious pilgrimage sites. The road into and out of the region is overwhelmed by pilgrims during the summer months, however the Niti Valley, where this study is located, is just beyond the pilgrimage routes. In this rural mountain geography it is hard to make a living, and access to mountain resources play an important part in creating a diverse portfolio of livelihood activities for any one household.

**Explaining Keera Jari**

*Keera jari* is the Hindi name for *Ophiocordyceps sinensis*, or what is commonly referred to in the academic literature as simply cordyceps. It is found only in the high elevation areas of the Himalaya and the Tibetan Plateau. In other parts of the Himalayas cordyceps also goes by the
local names of *yarsa gumba* in Tibetan and Nepali and *dōng chóng xià cǎo* in Chinese. *Keera jari* is a Hindi word concoction that literally translates to insect root. The term cordyceps is derived from the Latin word ‘cord’ which means club, the Latin word ‘ceps’ which means head, and ‘sinensis’ which means from China (Xu et al. 2016).

Cordyceps is a rare medicinal and parasitic fungus growing in the body of a caterpillar in the Tibetan Plateau of China and in the Himalaya Mountains of Nepal, Bhutan and India (Ranjit et al. 2010, Winkler 2009). Cordyceps is actually a combination of two separate organisms. Due to this unique combination of two organisms, cordyceps is hard to study, and there is relatively little know about its ecology. It is because of the unique joining of the caterpillar and fungi that it is popularly referred to as the caterpillar fungus.

The caterpillar larvae that acts as the host insect for the fungus is of the ghost moth (also known as a swift moth) and the Latin order *Lepidoptera*, and more specifically *Hepialus/Thitarodes* (Wang and Yao 2011, Cannon et al. 2009). There is a high dependence of the fungus on local populations of the host insect (Zhang et al. 2014). The parasitic fungus infects the larvae of the moth while in the ground during the summer feeding on alpine plant roots. Infection occurs when a spore or spores of the fungus attach to the outside of the caterpillar larvae and penetrates the exoskeleton (Xu et al. 2016). Before the caterpillar larvae can mature into a moth the cordyceps fungus’s mycelium takes over the caterpillar’s body, thereby killing the caterpillar. In the following spring the fruiting body of the fungus grows out of the now dead caterpillar’s head and protrudes above ground. The host insect requires about two years for the completion of its lifecycle while the fungus only requires one year (Zhang et al.)
Therefore the biogeography of cordyceps depends upon a complex interaction between the fungus, the host insect, and the alpine plants upon which the moths feed.

**Figure 2: Distribution of Cordyceps in the Himalayas (Winkler 2010)**

Cordyceps has been used for medicinal purposes within traditional Chinese medicine for an estimated 2000 years. Cordyceps has been used traditionally to “replenish the kidney and soothe the lung, for the treatment of fatigue, night sweating, hyposexuality, hyperglycaemia, hyperlipidaemia, asthenia after severe illness, respiratory disease, renal dysfunction and renal failure, arrhythmias and other heart disease and liver disease” (Zhou et al 2009:288). The recent academic literature finds that *Ophiocordyceps sinensis* has the following functional activities: immunomodulating, antiinflammation, antioxidant, inhibit apoptosis, induce apoptosis, antitumor, cardiovascular protection, kidney protection, reproduction protection and the
prevention of osteoporosis (Xu et al. 2016). Cordyceps is also valued as a natural aphrodisiac, having earned the nickname of Himalayan Viagra in the popular press, although there are no rigorous studies to document these assertions.

Cordyceps was only just ‘discovered’ in the Garhwal region of India in 2001 (Negi et al. 2006). There has been an explosion in its collection and sale by the locals since that time, representing rapid socio-ecological change for these people (Negi et al. 2006). Many rural mountain communities now receive the majority of their income from the collection and sale of cordyceps; however, there is relatively little known about the collection and sale of cordyceps as a livelihood strategy in Uttarakhand.

**Defining the Research Problem**

In 2005 I had the opportunity to experience the Garhwal and embarked on what has become twelve years of meaningful interactions with Bhotiya communities. By listening to friends, colleagues, and other local people, I began learning about the story of *keera jari*. As the woman quoted at the beginning of this chapter noted, *keera jari* represented one of only a very few opportunities for a livelihood, one that hinges on access to this particular mountain resource. During my annual field excursions to the Garhwal, I had noticed each year that the villages during the summer months had fewer and fewer people in them, as many of the villagers were in the alpine meadows collecting *keera jari*. *Keera jari* was the topic of every conversation it seemed. When I delved into the academic literature, I found that to my surprise there was almost nothing written about *keera jari* in India, and absolutely no academic work focused on *keera jari* in the Garhwal. *Keera jari* emerged as a poignant and compelling topic through which significant cultural, economic, and social processes could be analyzed and also a lens through
which I could investigate changing relationships between mountains and people. It was an
obvious topic to choose if I wanted to research something relevant to the local population as well
as fill a gap in the scientific literature.

Previous research to date that is focused on cordyceps collection elsewhere in the
Himalaya centers on the sustainability of the resources (Negi et al. 2006, Winkler 2009, Negi
2015); the composition of cordyceps commodity chains (Sharma 2004); production estimates
(Winkler 2009, Singh et al. 2010); harvesting techniques (Winkler 2008); accounts of the history
of cordyceps use in traditional Tibetan and Chinese medicines (Alessandro and Cardi 2009); and
general findings regarding social impacts of the collection and sale to local livelihoods (Garbyal
et al. 2004, Wangchuk et al. 2012). Most of these investigations into cordyceps were based on
case studies. This dissertation extends many of these important themes into a region which not
been the focus of any study on cordyceps.

In addition to the small body of work focused on cordyceps, this dissertation is informed
by a diverse and growing body of literature on mountain livelihoods (Olsen Larsen 2003, Wu et
al. 2014). This literature points to the importance of cordyceps to rural mountain livelihoods. In
this related but separate literature, cordyceps has been found to be one of the most important
non-timber forest products (NTFP) and medicinal and aromatic plants (MAP) collected, though
the details of cordyceps collection and sale are missing.

These previous studies have contributed greatly to our understanding of cordyceps as a
commodity as well as highlighted the importance of this commodity for mountain livelihoods
and rural economies. I have in this dissertation tried to further connect the collection and sale of
cordyceps with livelihood studies and the NTFP and MAP literature specifically. I have done this with a study grounded in the Garhwal—and a detailed focus on the ways in which cordyceps impacts these Garhwali livelihoods.

In the Garhwal there are a number of ecological, social and economic unknowns in regards to cordyceps collection and sale. It is difficult to understand the processes and effects of cordyceps collection and sale in the Garhwal due to the limited data available on how communities are accessing cordyceps, the market details surrounding the sale of cordyceps, and the social dynamics of these activities in India. As Sharma (2004:1618) notes, “There is need for scientific exploration in India to…formulate a strategy for conservation as well as sustainable harvesting of the fungus.” The dissertation research presented herein specifically addresses this void in the literature.

In the next section I will delve into the different facets of my dissertation. I will first introduce each of my three research questions, and then follow each question with a theoretical and conceptual discussion in order to explain how and why my research questions are relevant to the current situation in the Garhwal. Finally, I will briefly comment on the approach to addressing these questions.

**Research Questions and Approach**

This dissertation analyzes three intersecting dimensions: the geography, lived experiences, and commodity relations of cordyceps collection and sale in the Garhwal. The guiding research questions are as follows:

1) What is the geography of cordyceps collection in areas where it is widely collected?
2) How are opportunities of communities to access cordyceps influenced by location and social categories of difference? and

3) What are the commodity relations in which cordyceps are embedded?

I will briefly expand on the theory and relevance behind each separate but interrelated question, and how I went about answering these questions. However, before interrogating each question separately, I will first introduce the concept of ‘livelihood’ which serves as a central theoretical framework for this research and informs all three research questions.

I define livelihood as the “capabilities, assets (including both material and social resources) and activities required for a means of living” (Scoones, 1998:5). I use this theoretical framework because the livelihoods perspective that has emerged out of development studies in geography and allied social sciences represents a people-centered approach to research. I use a livelihood analysis to draw attention to intersecting considerations of social and ecological importance, access to resources, institutions and organizations, and various livelihood strategies (Scoones 2009; Batterbury 2008). Further, a specific focus on livelihood decision-making which is an important component of livelihood strategies can help to shed light on how those involved in the collection and sale of cordyceps make tradeoffs between risk and security.

Livelihood strategies include diversification, migration and agricultural intensification and extensification (de Sherbinin et al. 2008). Cordyceps represents a diversification strategy, a "process by which rural families construct a diverse portfolio of activities and social support capabilities in their struggle for survival and in order to improve their standards of living" (Ellis
Livelihood diversification is one of the "key features of how people respond to globalization trends, to neo-liberal reform agendas, and to endemic poverty" (Batterbury 2008:5).

The bulk of the field observations and interview data for this dissertation was collected from May to August in 2014. The study was also informed by a decade of formal and informal interactions in the field site. These interactions over a long period of time were fundamental for getting to know the research setting, developing a familiarity and confidence in language and cultural nuances, and building trusting relationships with study participants. For this project I took a four pronged approach to data collection. I engaged in extensive participant observation, participate in informal conversations, conducted surveys with cordyceps collectors, and undertook a legal and policy analysis. A full account of these methodologies is found in later sections of this dissertation.

My research questions and data collection methods are interrelated. To help make explicit how I address my research questions, in the following paragraphs I elaborate on how each research question is specifically addressed.

1) *What is the geography of cordyceps collection in areas where it is widely collected?*

In my approach to this question about the geography of cordyceps collection, I am referring to an explicitly spatial analysis of the trails leading to the alpine meadows, the meadows where collection occurs, and the people navigating these trails and collecting cordyceps. By trying to understand the geography of collection, this study is a counterpoint to
rural studies which tend to treat livelihood activities as aspatial (King 2011). King suggests that an explicit spatial consideration of livelihoods will enable a better understanding of the "diversification, intra-community differentiation, the structure and agency of livelihoods, and the effects of decision making upon social and environmental systems" (King 2011:297). As he points out, people access resources differently across space, a spatial feature which then impacts decision making power and livelihood strategies (King 2011).

My intervention into this geography of cordyceps collection entails a focus on three key sites and spaces: mountain trails linking villages to meadows; the alpine spaces constituted by the meadows; and households within the village where cordyceps are processed, stored and sometime sold. I first began with the trails leading to the cordyceps meadows. I noted the physical attributes of these trails. This included the length and difficulty of each trail as well as other important attributes such as the difficulty, prevalence of steep drop offs, overhanging cliffs, and water crossings.

I next looked at the meadows where collection occurred. I noted the physical attributes of these meadows. This included the size and steepness of the meadows. I also considered the types of vegetation cover, location of water, presence of caves and boulders, location of wood and so forth.

I also observed how people navigated these trails and meadows. I documented when people traveled on the trails, the groupings of people as they travelled, and how long travel to the meadows took. I also asked about their experiences on the trails. In the meadows, I took note of when people went out for collection, the groupings of people as they collected, and how long
they collected. I also identified where in the meadows people went to collect, where they went to camp and why. I examined the relationship between the different physical attributes of the meadows and the human activities taking place there.

Finally, I noted the livelihood activities surrounding cordyceps in the home. I took into account the ways in which the cordyceps were processed for storage and sale, and the locations where cordyceps were stored within the home.

2) How are opportunities of communities to access cordyceps influenced by location and social categories of difference?

Cordyceps collection is a livelihood strategy dependent upon access. I define access as the ability to derive benefits from something (Ribot and Peluso 2003). In the case of cordyceps, access mainly lies in accessing the alpine meadows where the cordyceps are found and accessing the markets and commodity webs where the cordyceps are sold. How an individual is able to access resources impacts how he or she goes about livelihood diversification (Wu et al. 2014).

In order to understand how access to cordyceps meadows and markets were influenced by location and different social categories of difference today I first had to gain a better understanding of the legal and political realities which pertained to these meadows and markets historically (Yeh 2000). This included an analysis of federal and state natural resource and tribal polices and how these polices trickle down to define local access for each village to capture the spatial variability of the area (Nüsser and Gerwin 2000). This scalar focus expands on the majority of livelihood studies which focus solely on the household (King 2011).
To investigate how access to cordyceps meadows and markets was experienced by different villages, I specifically examined how each village was uniquely positioned in regards to the cordyceps collection meadows and markets. This investigation was done by taking into account the location of each meadow, village and trail. I also took into account how different villages were able to engage with cordyceps markets, or in this case, the prevalence of travelling buyers by village.

To comprehend how access to cordyceps is influenced by different social categories of difference, I analyzed how gender, age, caste, and family clan impacted one’s ability to collect and sell cordyceps as well as receive benefits from the income gained by the collection and sale. I focused on the way that one access cordyceps from the markets and the cordyceps commodity relations as they travel to the market. I analyzed who benefits the most, and who benefits the least when the cordyceps moves from the hands of the collectors into the market.

3) **What are the commodity relations in which cordyceps are embedded?**

Cordyceps are commodities in a global trade involving primarily China with trade linkages extending to Europe, the United States, and beyond. I define a commodity not as a particular thing, “but rather the outcomes of processes of commoditization” (Yeh and Lama 2013: 322). Cordyceps are embedded in commodity chains which are a "series of relations through which an item passes, from extraction through conversion, exchange, transport, distribution and final use" (Ribot 1998:307). In the case of cordyceps, the cordyceps is commoditized or transformed from a natural resource to a commodity when it is removed from
the ground (Yeh and Lama 2013). The commodity chains of cordyceps begin with local collectors and travel through time and space to international consumers.

Attention to commodity chains is critical to an analysis of access to natural resource commodities such as cordyceps since "most of the benefits flowing from the forests derive from the resulting market control, not control of forests or trees" (Ribot 1998:311). In other words, just because a community has access and control over the environment from which the commodity is formed (in this case, alpine meadows), the factors and processes impacting cordyceps as a livelihood strategy will also be influenced by access and control over markets and cordyceps commodity chains. Recent work on commodity chains in political ecology has focused on dynamic webs of relations rather than unidirectional chains.

To understand the commodity relations in which cordyceps are embedded I engaged in participant observant, asked pointed survey questions of collectors and analyzed the policy context (Yeh and Lama 2013). I engaged in participant observation to fully understand how these secretive markets operate (Lama 2007). Survey questions addressed the following: the sale of cordyceps; how, where and to whom the cordyceps were sold; when and why the cordyceps were sold as they were; and broader commodity relations. Finally, I analyzed the nation-state policy context to situate the sale of cordyceps within existing legal frameworks pertaining to alpine resources.

Structure of the Dissertation

The dissertation is structured around six chapters and is an amalgamation of or melds together the traditional dissertation format consisting of chapters and the emerging trend to
publish ones dissertation as a grouping of separate stand-alone manuscripts. This introduction, the following discussion of my methods and the final conclusions are structured much like traditional dissertation chapters. The three main data analysis sections, Chapter 3, 4 and 5 are stand-alone manuscripts prepared for publication (of which Chapter 3 has already been accepted for publication). This introductory chapter is followed by Chapter 2 which provides an in-depth discussion of the methodology I employed as well as some of the unique opportunities and challenges I faced while conducting my research.

Chapter 3, a manuscript, presents a thick description of this emerging livelihood strategy in order to spatialize the collection and sale of cordyceps in the study site. The chapter addresses the inter-related questions: Who is able to access the cordyceps meadows? And who benefits from cordyceps sale? It also details the lived experience of collection and sale in order to contextualize this new livelihood strategy. This chapter draws upon my fieldwork and the academic literature. In addition, the chapter aims to help steer appropriate conservation measures grounded in local resource rights.

In Chapter 4, a second manuscript, I address the legal context of cordyceps collection and sale. I begin with this analysis to understand the policies which govern access to the cordyceps meadows and markets. This chapter draws on my review of the policy, other academic interpretations of these policies and the gray literature written by other non-governmental organizations working on similar issues. These documents outline legal context in which collection is allowed, and sheds light on where and why collectors and sellers leave the legal realm, to enter into the quasi-legal/illegal collection and sale.
Chapter 5, again a manuscript, explains, analyzes and then evaluates the current commodity webs in which the collection and sale of cordyceps is entangled. It addresses who is able to access and benefit from cordyceps collection and sale. This time however the focus is on how current policies create illegal subjects out of collectors, and the ways in which illegal buyers are able to take advantage of local collection and sale. This chapter draws on my fieldwork and the policy analysis done in Chapter 3.

The concluding chapter, Chapter 6, will tie together the distinct elements of the research and illustrate how this study can impact communities beyond this particular study site. I take the realities of cordyceps collection in the Garhwal and extrapolate on how this study helps to illuminate the broader issues of Indigenous Peoples’ access to natural resources in other geographies. This chapter also discusses some of the challenges and constraints encountered while undertaking this project and analyzing the data. Finally, the chapter presents avenues for future research.
CHAPTER 2 METHODOLOGY: REFLECTIONS ON LIFE AND RESEARCH IN THE GARHWAL

The purpose of this chapter is to describe the methodological and data analysis strategies used in this study and to capture my experiences as a researcher. In order to achieve this purpose, I first briefly review the feminist and Indigenous theory which informs my research methodology. I then describe my identity as a researcher and my long-standing relationship with my field site. This discussion is followed by a description of my study, data collection and analysis. Finally, I note some of the specific methodological issues and reflections I had during my fieldwork.

Situated Perspectives

Theories on the situated and partial nature of ‘knowing’ inform my overall engagement with the research process. Feminist theory and Indigenous methodologies are in essence theories of the marginalized or under-represented. Both bodies of work bring explanatory power to understanding axes of social difference and social divisions drawn along gender, caste, age, ethnicity, religious, class lines and the power structures that define how knowledge is created and reproduced (MacKenzie 1984; Warren 1996; IPSG 2010). Importantly, feminist theory is not about women per se, but about socially constructed and situated differences that are based on perceived social divisions, including but not limited to, gender. These categories of social difference and socio-spatial situatedness have a significant bearing on cordyceps collection and sale.
Feminist standpoint theory suggests that knowledge, as in the case of my study having to do with the collection and sale of cordyceps, is both situated and partial. This theory asks how different classes, ethnicities, races and genders both experience and interpret their worlds. In Indian society, social differentiation and socially prescribed roles greatly impact individuals. I tried to employ a feminist and Indigenous lens to view these social differences, without prioritizing one over another.

Feminist theory also highlights the need to focus on the household as a unit, but without losing sight of the individual. It also suggests the need to calculate individual contributions towards household livelihoods with temporal measures rather than only relying on financial units of measure. In other words the number of hours worked would be considered a better measure of an individual’s contribution towards the household rather than the amount of money earned. Finally, it acknowledges that social divisions have particular spatial and temporal attributes. For these reasons participant observation emerges as a key methodological strategy for capturing data that is nuanced and grounded in every day individual and local realities.

Feminist and Indigenous geographies literature also points to the importance of the researcher’s own position when conducting research (Hart 2010; O’Reilly 2006; O’Reilly and Dhanju 2010; Rocheleau 2008). I am a white middle class woman educated in the western tradition, a reality which results in my own particular social and spatial situatedness. This situatedness affects my understanding and interpretation of the collection and sale of cordyceps in the Garhwal as well as my interactions with study participants and the data that I was and was not able to collect.
Feminist methodologies have also begun to look at the role of emotions and emotional relationships in research. For example, Hardy (2012) found that one’s emotions in part impact positionality or situatedness. In general, however, the role of emotions in research and development studies in particular is largely ignored (Hardy 2012). In the case of my research on cordyceps, the emotions surrounding my relationships with friends, who later became research assistants, greatly impacted my study.

The academic literature on the experiences of geographers’ fieldwork is vast (DeLyser and Starrs, 2001). Within this literature there has been a recent focus on the importance of the researcher’s positionality, reflectivity and ethical conduct (Milgram 2012). The relationships I relied on most heavily during my fieldwork did not form over the course of my dissertation fieldwork, but rather began forming a decade before during my first encounter with the Garhwal Himalaya. In part, I choose my research questions based on their applicability to my friends’ families. When I reflect on these relationships, I find that my positionality within my study site impacts how I related to my study site and the ethical responsibilities I feel I have to fulfill in the research process. In order to better understand these relationships I will now situate myself as a researcher.

_Situating Myself as the Researcher_

My name is Laura Bess Caplins. I am a wife, daughter, sister, aunt, niece and now a mother. I come from a strong family, sandwiched between two incredibly talented and brilliant brothers, one an engineer and the other a chemist. I grew up in rural Maryland where corn, tobacco and crabs are prominent. Today, I live in rural Montana where barns, cattle and horses are the only things that obstruct our view of the mountains. This research and the dissertation
that flows from it, however, are located across the world from both of these places, in the Garhwal region of the Indian Himalaya.

I have been travelling to the Garhwal since 2005. Every year my husband and I make our annual pilgrimage to the Garhwal. We go to the same places and visit the same people. I consider one of these villages to be my second home. In this village I have two Indian ‘brothers’, both an older brother *bhai* and a younger brother *bhaaii*, though they come from different families. As is the custom, I call them ‘brother’ and they call me ‘sister.’ I have known my Indian brothers since the first time I visited India. We have in many ways grown up together.

My Indian brothers and I both helped start and worked for companies that focused on international tourism. Every year I co-coordinated groups of university students to study abroad, and my Indian brothers would welcome us and act as our hosts. Together, we learned how to be guides, teachers and business people.

I also must mention that I am the wife of Dr. Keith Bosak, a geographer who has been working in the Garhwal of India since 2001. In part, some of my status with this community lies in my relationship with my husband. Keith, who is a professor at the University of Montana, also did his doctoral studies in the same area. Many of my relationships with local families are in part built on the relationships that Keith first built. As a married woman, my status in the community is related to my husband’s status. Many of the families in the villages we interact with view Keith as a respected international scholar and a long time advocated for village needs.

I started learning Hindi because I wanted a direct relationship with my friends in India, and I didn’t want to rely on translators. I have substantially upgraded my Hindi knowledge.
through graduate school; however, I committed to learning the language long before a doctoral program was on the horizon. I argue that my relationship with my field site prior to starting any research project is a unique position for students preparing to enter the ‘field.’ I support the uniqueness of my relationship with the community because when I was engaged in my third and fourth year of Hindi studies, I was the only person in my Hindi-Urdu class who had long-term relationships in India at the time. All of my fellow students were masters and doctoral students preparing to ‘do’ research in India or undergraduate students preparing ‘for’ a study abroad.

Over time I have observed that my Indian brothers’ English has surpassed my Hindi. When we do speak, our conversations are a mix of Hindi, English, and the kind of slang that occurs from knowing someone well enough to play with a language. Over the last decade we have learned, laughed, travelled, worried, waited, played, prayed, sweated, grown and lived together. I convey these details because I am biased towards the needs of these mountain communities. My perspective is not that of an insider; however, I am also not fully an outsider. My brothers kindly insist that at this point I am adha Garhwali, adha American (half Garhwali, half American).

From this vantage point, I began my doctoral studies. I tried to choose a dissertation project based on the literature and the complex, contradictory and confusing trends in Indian’s mountainous north. How would I find the right topic? How could I make sure to pick a topic that would be ‘helpful’ to my brother’s families and villages? The last thing in the world I was interested in doing was taking up the time of villagers for a research project that primarily benefited myself and other ‘ivory tower academics.’ I had to find a topic that was meaningful to both locals and the academic community alike. I finally found a research topic that was grounded
in the Garhwal. Once I began my fieldwork, my brothers’ roles and my relationship with them shifted as they became ‘research assistants.’

I chose my research assistants for a number of reasons. First, given our relationship, and the level of trust that we had developed over time, they were willing to use their positions in the community to help me get interviews. Second, they were available during the time I needed help in the field. Third, they speak English well enough for us to communicate in part English and part Hindi. Finally, they were also culturally obligated to help me, given that I was their guest and that we had a long-standing relationship.

Situating the Study Site

My fieldwork was conducted in the Niti Valley of the Garhwal. Many of the villages in this area are actually composed of two villages, as many of the people who live in the Garhwal still practice a modified form of transhumance. Some communities still move their residences between a summer and winter village, though they are no longer able to participate in the sheep and goat-based trade practices. In about half of the cases, the summer home and winter home are located directly up and down slope of each other with a path separating the two villages. In the other half of the cases, the winter villages are located down valley kilometers apart. All of the interviews were conducted in the summer village locations.

Due to the secretive nature of the collection and sale of cordyceps, the exact names of the villages and meadows are not specified.
Data Sources and Analysis

The field data were collected from June to August 2014. Four different data collection methods were used, participant observation, informal conversations, collection group surveys, and a policy and document analysis and literature review. This section will briefly outline each data collection and analysis method and how it was employed in the research. A more detailed description of each data collection method is included in the following chapters.

Field Data Collection

The three field data collection methods included participant observation, informal conversations, and collection group surveys. I participated in local livelihood activities including, but not exclusive to, the collection and sale of cordyceps. I also engaged in numerous informal conversations throughout my time in the study site pertaining to, but not exclusively to, the collection and sale of cordyceps. Both of these data collection methods helped me gain insights into the day to day realities of local people.

A total of 88 collection group surveys were conducted. Due to the secretive nature of the collection and sale of cordyceps, a random sample was not possible. In order to overcome this limitation a quota sample frame was used. Quota sampling is suitable when random selection is not practical due to culturally sensitive or in-depth studies (Bernard 2006, Singleton and Straits 2010). In each village we divided the households up by caste and in some cases family clan and then took an approximate percentage of our interviews from each segment to achieve a general representation from that village. We spoke with villagers who were scheduled tribes (ST), general caste (GC), and scheduled castes (SC). Each village was composed of different combinations of these categories of social difference and our sample reflected these differences.
Field Data Analysis

Upon returning home, I had two main sources of data from the field to analyze. I had collection group surveys and my participant observation and informal conversation experiences and associated field notes. The collection group survey data were entered into an excel spreadsheet to allow for analysis by question. Some questions were straight forward, such as the amount of money earned by an individual and did not require any coding, while other questions were more complex and required open coding. As noted earlier, I asked 28 discrete questions with many of these questions having a probe.

My participant observations were recorded in detail in a field journal. I recorded my field observations daily or in some cases multiple times a day. I also recorded in detail much of the information I gained through informal interviews and conversations along the way. Reviewing my field notes has been invaluable for jogging my memory as to the precise context of many of these informal interviews.

Policy and Document Analysis

The policy and legal context which shapes the Bhotiyas access to cordyceps is fundamental to understand this new livelihood strategy. I therefore engaged in a policy and document analysis to advance my understanding of the legality of the cordyceps collection and sale. I used the academic literature and the gray literature for older polices, as access to forest resources and Indian Forest Policy has been heavily researched. For more recent policies, such as those coming out in the last decade, I went directly to the federal and/or state documents.
Trials and Tribulations in the Field

During my field work I ran into two main methodological issues. These issues included my inability to interview buyers and my inability to collect GPS points and physical attribute date for the cordyceps (geo-locate the cordyceps). I will delve into the details of these issues below.

In the research design stage I anticipated being able to interview cordyceps buyers. I knew that the collection of cordyceps was illegal, however I was unaware of the level of secrecy that surrounded the buyers. Some of the buyers are villagers, some are quasi local buyers, some are regional buyers, and finally some are from outside of the area. I was not able to speak with any of these buyers. My research assistants did not feel comfortable approaching the buyers and asking them for either formal or informal interviews. The inaccessibly of buyers was in part due to a number of different schemes in the area aimed at catching poachers. The police has in the past year gone under cover a number of times in an attempt to catch poachers and this scared many of the local villagers. My research assistants were willing to point out buyers to me, and trusted me with this information; however, since they were not willing to approach these buyers for interviews, we did not glean much information in regards to their actions, perceptions, and interactions with cordyceps sellers.

I did meet one buyer by accident as he was moving through the village, but I was surprised by the interaction and unprepared to ask any relevant questions. My research assistants also outed me as a ‘cordyceps expert’ at the onset of my interaction with the buyer. This was because the buyer was spouting a lot of misinformation, and when my assistants started to
correct him he was surprised. They let him know that I was an ‘expert,’ and as a result they had come to know more about cordyceps than the average villager.

I was also not able to geo-locate the cordyceps as I had originally planned. I was not able to geo-locate the cordyceps for two reasons: 1) the location from where some of the cordyceps were being harvested was not legal; and 2) the cloud cover and timing did not line up to allow for good GPS data. Many of the collectors are collecting outside of permissible areas, and though they are willing to in most cases tell me where they collected, or infer where they collected cordyceps, they were not willing to have GPS points taken of these areas. Furthermore, my collection season overlapped in part with the beginning of the monsoon, and therefore, there was quite a bit of cloud cover. This precluded our GPS camera from being able to access the satellites needed to triangulate our position. The mountain peaks also in some cases blocked our satellite views. The GPS data collection method would be better suited for this study site earlier in the collection season, when the skis are relatively free from cloud cover. I do believe geo-locating the annual cordyceps harvests would be beneficial to the process of designing local resource regulations.

**Authenticity, Trust and Ethical Dilemmas**

Earlier in this paper I outlined how I first became associated with my study site, and how my relationship with the people in my field site developed over the past decade. Now, I will address some of the opportunities and challenges that arose given my particular relationship with my study site.
As was noted earlier, I was not able to obtain a statistically representative sample of cordyceps collection groups as I had intended. I was only able to get a quota sample. This posed quite a challenge for me, as I was only allowed access to collection groups due to my relationship with my research assistants and my history of travel in the valley. I was recognized by many villagers, if not by name, but by appearance, as having ‘been around’ for a while. This recognition, that I had spent a lot of time in the area over the years, was helpful for establishing trust between the villagers and myself. However, I was only granted permission to conduct the interviews because of my research assistants.

My research assistants had to personally ask for interviews, and personally guarantee that the data would not be used against them in any way. Personal assurances from my research assistants was an incredible gift, but places a great burden on my shoulders in regards to how to ‘do right’ by my research assistants, their families, their communities, and the data. How will I make sure that the data we gathered gets to the right audience? How will I ensure that this data results in positive changes for the villagers? Furthermore, how do I put this information to use, which in many cases includes illegal actions by locals, without placing these respondents or their ability to collect and sell cordyceps at risk?

I continue to grapple with these questions. I worry about making sure that the benefits of my research return to these communities. I worry about how to make sure that their time was justly used. What I do, and do not do, with this data, is a direct reflection of my authenticity and the trust that these communities put in me as a researcher.
Returning to my field site is anticipated. I can feel the social responsibility of doing research in a place I am tied to. I know that next time I visit the area that that I will have to respond to a lot of questions about what I did with the research. I will have to explain myself, and what did and did not happen with our data. I will have to travel from village to village to let everyone know what the findings were. I feel that I have an ethical responsibility to share this data given the personal assurances I and my research assistants gave at the onset, and my aim of working against the history of imperialist science that has occurred in India and elsewhere (Bodwitc 2014).

Due to the social responsibility I feel towards the people of my study site, I am hopeful to influence local and non-local policies through my continued commitment to the area. I intend to present my research findings back to the communities which participated in my study and the locally relevant Forest Department offices. I also intend on presenting my research findings to the broader academic and management community through the publication of the three manuscripts presented in this dissertation.

**Summary**

In this chapter I have outlined my methodological approach in both theory and practice. I began this discussion by briefly outlining the theory I used to inform my methodology. I then went into detail regarding the different methods I used, and how these different methods linked together. I have also situated myself as a researcher in my study site. Finally, I touched on a few of the opportunities and challenges I faced given my particular positionality. In the next chapter I give a thick description of the livelihood activities surrounding the collection and sale of cordyceps.
CHAPTER 3 COLLECTING OPHIOCORDYCEPS SINENSIS: AN EMERGING LIVELIHOOD STRATEGY IN THE GARHwal, INDIAN HIMALAYA

Corresponding publication:


Abstract

In the Garhwal of Uttarakhand, India, the Bhotiya, an ethnically and culturally distinct tribal group, were historically engaged in seasonal migration (i.e. transhumance) to take advantage of scarce mountain resources and trade relations with Tibet. This livelihood practice has all but disappeared. Households are adapting to these changing circumstances by engaging in the collection and sale of the valuable alpine medicinal fungus Ophiocordyceps sinensis, widely known as Cordyceps. The collection of this fungus has exploded, emerging as a lucrative yet high-risk livelihood strategy for many Bhotiya communities. The Bhotiyas’ historic herding and trade-based interactions and knowledge of these alpine environments where Cordyceps are found uniquely positions them to access this valuable biological resource. Elsewhere in the Himalayan region, some households are earning as much as two-thirds of their income from the collection of Cordyceps; in China Cordyceps is now listed as an endangered species due to intense over-exploitation in the Tibetan Plateau. This paper seeks to fill the void in the scientific literature on the social, ecological and economic aspects of the emerging Cordyceps trade in the Garhwal. Our study investigates the socio-spatial dimensions of Cordyceps collection in the high alpine meadows. We document how a fusion of local knowledge and practice with alpine mountain
systems has served to reinvigorate the economic integrity of mountain communities at a time of rapid socio-economic change and to reimagine a new relationship between alpine resources and community well-being. The article offers suggestions to address the sustainability of both *Cordyceps* collection and livelihood activities which hinge on this fungus population. We find a need for (1) community-based conservation measures that are rooted in (2) secure resource access rights for local communities to continue sustainable collection and sale of *Cordyceps* and (3) participatory-and science-based processes for determining appropriate local collection numbers.

**Keywords**

*Cordyceps* (*Ophiocordyceps sinensis*); Garhwal; Himalaya; Livelihood; Alpine environments; Bhotiya; Sustainability

**Introduction**

In the Himalaya, mountain livelihood systems often rely on natural resources located in high elevation alpine meadows (Bergmann et al. 2008; Olsen and Larsen 2003). Across this region an increasing number of people are spending summer months in alpine meadows above treeline to collect a rare and valuable alpine medicinal fungus (AMF) called *Ophiocordyceps sinensis* and widely known as simply *Cordyceps* among the research community. We will be using the term *Cordyceps* throughout the paper to reflect this common vernacular. *Cordyceps* is spatially distributed across the Himalayan mountains of India, Nepal, Bhutan, and China (Sharma 2004; Cannon et al. 2009; Thapa et al. 2014). In the Chamoli District of the Garhwal
region of North India the collection of this fungus has exploded, emerging as a lucrative yet high-risk livelihood strategy for many mountain communities. While *Cordyceps* has only been ‘discovered’ in the past ten years in this part of the Garhwal, long-standing traditions of *Cordyceps* collection have been documented elsewhere such as in the Tibet Autonomous Region (TAR) in China (Winkler 2010). Recent increases in market demand for this fungus have actually led to its overexploitation in many of the collection areas in China, with *Cordyceps* now listed as an endangered species by the Chinese government (Wang and Yao 2011). The parallel trends of increasing demand and intensive collection in some areas has pushed *Cordyceps* buyers to search other Himalayan locales for new *Cordyceps* markets (Thapa et al. 2014). The Garhwal region has emerged as one of these areas of rapid market expansion and collection. Calls for an investigation of the sustainability of this fungus in alpine meadows in the Garhwal and elsewhere have recently been put forth by researchers (Cannon et al. 2009; Negi et al. 2006) as well as by local communities. Some suggest that bans on extraction are an over-reaction, and that due to the ecology of the fungus and its reproduction via spores, there is not a direct relationship between collection numbers and the population of the fungus (Garbyal et al. 2004).

In order to address debates over the sustainability of the collection of *Cordyceps* in the Garhwal, it is critical to examine this relatively ‘new’ alpine asset and the practices of collection in relation to broader socio-economic and livelihood contexts. Within mountain livelihood activities are chains, or what Rocheleau (2008) refers to as “webs of explanation” that help to explain why this biological resource is being collected in the way that it is. This article seeks to unravel these explanations through an investigation of the localized experience of extraction and exploitation of *Cordyceps* in the high alpine meadows of the Chamoli District of the Garhwal. In
order to contextualize the collection of *Cordyceps*, the intention here is to situate *Cordyceps*-related activities within a broader historical and economic framework of livelihood change and transformation (Gururani 2014). Today, nearly entire village populations partially relocate to their high alpine meadows to spend days, weeks and sometimes months searching for *Cordyceps* (Figure 1). While the sale of *Cordyceps* has resulted in unforeseen cash revenues and the ability to attain new levels of investment in home improvement, infrastructure, and community spaces (Figure 2), there has been little scientific investigation of the experience, process, or impacts associated with the collection of *Cordyceps*. To date, we have found no study that fully documents the local-scale experience of collection in this area.

*Cordyceps* has been a topic of inquiry for us for several years. In 2008 one member of our author team first observed seasonal depopulation of Garhwali villages that could be linked to the *Cordyceps* collection underway in mountain pastures. Village leaders indicated a decline in the local population that was spending time farming and managing livestock. A major motivation to undertake this study was our interest in probing these field observations in greater depth.

This article begins by outlining the methodological approach guiding this study, then follows with an introduction to the botanical and medicinal properties of *Cordyceps* and a brief history of its collection in the Himalaya. We contextualize this emerging livelihood strategy with a description of the collection, processing, and storage of *Cordyceps*. The paper concludes with the implications of this new livelihood strategy for the sustainability of collection and community well-being.
Methodology

Owing to a decade of extensive field campaigns and interactions with Garhwali communities, the first author was able to build upon collaborative relationships to facilitate three months of focused fieldwork on Cordyceps collection – including collection group surveys, informal interviews and participant observation – from June- August 2014. Before beginning the study, we received approval from the Institutional Review Board at the University of Montana to conduct interviews with human subjects. The study was also reviewed by local leaders, and permission to conduct the research was granted before proceeding.

Survey data was obtained from 88 Cordyceps collection groups representing 13 villages in the Chamoli District of the state of Uttarakhand in the Garhwal. Villages were selected based on recommendations of local leaders, relationships and familiarity with families in these villages, and the geography of meadow sharing. The 13 villages included in this study collected Cordyceps from four different alpine areas. We interviewed 60 men and 28 women, showing a moderate male bias. Women were more reluctant to grant interviews as they were often busy with other household activities. Male interviewees had an average age of thirty-one and four years of experience collecting. The female interviewees had an average of thirty-two and five years of experience collecting. The purpose of research was elaborated, and consent of all study participants was secured before administering the surveys. The interviews were conducted in either Hindi or Garhwali depending upon the preference of the interviewee. Two research assistants served as translators and guides. The assistants served as guides within the villages, on mountain trails, and in the alpine meadows. Both research assistants were from the area; the research would not have been possible without their help as their presence helped relax
interviewees. Interviews were conducted in the villages, either in homes or common areas, depending upon the preferences of the interviewees.

Our sampling protocol was influenced by the secretive nature of the collection and sale of the *Cordyceps*. In our case, due to the secretive nature of this livelihood activity, a probability sample was not possible and quota sampling was adopted. Quota sampling is appropriate when random selection is not viable owing to culturally sensitivity or the in-depth nature of the research (Bernard 2006; Singleton and Straits 2010). In order to obtain a quota sample, in each village we divided the households up by caste and/or family groups and then took an approximate percentage of our interviews from each segment to achieve a general representation of the village. Villages ranged in size from 6 families to just over 80 families. Our sampling frame only took into account families which lived year round in the villages. Quota sampling can appear a lot like a stratified random sample in its division of the population into appropriate strata (e.g., family clans, caste, gender, age). We used tight geographic controls, in this case each village was considered a discrete entity, to help reduce bias (Bernard 2006).

The survey consisted of twenty-eight questions in addition to basic demographic information about village, age, gender and caste. For all questions, follow-up probes were asked when needed. Survey questions addressed the following: where and with whom were collectors camping and collecting; the knowledge and resources needed in order to engage in collection; the problems encountered while engaging in collection; the mechanisms, social institutions, and challenges which influence how locals interface with the *Cordyceps* market; the shifts in livelihood and village activities when the collection season is underway; the financial impact of
collection and sale; local knowledge and understanding of the ecology of the *Cordyceps*; and the sustainability of collection.

In addition to the survey data, this article is informed by numerous informal conversations with female and male farmers, mountain guides, village leaders, traders, shopkeepers, forest department employees and local activists. Extensive participant observation took place in Bhotiya households, on mountain trails, and in camps and collection areas in alpine pastures.

**Ophiocordyceps Sinensis: A Brief Background**

*Cordyceps* is a peculiar combination of what was once two separate organisms: the larva of a ghost moth genus *Thitarodes* (*Hepialidae*) and the *Ophiocordyceps sinensis* fungus (Cannon et al. 2009; Singh et al. 2010). The larva of the ghost moth lives in soil tunnels on the Tibetan plateau and in the Himalayan Mountains (Zhong et al. 2014). The larvae live underground for three to four years, perhaps even longer, feeding on the roots of alpine plants (Li et al. 2011).

The fungus is able to reproduce both asexually and sexually, though a full understanding of both processes is lacking (Cannon et al. 2009). The fungus spores infect the body of the moth during its caterpillar stage, eventually killing the caterpillar host. The larva become infected while in the soil; however, little is known about the spatial distribution of *Cordyceps* in the soil or how precisely the larva becomes infected (Peng et al. 2013). During the teleomorph (sexual) stage, the fungus forms a sporulating structure and produces ascospores which then spread into the environment and becomes mycelium in the soil. Infection can take place though contact with the fungal mycelium in the soil or through the fungal colonization of particular alpine plant roots.
(Zhong et al. 2014). The *Cordyceps* fungus takes over the body of the caterpillar, thereby mummifying the caterpillar while it is still underground (Figure 3). *Keera jari* is the local Hindi name for *Ophiocordyceps sinensis*; *keera* meaning “insect” and *jari* meaning “root.” Garhwalis describe the fungus as an insect-root because the majority of the specimen resembles a caterpillar (insect); however, the caterpillar-shaped fungus is actually found in the soil just below the surface and dug up by hand in the same manner as a plant root. Many Garhwalis who participated in this study understand the ecology of this fungus, emphasizing that it is similar to a mushroom and grows especially well when there is an abundance of rain, snow, and snowmelt.

The portion of the *Cordyceps* that can be seen above ground is the fruiting body of the fungus which grows straight up from the dead caterpillar’s head. The fruiting body of the *Cordyceps* is a few millimeters wide and grows one to two times the length of the host body of the caterpillar.

When the fungus reaches maturity, spores are generated at the top of the fruiting body and released into the atmosphere. The *Cordyceps* that are collected in our study area are usually gathered before the fungus reaches full maturity and therefore before the spores are released. This is in part because once the fungus reaches maturity the *Cordyceps* begins to soften from decomposition and is worthless. One study participant explained his understanding of the reproduction process in this way, “*The sacks carry all of the [spores] that burst and then infect the caterpillar underground… If the [spores] are less, then there is a problem.*”

*Cordyceps* is thought to encourage physical vigor and stamina, and has been used for medicinal purposes within Tibetan and Chinese traditional medicine for an estimated 2000 years (Wangchuk et al. 2012). It has also been incorporated into Nepalese and Indian medical traditions, though not as extensively as in Tibetan and Chinese medicines. In our study area, we
did not find any instances where locals use Cordyceps either historically or today. It has recently earned the nickname of ‘Himalayan Viagra’ in the popular press and is valued as a natural aphrodisiac despite the fact that there are no rigorous scientific studies to document these assertions (Yeh and Lama 2013). Cordyceps can be ingested in pill form, but the more traditional approach is to boil whole Cordyceps in water and consume the fungus-infused hot brew as a tea or soup.

The explosion in the collection and sale of Cordyceps is related to its dramatic increase in demand by primarily Chinese consumers. Traditionally, Cordyceps was only collected in China; however, due to the increase in demand and its overexploitation in China it is now being collected in India, Nepal and Bhutan. Cordyceps collection began in the Garhwal and neighboring Kumaun in 2001 according to Negi and his colleagues (2006). This date corroborates with our survey data, as some collectors reported collecting for up to 13 years at the time of this study. Negi et al. (2006) indicate that the Kumaun has seen massive exploitation and a dramatic decrease in collection numbers.

This increase in demand is due to several important factors. First, Cordyceps is in high-demand as a luxury gift that was once only affordable by the wealthiest segment of the population (Cannon et al. 2009; Winkler 2009). Second, a growing middle class is increasingly aspiring to acquire luxury goods that were once beyond the realm of affordability (Cannon et al. 2009). Last, recent occurrences of SARS and avian flu in Asia have also increased interest in the potential of Cordyceps to boost immunity, disease resistance, and overall health (Cannon et al. 2009). Although there has been some success in the cultivation of Cordyceps, it is the wild variety that is highly desirable.
Landscapes and Mountain Livelihoods in the Garhwal

The Garhwal is one of two regions in the state of Uttarakhand. In the southeast of Uttarakhand is Kumaun, and in the northwest is Garhwal (Rais et al. 2009). The Garhwal is sparsely populated and characterized by small farms and poor infrastructure yet rich in biodiversity (Chandra et al. 2011). The region is composed of seven administrative sub-divisions including Hardiwar, Dehradun, Uttarakashi, Tehri Garhwal, Garhwal, Rudraprayag, and Chamoli. The population for the Garhwal region according to the 2011 Indian Census is estimated at 5,857,294. Our study site is located in Chamoli District, 30.42°N, 79.33°E (Table 1).

The Himalayan Mountains in the Garhwal are composed of steep valleys with raging streams and rivers that make up part of the Ganges River headwaters. Permanent infrastructure is difficult to construct and maintain as mountain slopes, seismic activity, and river hydrology are dynamic, unpredictable, and shifting energy downstream with gravity.

Due to the complex topography of the Garhwal, the alpine pastures all have unique microclimates (Silori and Badola 2000). In the alpine zone the mean annual temperatures in the Garhwal are 3.0°C-4.5°C and temperatures during the summer can vary from 6°C at night to over 50 °C in the sun during the day (Nand and Kumar 1989). In this zone winter predominates from October – April, with snow accumulating up to depths of about 5 meters (Nand and Kumar 1989). The monsoon season in the Garhwal is from June to September. During the monsoons the mountains receive 50%–90% of their annual rainfall (Chauhan 2015).
Garhwali villages customarily have rights to their own village lands, including the proximate land used for terraced agricultural fields, designated forested areas directly surrounding villages, and alpine pastures. Federally owned lands include forest department lands, national parks and other protected areas. Some of the lands are allocated for village use, and are primarily managed by village councils called Van Panchayats. Cordyceps collection is only allowed by the Indian Forest Department on these Van Panchayat lands.

Garhwalis have historically been engaged in an array of mountain livelihood activities at various elevations. Inhabitants were and in many cases remain farmers, foragers, herders, traders, mountain guides/porters, and crafts people. They continue to grow a substantial amount of their own barley and wheat and a variety of vegetables (e.g., potatoes, carrots, mustard greens, onions, garlic). They also continue to utilize a number of different non-timber forest and alpine products including wild mushrooms (morels), fiddle head ferns, herbs, and wild leafy greens. Fodder and timber are gathered from village forests and meadows. Herders tend large flocks of sheep and goats both in close proximity to the village as well as the forests and alpine meadows.

Bhotiya, the main ethnic group in this area of the Garhwal, have practiced a form of seasonal migration (i.e., transhumance) to take advantage of scarce mountain resources and trade relations with formerly independent Tibet (Bergmann et al. 2008). The herding of sheep and goats was an important activity, with a great deal of time spent tending the flocks in the high alpine meadows. Mountain travel, navigation, climbing, camping and surviving in these meadows were requisite skills and expertise for shepherds. When the trade routes opened up in the spring, herders would move their flocks from the alpine meadows where they had been pastured down to the villages. The animals would then be loaded with trade goods and proceed
northward over mountain passes toward Tibet. After crossing into Tibet, the herders would trade their goods for Himalayan salt and other valuable commodities. This system of overland trade has all but disappeared due to the 1962 closure of the Indo-Tibetan border and other nation-state policies, thereby drastically altering the way of life of the Bhotiya (Bergmann et al. 2008; Negi 2007).

The geography of the Garhwal includes the prominent peak of Nanda Devi (7817m). The area around Nanda Devi was first protected as a game sanctuary in 1939; it was further protected as the Nanda Devi National Park in 1982, and then later as the Nanda Devi Biosphere Reserve (NDBR) in 1988. Due to the international conservation policies that resulted in the creation of the NDBR, local control and access to a number of livelihood opportunities and resources were dramatically curtailed. Local protests to these conservation policies and other ongoing regional struggles of sovereignty and autonomy are well-documented. A thorough discussion of these movements is beyond the scope of this paper (See Bosak 2008; Guha 2000; Kainthola et al. 2006). The Garhwali people are uniquely positioned to collect Cordyceps based on their historic activities in and familiarity with the complex mountainous terrain and customary collective rights to alpine meadows.

Collecting Cordyceps

Timing and Preparations

The collection season for Cordyceps in our study area is from April through the end of July, with the most intense collection in May and June. The collection season begins when the
snow melts off the trails and the meadows are sufficiently exposed to sun to allow for the growth of the *Cordyceps*. The end of the season correlates with the beginning of the monsoon.

*Cordyceps* collection was found to occur between 3650 and 5200 meters. Given the history of village formation and meadow ownership there is a range and complexity of community-alpine meadow relations that have manifested over time. A few villages enjoy exclusive use of particular meadows while most villages share meadows with other neighboring villages. This difference in regards to exclusive use versus the sharing of meadows is due to the unique development history of the region. About half of our study villages saw a restriction in their use of alpine meadows with the imposition of the Nanda Devi Biosphere Reserve in 1988. Some of these villages have since entered into meadow sharing arrangements with other villages. The local micro geography also influences how many villages share a particular meadow. In some instances, villages have ‘private’ meadows located above them (without a nearby village close enough to also claim the meadows) and in some instances multiple villages all share the same alpine meadow. In other words, the arrangements around meadow use and access rights are a result of both politics as well as geography.

To collect *Cordyceps*, a number of different and specific activities need to be undertaken, starting first with the preparation phase. Preparation activities to a great extent involve preparing for the proclivities of mountain conditions, including the following: assessments of weather reports, discussions about when to travel given anticipated weather, and snow and trail conditions; decision-making about what pastures to go to; selection of group members and review of their preparedness; studying route details with other community members; the
purchase and packing of food and gear; and delimiting where to safely camp in the meadows in areas that are free from rock falls, landslide debris, and avalanche paths.

Collection groups are typically drawn along kinship and friendship lines, thereby ensuring that other farm and household responsibilities in the village are attended to during the small window of *Cordyceps* collection. Collection groups are usually two to four people. Another critical task to sustaining the collection groups while they are in the meadows is resupplying provisions and any other necessary supplies. Family groups are most common and include either a husband and wife team or any combination of immediate and extended family. Friend groups are usually of a similar age and the same gender.

Collection dates are influenced by larger social and village needs. Individuals are often needed for their labor contributions to harvesting, planting and plowing of fields, childcare, and hosting visiting relatives. Other instances where the departure for the alpine meadows is delayed include, but are not limited to, religious ceremonies, funerals, accompanying a friend or family member on a trip into town for medical purposes, or for a local election.

Collection groups generally tent and cook together and supplies are packed and organized accordingly. The supplies needed for collection include camping gear, cooking supplies, food rations for multi-day periods of time, personal apparel, and technology for entertainment/communication.

Camping gear includes a tent, sleeping pad/mattress and a sleeping bag or blankets. Some collection groups do not use proper tents, but instead rely on make-shift shelters out of large sheets of plastic. Cooking supplies generally include pots, a pressure cooker, plates, utensils,
cups, a kerosene stove, and kerosene. Food supplies vary but generally include a mix of easy to prepare foods and more traditional Indian cuisine. In most instances simple foods consist of Maggie (similar to Ramen noodles in the United States), soups and pastas. More traditional foods include lentils, beans, rice, spices and some vegetables. Personal gear includes warm clothing (many times made of wool or synthetic materials), gloves, warm hats, scarves or balaclavas, sun glasses, sunscreen, sun hats, waterproof shoes or boots and good socks. Collectors also transport an array of entertainment and communication technologies to the high pastures including small TV’s, radios, phones, and solar panels for charging these devices.

**Mountain Travel and Logistics**

Getting to the alpine meadows varies greatly by village. As noted earlier, each village has historical customary property rights to particular alpine meadows for collection. While a few villages have a choice of meadows, most villagers only have access to one meadow. These meadows vary greatly in their distance from the villages. Regardless of how far each group has to travel, the goal of each group is to travel on the trails during the cool of the night or early morning. Departure times range from midnight to early morning. The length of time to travel from the village to the meadows ranged in the study site from four hours to two days, depending upon the length and difficulty of the route.

Routes range from moderately challenging to very challenging. Most of the routes have only occasional exposure to falls while a few routes are highly exposed and include long stretches of a narrow cliff trail where a misstep could cause a fall to one’s death (Figure 4). Given the location of the alpine meadows, altitude sickness is also a concern. As one respondent
noted “more people are getting sick at altitude because of Cordyceps”. As the difficulty and inherent danger of a route increases the tendency of the group to travel together also increases in order for group members to help each other across dangerous sections. In addition to the exposure to falls and the dangers of traveling at altitude, snow patches and river crossings are also inherent risks in travel to the alpine meadows.

Snow patches which have not yet melted from the past winter are referred to locally as “glaciers.” These snow patches can be very dangerous to cross—a fall without the means or ability to stop could lead to a slide right off a mountain cliff. In 2008 a 28 year old man “slipped on a glacier and died” while collecting Cordyceps. In 2014 while the research was conducted, two men were reported to have fallen while engaging in collection. When groups are together they can help each other not to slip, or if one does slip, then having other villagers and group members close by is essential for getting help. Another hazard and reason for early morning departures is the tendency for rivers to rise throughout the day, as the sun melts last seasons’ snow in the higher reaches. The river crossings are less dangerous earlier in the morning before the sun emerges as most rivers have to be forded. After the perils of the trail are overcome collection groups decide on their camp location.

Village camp locations are determined by the location of flat camping sites, caves, water, and established rights. Camping locations are best if they have large boulders which can be used for shelter, are located next to a water source, and are flat. The meadows which are shared by different villages have mutually agreed upon camp locations for each village entitled to use that meadow. Collection groups prefer to camp in close proximity to other groups from their village for entertainment, safety, and proximity to resources.
Many of the villagers spend the mornings and early afternoons collecting but then enjoy the mid to late afternoons for socializing. They play games together including cricket, cards, and singing, as well as general conversation and enjoying each other’s time. Villagers also feel safer camping in close proximity to each other for fear of wildlife, weather, and groups not returning for the day. If a collection group is missing at the end of the day, the rest of the collection groups from that village will notice and search to find the missing group.

Other considerations for where to camp include the location of fuelwood. Those meadows which have fuelwood are chosen over areas which do not to make cooking and staying warm easier. The presence of fuelwood means that kerosene will not be required and will not add extra weight to the transporting of goods.

**Search Tactics and Safe Keeping**

In order to find the *Cordyceps*, collection groups set out early in the morning and collect till mid-day. A few groups do stay out all day long, but most groups are finished by mid-afternoon, when they return to camp for food and festivities. When a group sets out in the morning they often bring a day sack with them containing food and water. Many individuals also bring a stick or shovel to help remove the *Cordyceps* from the ground, any previously collected *Cordyceps*, a phone for music and communication, medicine, sunscreen, and sun glasses. The previously collected *Cordyceps* are kept in a secure or hidden location to reduce the risk of theft. Having the appropriate resources for collecting is as important as the knowledge of where and how to search for the *Cordyceps* (Figure 5).
Groups choose their gathering location based on a number of different variables, as group collection tactics vary greatly. Collection tactics noted by respondents include: returning to locations which proved fruitful the previous year; randomly choosing locations; going further to more remote locations than the rest of the village collectors; looking where the most moisture is thought to be; following the masses; and methodically searching day by day. The majority of groups listen to the most experienced collector in the group for direction on where to collect.

Searching involves scanning the ground for the fruiting body of the *Cordyceps*. This searching can be very intense and occurs while either standing, kneeling, or crawling. Collectors assert that the skill for searching is directly related to one’s ability to concentrate on the task at hand. Collectors suggest that one’s success is also related to one’s experience and self-esteem. A common local belief is that the more success one has in finding *Cordyceps* in the past, the more perseverance one seems to have to continue searching in the current moment.

Once a *Cordyceps* is found, the next step is to safely remove it from the ground. It is very important not to break the *Cordyceps* as a broken piece is much less valuable than a fully intact one. To safely remove a *Cordyceps* from the ground the first step is to pull away all the grass and vegetation from around the *Cordyceps*. Next a stick, tent stake, shovel or finger is placed in the ground parallel but a few inches away from the *Cordyceps*. This is then used as a leveraging devise to pry the *Cordyceps* out of the ground along with a bit of the surrounding dirt. Once the *Cordyceps* is removed from the ground the hole created is filled back in, and the *Cordyceps* is lightly brushed off and stored in a protected place. It is commonly asserted that when one *Cordyceps* is found, others are in close proximity, whereby the same area is carefully searched. Groups usually return from the meadows to the villages after about ten days to two weeks.
Groups return to fulfill family or village obligations, to restock supplies if they run out of food, to take a break when the *Cordyceps* is proving to be elusive or if the weather is bad, and also to physically rest. The return journey is more casual than the initial entry to the meadows. Groups pack up after breakfast, and then travel down in elevation to the village. After two or three days, collection groups are reassembled and collectors hike back up to the alpine meadows to resume collection.

**Processing and Storing**

Once the *Cordyceps* has been collected and brought back to camp or the village, they are then processed and stored for future sale. The cleaning process involves brushing the clumped up dirt off the *Cordyceps* with a toothbrush. The toothbrush is soft enough to not harm the caterpillar shell or break the fruiting body of the *Cordyceps*.

Once the *Cordyceps* are carefully cleaned, they are set out to fully dry in the sun before being stored. In this part of the Himalaya the monsoon brings almost daily rain which makes storing the *Cordyceps* in a low humidity environment difficult. The *Cordyceps* has a tendency to mold during the wet monsoon months and can become worthless as the moisture tends to lead to rot. Bhotiya families utilize different strategies to keep the *Cordyceps* in good condition including the following: wrapping each *Cordyceps* individually in toilet paper; wrapping the *Cordyceps* all together in fabrics; and placing the *Cordyceps* loose in boxes without any wrappings. When there are sunny days during the monsoon many families will painstakingly remove the *Cordyceps* from storage and place them in the sun for further drying.
Cashing in on *Cordyceps* Income

The average household income from *Cordyceps* among those surveyed was just over 200,000 IR or about 3500 USD per year. This amount represents valuable income, and in a few cases, the only cash income received by these mountain households. *Cordyceps* as a commodity is re-shaping entire household and community-scale economies. *Cordyceps* income allows families to access more modern conveniences (clothing, cell phones and pocket money), to make improvements in housing, to better fund children’s education, and to access better quality and/or quantity of food (Table 2).

Almost all of the study participants were concerned with the sustainability of the resource. Sustainability concerns that we recorded centered on both ecological and social risks. Ecological risks were associated with over collection and perhaps even the extinction of this fungus as well as environmental damages to the alpine meadows. When asked if there is less *Cordyceps* now, collectors responded overwhelmingly with 86% saying that there is less *Cordyceps* now. Twelve percent do not feel that there is less of this bio resource today, and 2% indicated that they are not sure if there is less *Cordyceps* now. When asked to elaborate on why there is less *Cordyceps* now 68% of the respondents suggested that it is because there are more collectors. Ten percent of the collectors made sure to point out that the total *Cordyceps* population has not decreased, just the number of *Cordyceps* available per person due to the increase in collectors. A number of respondents reported that they were concerned with the vulnerability of the *Cordyceps* population to being over-collected; some even suggested that in a few years they expect there to be no *Cordyceps* left. When probed about why there might be more or less *Cordyceps*, 23% of the respondents suggested that there are less spores or the spores
are not able to spread, and 21% of those interviewed say the decrease in *Cordyceps* is due to changes in the climate. One respondent offered an alternative view, suggesting that “here there are more people and more keera jari, [where] there is less people... [there is] less keera jari.” In other words, this individual insinuates that collecting is good for the *Cordyceps* numbers.

Collectors were also worried about environmental damages to the meadows, including seeing areas polluted or the presence of trash, fires in the meadows from local cigarettes, and the use of iron tools. Some locals believe that the use of iron tools in the meadows harms the *Cordyceps*.

The socio-economic risk of losing the collection of *Cordyceps* as a livelihood strategy was a great concern among study participants. One woman expressed her concern in this way: “...more people are now going to school because of keera jari, then perhaps in the future [our] lives won’t be very good because [without keera jari people would] not [be] in school.” Another respondent stated that “if keera jari stops then everyone’s lifestyle is going to drop.” Again, another informant discussed the importance of the *Cordyceps* especially for the poor and women in this way, “Before keera jari there was no good education but now because of keera jari even poor families can give their children a good education and can marry off their daughters to good families.” What goes unstated here is that if the *Cordyceps* money is no longer available, then those who will suffer first are lower-income families, and especially their daughters.

**Perspectives on *Cordyceps* Conservation and Sustainability**

From our study findings it remains unclear if in the Chamoli District of the Garhwal the overall *Cordyceps* population and collection numbers are decreasing, remaining the same, or perhaps even increasing. In the neighboring region of the Kumaun, the two published studies
which focused on *Cordyceps* came to vastly different conclusions. Garbyal et al.’s (2004:185) study concludes that the “[c]ollection of *Cordyceps* does not endanger the environment or the ecology nor is it making any species extinct.” This is in contradiction to Negi et al.’s (2006:168) study which finds “[a] sharp decline in the harvest, by as much as 30%–50%.” Garbyal et al. (2004:185) suggests that “[i]t would…be most prudent if guidelines for extraction and trading in *Cordyceps* are worked out in consultation with the villagers rather than demanding blanket ban on its extraction, which will only alienate the villagers, as it would mean that people would be denied most potent source of income.” Negi et al. (2006) suggests that poverty drives overexploitation, that villagers should be encouraged to cultivate other medicinal plants, and that collectors should be educated to leave a few *Cordyceps* each year.

**Concluding Remarks**

In this article we have documented the many facets of how the collection and sale of *Cordyceps* has rapidly emerged as a new and lucrative livelihood strategy in the relatively remote Garhwal Himalaya. We have also explored how this new livelihood activity fits in the context of broader mountain-society relations given the study area’s unique local resource histories and mountain geography. Finally, we offer three suggestions to address the sustainability of both the *Cordyceps* collection and the livelihood activities which hinge on the *Cordyceps* populations.

We suggest taking a three pronged approach to addressing the sustainability of the *Cordyceps* collection. We find a need for 1) community based conservation measures - an approach that also hinges on 2) securing local resource rights to continue to collect and sell...
**Cordyceps** into the future, and 3) the need to establish local collection numbers. There is little incentive for local conservation to occur if local resource rights are not secured. We disagree with Garbyal et al.'s (2004) statement that there is no concern for overexploitation given that 86% of our respondents replied that there is less *Cordyceps* now and many respondents specifically stated concerns regarding resource overexploitation; however, our findings do not align with the dramatic decrease in wild populations noted by Negi et al. (2006). The current state of overexploitation in China and Garhwalis’ pressing concerns in regards to collection numbers in their meadows do support the need for the identification of conservation measures as soon as possible. Similar to Garbyal et al. (2004) we find that there is a need to work with Bhotiya communities and other mountain residents in the Garhwal to ensure the long term collection of *Cordyceps*.

We highly suggest following the thinking of the collectors themselves who reported the need for community meetings to collectively decide on collection limits. This approach would serve to empower Garhwalis and goes beyond the education of collectors that has been suggested elsewhere (Negi et al. 2006). The local communities in this area have a long and colorful history of resource management, and are capable of developing their own conservation measures. This is shown by the suggestions made by 14 different individuals (though they were not asked for directly) for *Cordyceps* management which included setting a fixed collection season, rotating between collection years and non-collection years, leaving a certain number of *Cordyceps* in the ground while collecting others, and limiting the number of collectors allowed per household. We disagree with Negi et al.’s (2006) suggestions to try to push for the cultivation of medicinal plants as a replacement livelihood activity—as the economic returns realized for other medicinal
plants are much less than *Cordyceps*, and as we pointed out in our article, our study area is uniquely positioned for *Cordyceps* collecting. It seems unrealistic to assume that the communities we focused on would be interested in shifting livelihood activities away from the collection of *Cordyceps* given the great deal of effort and learning that has been invested into this livelihood activity and the very high financial returns which are currently being seen. The third approach we suggest is to focus on addressing the dearth in accurate *Cordyceps* collection numbers in the Chamoli District of the Garhwal. More ecological data on the geo-spatial aspects of the collection is recommended. What are the actual collection numbers for *Cordyceps* for each village and associated meadows from year to year? Without studies to record collection numbers, monitoring *Cordyceps* populations over time for increases or decreases is impossible. This lack of collection numbers severely limits the development of science-based locally-appropriate conservation measures.

By describing the range of tasks and activities involved in the collection and processing of *Cordyceps*, and how they are the product of specific local resource histories and geographies, as well as the Garhwals’ economic marginalization, one can see how the larger socio-economic and geographic reality of the Garhwal influences the current collection of this alpine medicinal fungus. This level of detail and contextualization can help to inform conservation measures that are mindful of local practices, needs, and realities.

Due to the history of livelihood and resources struggles in the region, locals are unsure of their resource rights – many questioned how long their ability to access *Cordyceps* will remain. Though the rights to decide their own resource use or access remains in question, local people are still in a unique position to exploit *Cordyceps* due to the local geography and their communal
use of meadows. The alpine meadows where the *Cordyceps* are located are in essence naturally “protected” from outside exploitation owing to their geographic location: high elevation with access point through villages. Non-locals with the intention to collect *Cordyceps* are quickly and easily discovered. Finally, most villagers are well versed in mountain-based travel and camping - and enjoy taking part in these activities.

The marginalization of this area due to its relatively isolated setting also impacts household livelihoods. The exploitation of *Cordyceps* is taking off in part because of the lack of other livelihood opportunities and the need for local livelihoods to be diverse to reduce the risk to the household if some other livelihood activities fall short of household needs (Wu et al. 2014). As we have shown, the current level of investment that locals are able to make on their own behalf due to the collection of *Cordyceps* is having profound and mostly positive impacts on the standard of living, education levels, and quality of housing for locals. These are all areas in which rural residents in the Garhwal tend to fall behind the national averages.

There is no long term future for the collection of *Cordyceps* as a livelihood activity if *Cordyceps* sustainability and local resource development rights are not systematically addressed. However, it would be premature to impose bans or restrictions on the collection of *Cordyceps* form outside the community. Without scientific data to support these policies (such as a documented decline in collection numbers) the imposition of a collection ban from outside would only continue to marginalize an already marginal population. The positive impacts of the collection of *Cordyceps* for the poor is the one finding that is congruent across almost all the *Cordyceps* studies conducted across the region—from China to Nepal to Bhutan and now in India. What we do have good data on is the positive impacts that the *Cordyceps* cash is bringing
to these otherwise marginalized communities. What is lacking is quality data on the potential negative ecological impacts that the *Cordyceps* collection is having in the alpine environment. To limit the collection of *Cordyceps* based on our current data is unfounded given its uncertain ecological dynamics and documented overwhelmingly positive socio-economic impacts.

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Figure 1 *Cordyceps* camp with fresh snow.

Figure 2 Construction funded by *Cordyceps*. 
Figure 3 *Cordyceps* cleaned and ready for market.
Figure 4 Fatal trail drop-off on route to *Cordyceps* meadows.

Figure 5 Searching for *Cordyceps*.
Table 1  Social and health development indicators for Chamoli District, Garhwal (Data drawn from the Indian Census 2011)

<table>
<thead>
<tr>
<th>Development indicators</th>
<th>Rural</th>
<th>Urban</th>
</tr>
</thead>
<tbody>
<tr>
<td>Percentage of population</td>
<td>84.8%</td>
<td>15.2%</td>
</tr>
<tr>
<td>Total population</td>
<td>332,209</td>
<td>59,396</td>
</tr>
<tr>
<td>Sex ratio (females per 1000 males)</td>
<td>1072</td>
<td>767</td>
</tr>
<tr>
<td>Literacy of population</td>
<td>80.9%</td>
<td>92.0%</td>
</tr>
<tr>
<td>Male literacy</td>
<td>92.9%</td>
<td>95.6%</td>
</tr>
<tr>
<td>Female literacy</td>
<td>70.1%</td>
<td>87.2%</td>
</tr>
<tr>
<td>Housing condition reported as good</td>
<td>71.3%</td>
<td>87.5%</td>
</tr>
<tr>
<td>Location of drinking water:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Within Premises</td>
<td>29.6%</td>
<td>79.0%</td>
</tr>
<tr>
<td>Near Premises</td>
<td>42.5%</td>
<td>12.6%</td>
</tr>
<tr>
<td>Away</td>
<td>27.8%</td>
<td>8.3%</td>
</tr>
<tr>
<td>Location of latrine facility:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Within Premises</td>
<td>47.0%</td>
<td>87.5%</td>
</tr>
<tr>
<td>Public Latrine</td>
<td>1.4%</td>
<td>2.4%</td>
</tr>
<tr>
<td>Open</td>
<td>51.6%</td>
<td>10.2%</td>
</tr>
</tbody>
</table>

Table 2  Reported changes in the family economy due to keera jari income (N=88)

<table>
<thead>
<tr>
<th>Family economy changes</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Live a more modern lifestyle (phone, cloths, TV, laptop)</td>
<td>27</td>
<td>31%</td>
</tr>
<tr>
<td>Invest in a better home</td>
<td>24</td>
<td>27%</td>
</tr>
<tr>
<td>Pay for education</td>
<td>24</td>
<td>27%</td>
</tr>
<tr>
<td>Invest more money toward food</td>
<td>18</td>
<td>20%</td>
</tr>
<tr>
<td>Increase in family financial security and independence</td>
<td>16</td>
<td>18%</td>
</tr>
<tr>
<td>Less stress</td>
<td>11</td>
<td>13%</td>
</tr>
<tr>
<td>Make investments</td>
<td>6</td>
<td>7%</td>
</tr>
<tr>
<td>Changed from below to above poverty line</td>
<td>5</td>
<td>6%</td>
</tr>
<tr>
<td>Pay for marriages</td>
<td>5</td>
<td>6%</td>
</tr>
<tr>
<td>Less work to support the family</td>
<td>5</td>
<td>6%</td>
</tr>
</tbody>
</table>
CHAPTER 4 CORDYCEPS COLLECTION AT INDIA’S MOUNTAINOUS MARGINS: POLICIES, BOUNDARIES, AND THE MAKING OF ILLEGAL LIVELIHOODS

Abstract

In the Indian Himalayas the Indigenous Bhotiya are engaged in the collection and sale of a relatively new and valuable alpine resource known as cordyceps (*Ophiocordyceps sinensis*). Access to this alpine resource is governed by numerous policies from local level governance to nation-state policies and even international trends in conservation and development. This paper explores the historical and current legal and policy contexts which govern the Bhotiyas’ access to this alpine resource in the Garhwal region. In doing so, we explore how local actors and their livelihood activities have been framed as legally ambiguous by the existing body of state policies. We argue that the existing set of policy and legal frameworks are making illegal subjects out of those engaged in the collection and sale of cordyceps. Analysis of the body of policy and the spatial distribution of historical and contemporary borders reflects these ambiguous and contradictory realities. Our analysis, which compares historical and contemporary policies, shows that differences also exist in the treatment of Indigenous people. This implies a highly complex policy reality. We explore the obstacles and opportunities arising from this situation to help shift the current paradigm to benefits both locals, their livelihoods and the nation-state of India.

Keywords

alpine resources, mountain livelihoods, cordyceps, Garhwal Himalaya, illegal livelihoods
**Introduction**

Since 2001, local communities Garhwal Himalaya have been engaging in the collection and sale of cordyceps as a new livelihood activity. This alpine resource, located in the high alpine meadows or *buygals* as they are referred to locally, is currently considered one of the world’s most expensive biological resources (Shrestha and Bawa 2013). Local communities have become dependent upon its collection and sale as a way to earn valuable income in an otherwise economically marginalized region. Cordyceps are consumed by primarily Chinese middleclass consumers and is the basis of a lucrative local livelihood strategy.

Multiple inter-connected factors place pressure on Himalayan alpine systems on which communities and biodiversity depend. Resource use patterns, climate change and variability, globalization in terms of trade and commerce surrounding alpine resources (minerals, metals, ore, forests, wildlife, and now cordyceps), ethnicity and social inequity as well as international development enterprise itself, have led to a (re)thinking of the institutions and policies governing alpine spaces. The mountains of India Himalaya are borderland areas, with the mountains acting in part as natural borders, but also the focus of nation-state policies aimed at securing these border areas. This is precisely the case in the Garhwal region of the Indian Himalaya, where the Bhotiya, a tribal group with a history of trade with Tibet, are currently negotiating access to alpine resources located in alpine meadows.

The Bhotiya have had to adapt to a number of different livelihood transformations over the last century due to changing nation-state priorities and corresponding policies. The Bhotiya have had to shift away from their transhumance lifestyle, and their trade relations with Tibet with the closure of the Indo-Chinese border and other policies. Many of the animals that were used for
packing—primarily sheep and goats—were disposed of, and the herding lifestyle that accompanied the trade routes has been drastically reduced. The Bhotiya living near the entry point to the Nanda Devi Biosphere Reserve (NDBR) have also had to give up guiding, mountaineering and portering, when the NDBR was declared closed to humans. The concomitant decline in mountaineering and mountain tourism also resulted in a drop in handicraft sales. These changes have been recently documented in the literature (Naitthani and Kainthola, 2015).

Today, the collection and sale of cordyceps has emerged as a lucrative livelihood activity; however; while outwardly the state of Uttarakhand supports the exploitation of cordyceps, many of the facets of engagement with this livelihood activity result in local livelihood activities being viewed as illegal by the nation-state. Furthermore, there is a great deal of confusion and contradiction in the interpretation of the policies which are designed to govern the collection and sale of cordyceps.

In our study area cordyceps are currently being collected in a number of different land designation types. They are collected in village, forest department, national park and biosphere reserve lands. These lands are subjected to regulations from local governance systems, state Forest Department regulations and federal laws. They are also influenced by the history of colonial development in India and more broadly by current trends in conservation and development internationally. In our study area the majority of the population is tribal, and Indian tribal law also impacts legal access to cordyceps.

The “negotiations over resources and socio-spatial arrangements” in these borderlands are thought to be “influenced as much by state politics as by the livelihood strategies of local
communities” (Bergmann et al. 2008:209). These negotiations are especially influential in the case of cordyceps given its high degree of spatial variability. For example, Yeh and Lama (2013: 322) find that, in Tibet:

Caterpillar fungus is highly spatially (and temporally) variable, its abundance dependent on a host of factors, which can create situations in which one village has plenty of caterpillar fungus while its neighbor has none. This uneven access to resources sets the conditions both for inequality and for new forms of property rights and state interventions into the governance of land.

The situation of cordyceps in the Garhwal is similar. Our aim in this paper is to critically investigate the legal and political realities governing the Bhotiya’s access to cordyceps in the alpine pastures. This article documents the historical and current negotiations over alpine resources in the region as local livelihoods and their resource needs intersect with governmental policies and the priorities of the nation-state. In parallel to emerging structures to control and manage these alpine spaces, the local Bhotiya population have also been subjected to legal framing and categorization, having been subjected to an array of policies and legal gyrations designed to categorize them as tribal with legally upheld rights and privileges. In short, our objective is to highlight how local Bhotiyas who are collecting and selling cordyceps as a livelihood activity are constructed as illegal subjects by the state.

In order to achieve this objective this paper will outline our methodological approach; introduce key theoretical ideas surrounding the construction of illegal livelihoods; examine alpine resources in the Garhwal; review historical and contemporary policies applicable in the Garhwal, including the legal context of the Bhotiya and access to the buygals in the Garhwal;
explain the current consequences of these policies; and finally, make some policy recommendations.

**Methodological Note**

The methods used to inform this paper include a survey of cordyceps collectors, analysis of the academic and gray literature, a policy analysis, and field work. Our review of the literature included peer reviewed academic and scientific journals and gray literature put out by NGOs and other similar organizations. Indian forest policy has received a great deal of attention in the scientific journals and gray literature. This has enabled us to use secondary sources, versus the policies themselves, to assess the policy context in the Garhwal.

Cordyceps is found in the alpine meadows of the Garhwal, a landscape that is governed by forest policy. The history of forest policy and access in pre-colonial, colonial and independent India has been well documented. Gadgil and Guha (2014) in *This Fissured Land* link colonial and post-colonial forest regimes in their ecological history of India. Guha (2000) in *The Unquiet Woods* further reviews ecological change in the Himalaya by focusing on the regional resistance to ecological changes in the Himalaya and the Chipko movement. Rangan (2000) in *Of Myths and Movements* works to help set the story of the Chipko movement straight. Finally, Saxena et al. (1995) in *Forest, People & Profit* focus on forest policy and the problems with its implementation in independent India. These are some of the most widely read and disseminated ecological narratives in respect to Indian Forest Policy in general and the Garhwal in particular, and our history of forest–tribal relations will draw heavily from these works. We also draw from a locally specific publication by Kainthola et al. (2006) entitled the *Community Rights and Livelihoods in the Nanda Devi Biosphere Reserve, India*. Finally, we use the academic and gray
literature to supplement these resources. Some of the polies regarding tribal access to resources put out in the last decade have not received as much attention in the literature, and we felt that it was necessary to analyze these policies directly.

Field work included extensive participant observations and informal conversations with locals and nonlocals alike. Field work was conducted in the summer of 2014 with a three month stay in the region by the first author. This field work for this study is also supported by over three decades of combined experience between the two authors in the Himalayan mountain region.

**Constructing Illegal Livelihoods**

Livelihood strategies that involve the illegal extraction of natural resource are temporally and spatially situated (Schendel and Abraham 2005). This is because “law and crime emerge from historical and ongoing struggles over legitimacy, in the course of which powerful groups succeed in delegitimizing and criminalizing certain practices” (Schendel and Abraham 2005). In other words, criminal activity is at a basic level a “matter of perspective” and is contested and created over time and space (Ribot and Peluso 2003:164).

We define illegal resource use in this paper as resource use that violates nation-state regulation (Gavin et al. 2009). A related literature on the informal economy focuses on "how economically vulnerable groups of the population secure a livelihood...by circumvention of certain legal stipulations" (Beckert and Wehinger 2012:1). Given the nature of our focus, the sometimes illegal collection and sale of cordyceps by marginalized mountain communities for their livelihoods, we will be pulling from both literatures; the literature focused on illegal resources use and access and the literature on informal economies.
When perspectives on a particular livelihood activity diverge, when for instance the nation-state views them as unwanted, and communities view them as necessary, particular livelihood activities are then seen as ‘illegal’ by the nation-state but as an ‘illicit’ right by communities. Schendel and Abraham (2005) make a distinction between what the state considers illegal and what people consider their ‘illicit’ rights, particularly in borderlands such as the Himalaya where illegally accessing natural resources such as cordyceps is socially permissible.

In this instance, we theorize access as “all possible means by which a person is able to benefit from things” (Ribot and Peluso 2003:156). Illegal access is gained, maintained and controlled via coercion and/or stealth and defined as “the enjoyment of benefits from things in ways that are not socially sanctioned by state and society” (Ribot and Peluso 2003:164).

Conservation policies many times place restrictions on local communities in regards to accessing local resources (Shova and Hubacek 2011, Naitthani Kainthola 2015). The majority of illegal collecting remains largely undocumented since until recently NTFPs and MAPs have been largely ignored in both conservation policy and implementation (Neumann and Hirsch 2000, Dove 1993).

Illegal extraction occurs on all different kinds of land designations in the Himalaya. Most studies which focus or mention illegal use are based on resource use in national parks or biosphere reserves; however, illegal extraction also occurs from government forests/alpine meadows and even community Van Panchayat forests. In these cases, the spatial location of the resource collection, especially in regards to protected area boundaries become important. Boundaries can be the defining factor in regards to legal versus illegal natural resource use.
The literature which touches on the illegal extraction of medicinal and aromatic plants (MAPs) and non-timber forest products (NTFPs) in India and Nepal proclaims that despite “various policy measures, excessive and illegal gathering of medicinal plants persists…to obtain higher incomes in the short term with little concern for sustainability” (Negi et al. 2010:104). In a study investigating the illegal extraction of natural resources from a protected area in neighboring Nepal, it was found that proximity and access to natural resources combined with the impact of these resources on one’s livelihood had a significant role in predicting illegal resource extraction activities (Shova and Hubacek 2011). In other words, illegal resource extraction was most likely if the resources were instrumental in securing a livelihood and were in close proximity. In central Nepal, it was found that the illegal aspects of the collection and sale of wild orchards was in part because there was no clear guidelines on harvesting and a weak enforcement of conservation policies (Shova et al. 2013). Other studies in Nepal also finds that the illegal harvest of MAPs is common and that trying to curtain collection and sale via legal means doesn’t work (Heinen and Shrestha-Acharya 2011, Kunwar et al. 2013).

Existing literature pays only scant attention to the details of the illegal activities surrounding the collection and sale of MAPs. Most studies only cite that there is rampant illegal harvesting and overexploitation without going into the details of how these processes are occurring, why they are occurring, and who is doing the extraction. There is a paucity of literature directly focused on the place-specific details of the factors determining the illegal extraction of alpine plant resources for commercial sale in the Himalaya.

In summary the literature reveals that illegality is a matter of perspective, and is constituted in a particular time and place. These factors are key for understanding disputes over
resource rights for alpine plant resources located on government lands such as protected areas and other demarcated boundaries of control. These boundaries define what is legal and illegal in regards to extraction. Regardless of boundaries, the use of these local natural resources are many times viewed as a community’s ‘illicit’ right, and consequently the extraction of these resources can be socially acceptable. This illegal extraction is a result of larger community and regional influences such as limited livelihood opportunities and the availability of valuable resources. The illegal extraction of NTFPs and MAPs is a coping strategy for many marginalized mountain communities; however, the details of such livelihood diversification strategies are not well documented. Finally, studies show that policies alone are not sufficient for curtailing the illegal extraction of NTFPs and MAPs in the Himalaya. We will now delve deeper into the literature on alpine resources.

Access to Alpine Resources

Give the unique ecology of cordyceps, there is ambiguity in regards to how to best describe the resource. This indecision is demonstrated in the common names attributed to cordyceps, such as ‘caterpillar fungus’ ‘insect root’ ‘insect grass’ and ‘winter worm, summer grass.’ These local descriptors of cordyceps reflect the understanding of it as a fungus, an insect, or a grass or root. This uncertainty, regarding the biology of the resource is also found in the academic literature, the gray literature, and state policies. We find references to cordyceps as a type of medicinal or aromatic plant (MAP) and non-timber forest product (NTFP) although it is neither a plant or found in the forest. Given the vagueness regarding how to classify cordyceps we seek to clarify the parameters our discussion of this alpine medicinal fungi in relation to the literature on MAPs and NTFPs.
MAPs can be collected in the wild or cultivated. Our present focus is on those MAPs which are collected in the wild, and specifically from alpine environments in the Garhwal. The Himalayan mountains are considered a biodiversity hot spot and host about 1750 endemic plants, many of which are located in alpine environments (Caur et al. 2010). Furthermore, the Garhwal and Uttarakhand more broadly are being promoted and marketed by as the ‘Herbal state’ (Chauhan 2010).

As such, given the unique and abundant plant material, Uttarakhand is viewed as important for international conservation. However, the illegal extraction and over-harvesting of MAPs is viewed as a major problem for conservation goals (Caur et al. 2010, Uprety et al. 2011). Furthermore, the mountainous areas where these plants are located are in border regions, making them attractive for illegal collection and sale (Basnet 2003).

MAPs collection and sale cannot be separated from local livelihoods due to the history of use, and is one way that local communities take advantage of scarce mountain resources. MAPs are collected for both household use (food and medicine) and/or commercial sale (plant material for pharmaceutical and traditional health systems) (Badola and Aitken 2003, Kunwar et al. 2013, Shova et al. 2013, Negi et al. 2010). In the Kumaon region of Uttarakhand, some households are earning as much as 78% of their total household income from the collection of wild MAPs (Negi 2007).

Given the relative importance of the role of MAPs harvested from the wild, there has been very little attention in the literature paid to the importance of MAP income for the rural poor and marginalized (Chettri et al. 2011) or the relationship between this illegal extraction and
local livelihoods (Shova and Hubacek 2011). This lack of attention is in part because the illicit nature of the MAP trade makes it difficult to study. It is hard to observe, discuss and analyze informal trades.

We do know that livelihood strategies which depend on MAP extraction from the wild face numerous problems including ambiguous policies; lack of market resources, information and infrastructure; habitat degradation; resource over-exploitation, and the presence of local mafias (Uprety et al. 2011). Given these constraints the Government of India and Nepal have both pushed for the cultivation of medical and aromatic plants to improve livelihoods (Chauhan 2010, Negi 2007). However, cultivation is also littered with problems not including the extreme difference between the prices received for wild and cultivated MAPs (Negi 2007, Rasul et al. 2012). The following section discusses the historical and current policies influencing the collection and sale of wild products from forest and alpine environments in Uttarakhand today.

Policy in the High Himalaya: Historical and Contemporary

To understand the complexity of the policies which guides access to cordyceps in Uttarakhand today, access to alpine resources must be situated in the historical policy context. This historical policy context has over time constructed a historical and spatially specific reality in regards to accessing the alpine meadows of the Garhwal. This section will trace forest/alpine rights and forest/alpine-tribal relations from the 1800s until today in three distinct periods: British policies, newly independent Indian policies, and today’s policies.
British Policies 1815-1947

British colonial forest policies set the stage for forest policy in India today. In 1815 the British East India Company brought the Garhwal under its control. Up until this time, the local forest resources that villagers needed were for the most part left for village use and management. At this time, the British East India Company was most interested in the Garhwal in order to take advantage of trans-Himalayan trade. From 1815-1833 the East India Company did its best to re-establish the trans-Himalayan trade to see financial returns for its involvement in the region. In order to accomplish this, cultivators who left the region under previous Gurkha rule were encouraged to return to the area in order to create political stability through their cultivation and livestock husbandry. Taxes on trade were also dropped in hopes of stimulating trade.

From 1833-1858 the emphasis in the Garhwal was shifted from trade to agricultural production. Though intensive agriculture quickly proved incongruent with Himalayan people and its environment agriculture, infrastructure development and tea plantations were for a short time period of time the major focus of the East India Company. These production schemes failed and timber became the main income generating source in the Garhwal. “As forestry became the most important economic activity in Garhwal…its role in the region’s economy was reshaped by the policies devised under the colonial authority of the British Crown” (Rangan 2000:95).

The British were the world leaders in deforestation with their use of wood for ship building, iron smelting, and farming. Colonial land policies were oriented towards revenue generation and resulted in the destruction of forests. Forests were considered a barrier to agriculture and economic development. Agricultural expansion was encouraged in the Garhwal. As the colonial state developed, the railway expanded through the country, and wood for sleepers
and fuelwood was in great demand. Stands of deodar (*Cedrus deodara*) used from the Himalayan forests for these purposes.

In 1864 the Imperial Forest Department was formed with help by German foresters, who were leaders in Europe in terms of forest management (Guha 2000). The creation of the Forest Department was to develop a legal means to control the forests that were already earmarked for the railways. Control included asserting governmental rights over community-owned lands which went against historical thinking that village forests were under the control of villagers (Guha 2000).

The Indian Forest Act (IFA) was created in 1865. The Indian Forest Act was an attempt to help clarify who was to manage and who had the rights to exploit the forests (Rangan 2000). The IFA assumed control over much of the forested areas the villagers historically controlled. The Act divided the forests into reserved forest, protected forests, civil forests, village forests, private forests, and wastelands, and designated management responsibilities to different governmental departments. The Forest Service, which controlled the reserved forests, was required by law to conserve forest lands in order to support the financial and natural resource needs of the government over time. The Revenue Department, which controlled the protected, civil and wastelands, was not required to keep its land as forests, and was much more relaxed in its conservation measures. Village lands and private property was controlled by the villages.

The 1878 Indian Forest Act, a revision of the earlier Act, was a much more comprehensive legislation, and replaced the 1865 Act. The 1878 Act took away the rights of villagers to the lands that they had been using for centuries. The 1878 Act stated that the use of forests by villagers was not a ‘right’ but rather a ‘privilege’ granted by the government (Mitra
and Gupta 1996). The Act also created the foundation for the scientific management of the forests as the Forest Department had to be a self-supporting agency through revenue generation. (Guha 2000)

The 1878 Act divided the forests into three categories: reserve forests, protected forests and village forests. Reserve forests were for exploitation; protected forests were for village level use (though the state held timber rights over the trees and could limit local use at any time), and village forests, which were not granted in most places, were to serve locals (Guha 2000). Villagers were allowed to use some areas for fuelwood and timber, but were not able to sell these products.

Research in 1912 showed that chir (Pinus roxburghii) and blue pine (Pinus wallichiana) were good for railroad ties (sleepers) so Garhwal and Kumaun were specifically targeted for timber (Guha 2000). During this time the pressures of World War I for resource generation helped to strip the lands of trees. The forests now had strategic value for not only the railways but also war (Guha 2000)

After the establishment of the government’s control over much of the forest lands, complaints regarding forest and land management erupted in Garhwal and Kumaon (and much of the rest of India). These complaints were between the Forest Department and the Revenue Department as well as with local elites, peasants, and petty commercial interests. The government in an attempt to rectify these issues requested the Revenue Department to reclassify its forests. When reclassification did not relieve the tensions in the region a Forest Grievance Committee was created by the colonial government in 1921. As noted by (Rangan 2000:125) a Kumaon Association was formed to attend to these grievances.
The report advised the government to: (1) revoke all restrictions on extraction of minor forest produce from Reserved and Civil forests contiguous to villages; (2) reclassify New Reserves as Village or Civil forests; (3) give village panchayats and local representatives the power to regulate extraction from forests; and (4) exempt local communities from forest laws that banned ownership of firearms, so that households could protect their crops and livestock from wild animals straying from nearby forests.

The government took action on all of these recommendations. There was continued dissatisfaction by local communities with forest management, and in 1938 another committee was formed to look into forest rights and management. Again, in 1941 the regulations on village communities were relaxed, and rights for fuelwood, fodder and some species of timber were granted on some classifications of forests. These relaxed regulations along with growing populations and resource needs resulted in depleted forests across all classifications of forests at the end of British rule.

The period of British and colonial rule represented an economic transformation, where natural resources were viewed primarily for their economic value. Trans-Himalayan trade became less important at the regional scale. At the village and household scale livelihood opportunities based on the use of natural resources dwindled and household livelihood portfolios became more diversified to compensate for the changes in access to natural resources. During this time “taxes, levies, and auctions became mediating instruments for regulating extraction of commercially valuable natural resources from Reserve Forests (such as medicinal and edible plants, fodder, and resins)” leaving only the wealthier households able to access these forest resources (Rangan 2000:133).
To access forest resources, one's labor had to be exchanged for forest rights, including the right to grazing rights in alpine spaces for livestock. Poorer households were not able to diversify their livelihoods and were forced into poverty. In many cases these families depended upon remittances from male labor living elsewhere, leaving the Garhwal with a geography of missing men.

**Newly Independent Indian Forest Policies 1947-1976**

As the newly independent government began carving out its own forest policies “the demands of commercial industry became the cornerstone of postcolonial forest policy” (Mitra and Gupta 1996:197). Over time Indian forest policy began to shift slightly. The general trend has been a shift towards greater social equity and economic prosperity for all of India, though this shift has been desperately slow at times. Independent forest policy can be divided up into three successional time periods; an almost exclusive focus on timber to the exclusion of villager rights, a slight shift towards social and farm forestry with development as one of the aims, and finally a concerted effort to focus on including villagers in forest management (Saxena 1995).

From 1952-1976 the forests were mainly managed for timber and in most cases neglected the village commons. This is in part because when India became independent, the colonial forest policy remained. Gadgil and Guha (2013:xiv) find the British forest policy to utilize an “exclusionary legal framework” and find that the new government’s actions contributed to “marginalizing peasants and tribals while greatly eroding biodiversity.”

In the Garhwal at this time policies regulating forest products became stricter, and many households and small scale commercial interests were no longer able to access forest produces. When an important forestry contract was given to an outside sporting goods company instead of
a local community cooperative protests erupted in Garhwal. Community members were urged across the region to keep outside contractors from being able to access timber contracts given by the government. Community members were able to stop outside development by gathering around trees and hugging them. This movement is referred to as the Chipko movement (meaning “to adhere” in Hindi) and in the Garhwal region spanned from 1973-4.

In response to Chipko, in 1975 a state Forest Development Corporation was created. This state agency was tasked with acting as the wholesale supplier of forest commodities, both timber and non-timber forest produces, and was to work with small scale producers separate from the Forest Department. “Chipko’s legislative victories have eroded the state Forest Department’s administrative control and its revenue-earning capacity in the region” (Rangan 2000:164-5).

All three of the Indian Forest Acts focused on the “constitution and classification of forests” in order to enforce the states control over the forests (Damodaran 2006:361). The 1927 Act provided for three different forest types: reserve forests are for exploitation by the Forest Department only; protected forests are permissible for household use by villagers – but no commercial use is allowed; and village forests are to serve local villager needs. The Act grants the state rights over forest management and dictates, “how the villagers may use timber and village produce and pasture, and their duties for the protection and improvement of such forests” (Mitra and Gupta 1996:196).

The creation of village forests for the needs of villagers led to the creation of the forest councils for village management in 1931. Section 28 of the Indian Forest Act, 1927 allows for community-based management of forests. This section of the IFA provoked the 1931 Kumaon Panchayat Forest Rules. These rules have undergone numerous changes over the years, and
today are known as the Uttaranchal Panchayati Forest Rules last amended in 2005. These rules are discussed below to ascertain the details of Panchayat Forest management in Uttarakhand today. There are a few national level acts which also impact forest access. These acts include the Wildlife (Protection) Act of 1972, the Forest Conservation Act of 1980, the National Forest Policy of 1988, Joint Forest Management resolution of 1990 and the Biological Diversity Act of 2002. These Acts will be reviewed in sequential order in the rest of this section.

The 1972 Wildlife (Protection) Act (WPA) focused on forests of "wildlife significance" and there development as "protected areas" (Damodaran 2006:361). These areas were managed strictly for the sake of wild plants and animals. The WPA was cited to stop all “grazing, trekking, quarrying and extraction and entry” in the Nanda Devi National Park (what is the core zone of the NDBR) in June of 1983 (Naitthani and Kainthola, 2015:8). In our study site the Nanda Devi National Park and Biosphere Reserve impacts access of locals to the alpine pastures and NTFP/MAP located in these pastures.

Indian Forest Policies 1976 – present

From 1976 national policy shifted slightly. Though the main focus remained on commercial forestry on Forest Department lands, some attention (and funds) were given to social and farm forestry on non-Forest Department and private lands.

The focus on social forestry is in part because forest dwellers no longer able to continue their traditional livelihoods were in some cases forced to cut trees for their own survival. This lead to severe deforestation in many places, and resulting social ills and conflict. The response to the deforestation was to focus on tree planting and social forestry. Tree planting however was misinterpreted as forest planting. Support for social forestry and farm forestry meet the need of
the urban populations, but continued to leave forest dwellers without a livelihood. Saxenz explains one perspective on the challenges the Forest Department had during this time: “It is this failure to meet the livelihood needs of the people that accounts for our poor performance in the natural forest regions” (Saxena 1995:xiii).

In 1980 the Forest Conservation Act was created and with the act the Ministry of Environment and Forests. The Forest Conservation Act outlined the processes to convert forest land to non-forest uses, which required approval from the new ministry. The Ministry of Environment and Forests became the nodal agency for the Forest Department.

The Forest Conservation Act’s purpose was to "restrict diversion of forestlands, created under the Forest Act, for non-forest purposes" (Damodaran 2006). In other words the Act was to protect the forests as forests, and required the national government must approve all state led forest diversions. This piece of legislation considered the allocation of lands to tribals to be classified as a "non-forest use" and is one of the barriers to the conversion of lands from the Forest Department to tribal populations (Damodaran 2006).

In 1981 the national government issued a ban on all green-felling of trees above 1000 meters in the Himalaya. This greatly restricted forestry in the Garhwal and the ability of the newly created UP Forest Development Corporation to work with small-scale producers to gain benefits from forest resources. In much of the Garhwal and the majority of our study site the elevation exceeds 1000 meters.

focus was on the role of communities in environmental issues, and emphasized the need to first meet the basic human needs of the population in order to achieve conservation and sustainable development. The international focus on acknowledging the importance of human and communities was followed with Indian policy shifts; from policies “of policing against/from the forest dwellers…to policing by the people” (Saxena 1995:xii).

From 1988 onwards, there has been a concerted effort to focus on joint forest management and integrated forestry, however “[a]fter almost a century of management of forests by policing and by regulating the fights of the forest dwellers, an administrative situation was created where it was not even perceived that people could protect” the forests (Saxena 1995:xii).

The National Forest Policy of 1988 focused on the protection of forests for watershed management. It began a trend towards the Joint Forest Management of forests with the establishment of Forest Protection Committees in many states. The Act was in part to help rural and tribal communities gain access to the fodder, fuelwood and timber they needed from the forests. The Ministry of Environment and Forests also issued guidelines on Joint Forest Management in 1990.

Under the Joint Forest Management scheme of 1990 the “state (represented by the Forest Department) and a village community enter into an agreement to jointly protect and manage the forest land adjoining villages and to share the responsibilities and benefits of such endeavors” (Mitra and Gupta 1996:202). The Joint Forest Management policies have in some cases represented a "step back for communities that have had legally recognized communal rights over forest products" such as in the Van Panchayats of Uttarakhand (Mitra and Gupta 1996:202). This
is because these policies “creates new obligations for communities without resolving old claims over forests and forest produce” (Mitra and Gupta 1996:202).

In 2001 The Biological Diversity Act was created to provide for conservation of biological diversity, sustainable use of its components and fair and equitable sharing of the benefits arising out of the use of biological resources, knowledge and related matters.

We will now review two recent policies. These policies have a great deal of bearing on the context of access to natural resources in the Garhwal today, and have come about relatively recently. These policies include the Uttaranchal Panchayati Forest Rules of 2005 and the Scheduled Tribes and Other Traditional Forest Dwellers (Recognition of Forest Rights) Act of 2006.

In Uttarakhand the Uttaranchal Panchayati Forest Rules, 2005 outline panchayat powers in the state. In the functioning of the Panchayats there are two main interest groups, villagers and the Forest Department. These two interest groups ‘co-manage’ the Panchayat forests. Co-management is done through a hierarchy of management positions and management plans.

The village management of the Panchayat forests is done through the creation of a Village Management Committee which is headed by a Sarpanch. The Village Management Committee is elected from the village population. The Sarpanch is elected by the Village Management Committee from among its own nine members. Four of the members of the Village Management Committee are reserved for women.

The Forest Department management that most directly impacts the local Panchayat forests is the Divisional Forest Officer whom is responsible for a divisional forest unit. The DFO
also has Range Officers who work for them in the forest division but spend more time on the ground.

Management plans are created in order to manage the Panchayat forests. These plans occur at multiple scales. The Divisional Forest Officer creates a 5 year Composite Management Plan for all the panchayat forests within his jurisdiction. He then sends this Composite Management Plan to the Conservator of Forests for approval. The composite management plan is then to guide a five year Micro Plan for the management of individual Panchayat Forests. The Micro Plan is created by the Village Management Committee but approved by Divisional Forest Officer. Finally an Annual Implementation Plan is also created and approved for year to year forest management.

In Section 18, Exploitation and Utilization of Forest Produce the rules state the rights of villagers to sell forest produce from the Panchayat lands to either “cottage industries” “village industries” or for “commercial sale” as long as the “ecological requirements of the area are ensured.” These rights must be approved by the Forest Range Officer, Divisional Forest Office, Assistant Conservator of Forests/Sub-divisional Forest Officer and be accounted for in the Micro Plan.

In reference to the financial income made by such sales, we refer to Section 30. Determination of Net Income from Forest Produce and Distribution and Utilization thereof. This section states that for “other forest produce” the “Forest Department shall charge ten percent of sale proceeds as administrative expenditure.”
The Uttarakhand Panchayati Forest Rules of 2005 have a great deal of local relevance in regards to regulations and policies regarding access to cordyceps as a local resource on panchayat lands. The policy which focuses on the people, the Bhotiyas and their indigeneity, is the Scheduled Tribes and Other Traditional Forest Dwellers (Recognition of Forest Rights) Act.

In 2006 the Scheduled Tribes and Other Traditional Forest Dwellers (Recognition of Forest Rights) Act was passed. This act "seeks to recognize pre-existing rights which were never recognized due to the unsound processes of state appropriation" of Scheduled Tribes and Other Traditional Forest Dwellers (Sarin et al 2009: 20). The stated purpose of the Act is:

An Act to recognize and vest the forest rights and occupation in forest land in forest dwelling Scheduled Tribes and other traditional dwellers who have been residing in such forests for generations but whose rights could not be recorded...

Furthermore, the Act acknowledges the history of injustices to scheduled tribes and other traditional forest dwellers.

And whereas the forest rights on ancestral lands and their habitat were not adequately recognized in the consolidation of State forests during the colonial period as well as in independent India resulting in historical injustice to the forest dwelling Scheduled Tribes and other traditional forest dwellers who are integral to the very survival sustainability of the forest ecosystem.

The two main sets of rights the FRA seeks to remedy are those of land ownership rights and community resource rights. Chapter II of the act details thirteen different forest rights. Those
rights which may impact the Bhotiyas access to NTFP’s and their historic grazing grounds include:

(c) right of ownership, access to collect, use, and dispose of minor forest produce which has been traditionally collected within or outside village boundaries;

(d) other community rights of uses or entitlements such as fish and other products of water bodies, grazing (both settled or transhumant) and traditional seasonal resource access of nomadic or pastoralist communities;

(i) right to protect regenerate or conserve or manage any community forest resource which they have been traditionally protecting and conserving for sustainable use.

Sarin et al (2009:22) summarize the FRA finding that "the Act gives extensive provision for major reforms in tenure and governance of forests. There are indeed issues with precise wording; however, the bigger issue is how and by whom the Act will be interpreted. Whether it will be taken up and implemented according to its spirit, or rather whether the terms will be interpreted narrowly to divert the intent.” In other words, Sarin et al. (2009) suggest that it is going to be the "politics of implantation" that mediate the influence of the FRA.

All of these policies which we have just reviewed have over time constructed a historical and spatially specific reality in regards to accessing the alpine meadows of the Garhwal. Much of this picture however is missing specific policies directed towards the alpine spaces or its contents. We summarize the broad implications of these policies in the following table.
Table 2: Policies impacting access to alpine meadows in the Garhwal Himalaya

<table>
<thead>
<tr>
<th>Date</th>
<th>Policy</th>
<th>Impact on rights to alpine meadows and resources</th>
</tr>
</thead>
<tbody>
<tr>
<td>1815-1833</td>
<td>Pro-trade policy</td>
<td>villagers manage their own resources</td>
</tr>
<tr>
<td>1833-1858</td>
<td>Pro-production policy</td>
<td>timber became the focus for extraction</td>
</tr>
<tr>
<td>1864</td>
<td>Imperial Forest Department formed</td>
<td>Imperial Forest Department assumes control over village forests</td>
</tr>
<tr>
<td>1865</td>
<td>Indian Forest Act</td>
<td>Imperial Forest Department asserts control over village forests</td>
</tr>
<tr>
<td>1878</td>
<td>Indian Forest Act</td>
<td>Defines village forest use as a privilege not a right.</td>
</tr>
<tr>
<td>1927</td>
<td>Indian Forest Act</td>
<td>grants the state rights over forest management</td>
</tr>
<tr>
<td>1947</td>
<td>India becomes independent</td>
<td>rights transfer from British to Indian governments</td>
</tr>
<tr>
<td>1972</td>
<td>Wildlife Protection Act</td>
<td>forests of &quot;wildlife significance&quot; developed as &quot;protected areas&quot; managed strictly for the sake of wild plants and animals</td>
</tr>
<tr>
<td>1975</td>
<td>UP Forest Development Corporation created</td>
<td>corporation responsible for forest commodities (timber and non-timber)</td>
</tr>
<tr>
<td>1982</td>
<td>Nanda Devi now a National Park</td>
<td></td>
</tr>
<tr>
<td>1983</td>
<td>Nanda Devi NP is closed to humans</td>
<td>alpine meadows closed to all human activity local rights to meadows taken</td>
</tr>
<tr>
<td>1988</td>
<td>Nanda Devi now a Biosphere Reserve</td>
<td></td>
</tr>
<tr>
<td>1980</td>
<td>Forest Conservation Act</td>
<td>creation of the Ministry of Environments and Forests MoEF becomes nodal agency of Forest Department</td>
</tr>
<tr>
<td>1981</td>
<td>Ban on green felling</td>
<td>ban on all green felling above 1000 meters in the Himalaya</td>
</tr>
<tr>
<td>1988</td>
<td>National Forest Policy</td>
<td>protection of forests for watershed management establishment of Forest Protection Committees help rural/tribal communities gain access to resources</td>
</tr>
<tr>
<td>1990</td>
<td>Joint Forest Management</td>
<td>joint agreements between state and communities over forests</td>
</tr>
<tr>
<td>2001</td>
<td>Biological Diversity Act</td>
<td>conservation of biodiversity sustainable and fair use of biodiversity</td>
</tr>
<tr>
<td>2005</td>
<td>Uttarakhand Panchayati Forest Rules</td>
<td>villagers and Forest Department ‘co-manage’ Panchayat forests through a hierarchy of management positions and plans dictates percentage of commercial sales owed to government</td>
</tr>
<tr>
<td>2006</td>
<td>Forest Rights Act</td>
<td>seeks to remedy land ownership and community resource rights for tribals and other forest dwellers</td>
</tr>
</tbody>
</table>
Bhotiya and the Spaces of the Bugyals: Institutions, Governance, and Indigeneity

This section will outline the place-specific rights of the Bhotiya to collect cordyceps in the meadows adjacent to their villages as constituted by nation-state and local governance practices. The institutions which govern access to cordyceps include the Ministry of Environment, Forests and Climate Change (MoEFCC), and the Ministry of Tribal Affairs (MoTA). Local governance is through Van Panchayats and the locally specific traditional indigenous management system used by the Bhotiya. We will review each of these institutions in turn.

Ministry of Environment, Forests and Climate Change

The Ministry of Environment, Forests and Climate Change (MoEFCC) was created at the national level to help steer natural resource development. This agency is the main federal administrative unit for the “planning, promotion, coordination and overseeing the implementation of India's environmental and forestry policies and programmes” regarding the “conservation of the country's natural resources including its lakes and rivers, its biodiversity, forests and wildlife, ensuring the welfare of animals, and the prevention and abatement of pollution” (MoEFCC webpage). The MoEFCC is the agency that administers the Indian Forest Service, and therefore informs the Uttarakhand Forest Department and the Nanda Devi Biosphere Reserve management.

The Uttarakhand Forest Department is the administrative unit responsible for the implementation of the National Forest Policy at the local level controlling the Nanda Devi
Biosphere Reserve (NDBR). The Forest Department develops working plans for its operational activities including the management of the NDBR and other forest lands (Pande eds).

NDBR management drastically impacts local access to alpine meadows and alpine resources. Nanda Devi Biosphere Reserve was established in 1988, and became the 2nd biosphere reserve in India (Silori 2001). The core zone is known as the Nanda Devi National Park and is free from human inhabitation. It is managed under the Forest Service rules of a ‘protected’ forest and is in most part off limits to local use. The buffer zone is considered a ‘reserve ‘forest - and includes multiple uses, in this case specifically recreation.

In the case of the NDBR two villages lost access to their alpine/sub-alpine meadows which they customarily used for livelihood and religious activities (Kainthola et al. 2006). The loss of use of these meadows drastically changed the livelihood activities of these and the neighboring villages (Bosak and Schroeder 2004). This is in part because the NDBR policy "ignores the linkages between people and the bugyals [alpine meadows] and forests of the core zone" (Bosak and Schroeder 2004:4).

NDBR policies banned the collection of natural resources from the core zone most of which includes high altitude meadows and limited the collection of mushrooms on Van Panchayat lands (Howe 2005). Livelihood impacts included the loss of income from and access to traditional grazing meadows, restrictions on the collection and sale of MAPs, and restrictions on the collection and sale of NTFPs among others (Howe 2005, Kainthola et al. 2006, Naithani and Kainthola, 2015). The creation of the NDBR greatly impacted these villagers ability to access and control the alpine and sub-alpine pastures and resources upon which they traditionally relied.
In 1998 a movement called *jhapto chheeno* occurred in the same villages in which the Chipko movement was born. *Jhapto chheeno* translates to “swoop and grab” and was a movement where hundreds of villagers entered the core zone of the NDBR illegally to assert their traditional rights. The tensions over the management of the NDBR meadows and their resources continues today. In response to sustained complaints by those villages in the NDRB a portion of the core zone was opened to tourism in 2003. This opening does not fully address Bhotiya villages’ traditional rights. The management of the NDBR has ‘infuriated’ many of the impacted villagers (Kainthola et al. 2006).

*The Ministry of Tribal Affairs*

The Bhotiya were recognized as a tribal community, and awarded the status of Scheduled Tribe (ST) in 1967 via the Constitution (Uttar Pradesh) Scheduled Tribes Order, 1967 (MoTA). The Ministry of Tribal Affairs (MoTA) is the federal agency responsible for regulating tribal rights and therefore impacts the Bhotiyas local resource rights.

Today, the MoTA is focused on executing the newly passed Tribal Rights Act reviewed earlier in this paper. In one reading of this Act, the Bhotiya’s should have (c) ownership rights over NTFP’s both inside and outside their villages, (d) access to their historic alpine grazing pastures, and (i) the right to manage these historic alpine grazing pastures as they have in the past.

It is unclear however how this law will regulate the rights over the utilization of a ‘new’ NTFP, in this case cordyceps. The collection of cordyceps has only been since about 2001 in the Chamoli District, and therefore, it would not fall under the three generations requirement of the FRA. Cordyceps is found in the Bhotiyas’ historic alpine grazing pastures.
The one major concern in relation to the Bhotiya’s access to their historic grazing pastures is the limitation in the FRA regarding ‘critical wildlife habitat.’ This concern is stated in Chapter III of the Act:

(2) The Forest rights recognized under this Act in critical wildlife habitats of National Parks and Sanctuaries may subsequently be modified.

In the case of the NDBR, the Forest Department may decide that the area is critical wildlife habitat and apply this policy to severely curtail the rights otherwise accorded in the Act.

*Van Panchayats (Forest Councils)*

The beginning of formal recognition of village-based rights to local natural resources by the colonial government began with the Indian Forest Act of 1927. This lead to the state legislation in 1931 of the Kumaon Panchayat Forest Rules as reviewed above. *Van Panchayats* were developed as administrative bodies for the local regulation of forest and meadows (Nüsser and Gerwin 2000). These councils were decentralized with some level of freedom to regulate grazing, fuelwood and leaf litter usage (Nüsser and Gerwin 2000). Today, *Van Panchayats* have been in existence in Uttarakhand for over 85 years, and in respect to our study area has “democratic and autonomous community management of legally demarcated village forests (on Forest & Revenue Department land) by elected forest councils” (Sarin 2001:np).

*Van Panchayat* forest areas however are not all equally sized as they are a hybrid result of both social and ecological realities. In the neighboring Kumaon region, most *Van Panchayats* were not established until after independence (Nüsser and Gerwin 2000). In the Kumaon some villages are left without any access to forest and grasslands at all (Nüsser and Gerwin 2000). In fact, some of the most shocking instances of inequality in regards to forest and meadow access is
in the alpine areas in the Kumaon region (Nüsser and Gerwin 2000). Today “the control over medicinal plant collection arises as a challenge for these institutions” (Nüsser and Gerwin 2000:115).

This challenge was identified by Negi et al (2006, 169) in the neighboring Pithoragarh District where "ambiguity remained as to the legality of Cordyceps exploitation" even though, as they state:

the government of Uttaranchal issued guidance to the district magistrate of Pithoragarh on the exploitation of Yar tsa Gumba, stating that it should be done through the Van Panchayats (forest councils), that a committee of Van Panchayats be formed to monitor exploitation, and that the over-all power be vested in the Sarpanch (headman of the village council).

**Bari (Indigenous Management)**

In our study site in the Niti Valley of the Chamoli District of the Garhwal the Bhotiya still practice an indigenous management system (*Bari*) to regulate the local natural resources to which they still have access to. This traditional management system is working today to regulate village level resources. Kainthola et al. (2006) explains the system. The basis of management is through a “socio-religious intuition” that operates by “ensuring participation of all stakeholders under an authority that everyone in the area respects” (Kainthola et al. 2006:8). The system is run through a *Bari* which is the “rotational duty of a family to take the lead on collective issues” (Kainthola et al. 2006:8). Today the *Bari* is focused on religious ceremonies, collective work needs such as seasonal bridge construction, and the distribution of hay collections areas (Kainthola et al. 2006). The *Bari* system currently helps distribute hay collection areas and could potentially act in the management of *cordyceps*.  

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This review shows the myriad layers of institutions, working groups and the like which impact access to natural resources by tribals in Uttarakhand and the Garhwal more specifically. The policy which governs these alpine resources is complex and difficult to understand. We also show how local responses to these institutions and there governance structures, especially in the case of the NDBR have provoked resentment from locals. This resentment has resulted in a number of local movements and has not been remedied. In our case, with Bhotiya being recognized as a Scheduled Tribe, the local context of access to alpine resources is also heavily impacted by a handful of federally based acts and rules, which shape tribal access to natural resources.

**The Consequences of Policy: Local Agency and Black Markets**

The collection of cordyceps has resulted in the creation of illegal livelihood activities by otherwise law abiding local level collectors. The transformation of local collectors engaging in livelihood activities into actors participating in illegal activities is influenced by the fact that some cordyceps are collected outside of the permitted collection areas and all of the cordyceps are sold illegally.

In the following section we will discuss how and why these two activities occur. A full account of this new livelihood strategy is beyond the scope of this paper, and can be found in the Caplins and Halvorson (forthcoming).

**Collecting keera jari from Van Panchayat lands and beyond**

The Forest Department has issued permits for the legal collection of cordyceps, but these permits are only valid for collection on Van Panchayat lands. These Van Panchayat lands are not
always areas suitable for cordyceps collection. For some villages, Van Panchayat lands and cordyceps collection areas overlap significantly, and for some villages these lands do not overlap adequately. And as was noted earlier in the case of the NDBR some villages lost the majority of their Van Panchayat meadows with the creation of the protected area. Much of the lands which the Forest Department permits for collection are areas where cordyceps don’t grow—or do not grow well enough to allow for a productive village scale collection area. There is a great deal of local variability in regards to the types and quantity of lands and their suitability for cordyceps.

The resulting situation is that in some cases locals are issued permits to collect cordyceps in areas where cordyceps is not adequate. This contradiction leaves locals with two options: 1) spend time searching for cordyceps in meadows where few cordyceps are located but be in compliance with the permits issued; or 2) search in other areas for cordyceps which are not in compliance with the permits but which do have significant cordyceps populations. Given this contradiction, where permits are issued but they are in all actuality useless, many collectors choose to search for cordyceps where the cordyceps are located though it is outside of the collection area. Thus otherwise law abiding collectors, who do obtain cordyceps permits in order to follow legal guidelines end up becoming illegal collectors. Our study represented thirteen different villages. Out of these thirteen villages four villages collected only in their permitted areas, while the remaining nine villages collected both inside and outside of their permitted areas.

The tendency for local collectors to ignore permitting rules is also impacted by the history of eroding land and resource rights noted above. Many locals feel that they do not have appropriate local control over ‘their’ meadows. This assertion of control by locals, to be able to
use ‘their’ historic meadows for livelihood needs, results in conflict over where cordyceps collection should be allowed. This is a case where such activities are seen as illegal by the state, yet are locally sanctioned and viewed as an illicit right.

The Forest Department does have local staff to patrol the collection areas. These staff seem to be either closely aligned with village families (many times they are from the village or live in the village in question) to enforce the rules, or are not from the local village and are not fit enough or knowledgeable enough about the local area to be effective while on patrol. Due to these realities, local collectors collect in non-permitted areas. There are lots of stories of villagers having to help Forest Department officials while they are out patrolling as the Forest Department folks are not well equipped enough to be in the mountains. Villagers enjoy recounting stories of offering food and shelter to the patrollers—a momentary upset in the power regimes between local collectors and Forest Department personnel.

**Conclusion**

In this article we review in detail the policies, politics and boundaries that over time have influenced the local collection and sale of cordyceps. We demonstrate how while on the one hand, the nation-state promotes and in some cases even empowers local institutions in regards to accessing alpine meadows through the FRA of 2006, they are simultaneously are also curtailing local rights with the establishment of the NDBR, limitations regarding the collection of cordyceps, and only limited opportunities to sell cordyceps without an open market. We show how local livelihoods in this region have historically have been framed or constructed as ‘illegal’ by the nation-state, beginning with limitations on transhumance lifestyles and the closure of the NDBR, and how that framing is continuing today with cordyceps. We also show how locals have
resisted these assertions through different social movements, and today continue this resistance through their continued collection of cordyceps in restricted areas and sale on the black market. Finally, we demonstrate how these conflicting policies create an opening for the creation of a black market—and how this black market operates today to marginalize those interested in selling cordyceps.

From field observations and data analysis, there is sufficient evidence to suggest a move toward making the collection and sale of cordyceps fully legal. We assert that this be done by giving the rights to collect alpine resources back to the local communities if they are located in protected areas or not and as guaranteed to tribal people by the First Rights Act of 2006. In order for these local communities to continue to see benefits from keera jari and other similar alpine resources, the Government of Indian must develop appropriate policies in regards to these products.

As we have attempted to demonstrate, currently the collection and sale of keera jari is not well supported by policy. It like other NTFP/MAPs are lost in a mess of policies focused on forest resources. These policies are not specifically for NTFP/MAP or the high alpine meadows where they grow. There needs to be specific policies to support rural communities’ access to these alpine resources. The government needs to develop policies which directly relates to NTFP/MAP collection rights in alpine meadows. Furthermore these policies need to support local communities’ ability to manage these resources. This includes secure local resource rights for collectors and the legalization and support for local markets for cordyceps. Communities would be better able to profit from the cordyceps if local markets were enabled to encourage a better flow of information regarding the resources current market price. It would also allow for
communities to sell their collections in larger batches—and therefore have greater negotiation power with buyers.

Finally, in the case of some villages, policy needs to be implanted to give local rights to NTFP/MAP and their associated meadows in protected areas such as the Nanda Devi Biosphere Reserve. The NDBR greatly impacts some of the village’s ability to profit. This long standing inequality, where some villages lost their traditional meadows, needs to be corrected. The protected area polices create inequality at the local level. Rural mountain communities have long sustained themselves by utilizing different mountain resources, from the rivers below to the alpine meadows and mountain above. The NDBR restricts some villages in their ability to uses all of these altitudinal zones.

Locals view these lands as their own, and will continue to use them for their livelihood needs given their lack of alternative opportunities and the inability of the Forest Department to enforce conservation policies. By remaining in conflict with local community needs the Forest Department has disallowed locals to use their traditional alpine resources and in the process places locals in opposition to the NDBR and the Forest Department. This relationship must be repaired in order for the management of the NDBR to satisfy local and non-local needs alike.

Cordyceps may or may not be a long term livelihood strategy, however as our paper shows, the tensions between locals and non-local use is an ongoing issue. Furthermore, as was noted in a review of the commercial use of NTFP’s worldwide in 2000, the commercial collection of NTFP’s or in our case MAPs rarely ends in extinction (Neumann and Hirsch 2000). If local resource rights are not addressed and the tensions between locals and the Forest Department dispelled, the resistance of locals to the Forest Department will continue to hamper a
positive relationship and the overlapping of conservation goals between locals and the nation-state where they do exist. Without this positive relationship, the benefits of these alpine resources will flow to local communities members, the black market and then onward to the Chinese market, with the Forest Department only seeing further tensions with local communities.
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CHAPTER 5 FROM MEADOWS TO MARKETS: A POLITICAL ECOLOGY OF CORDYCEPS COMMODITY CHAINS IN THE GARHWAL, INDIAN HIMALAYA

Abstract

Mountain policymakers and sustainable livelihoods activists have identified local niche product development as an important strategy for confronting a host of rural problems facing mountain communities, including food insecurity, illiteracy, health disparities, poverty and community development. Much recent work on mountain livelihoods in the Hindu Kush-Karakoram-Himalayan region (HKH) has examined high elevation agriculture as well as grazing systems (i.e., transhumance), but little research focuses specifically on the role of alpine resources as potential niche products. This article examines the factors and processes that influence the transactions surrounding the collection and sale of cordyceps (Ophiocordyceps sinensis) in the Garhwal Himalaya of north India. We do this by tracing the commodity chain of cordyceps, an alpine medicinal fungus, from the meadows where it grows and is collected to the markets where it is bought and sold. In our analysis of this commodity chain we unveil how mountain geographies and government policies impact the ways in which local communities capitalize upon this lucrative informal trade of a valuable alpine-based resource. We find that the current collection and sale of cordyceps is benefiting local residents while simultaneously encouraging an elusive black market with international bio-economic/bio-social reach. We also find that the collection and sale of cordyceps is a livelihood strategy that is relatively open to all local villagers. We provide policy suggestions to support local agency, niche product development, and the integrity of the alpine ecology.
Keywords
alpine resources, niche product, Indigenous Peoples, mountain livelihoods, cordyceps, Garhwal Himalaya

Introduction

Mountain policymakers and sustainable livelihoods activists have identified the collection and sale of niche products from the wild as an important strategy for confronting a host of development challenges facing mountain communities, including food insecurity, illiteracy, health disparities, poverty and community development (Choudhary et al. 2014, Mahapatra, et al. 2005). This movement towards niche products as a solution to rural mountain underdevelopment in the Hindu Kush-Karakoram-Himalaya (HKH) is not new. In the HKH niche products are gathered from wildly diverse aspects, slope angles, and elevations and include a plethora of non-timber forest products (NTFP) and medicinal and aromatic plants (MAP). The use and sale of many of these products have cumulatively resulted in significant economic activities, and in some cases, dramatic livelihood changes. Yet, some contend that niche product-based rural economies are difficult to sustain given pervasive social structures, marginalizing government policies, agendas of parks and protected areas, and environmental and climate changes (Choudhary et al 2011).

In the HKH, mountain livelihoods research has focused on the complex interactions between agriculture, animal husbandry and the collection of natural resources from forests and alpine meadows. For many mountain communities, forest and alpine resources are an extension of the household economy; therefore, alpine meadows are part of the portfolio of mountain
resources that enhance food security, household economics, and community well-being, but are relatively unexplored. Little research has focused on the collection of NTFPs, MAPs, and other natural resources specifically from alpine environments. We define alpine environments as above tree line, which in this part of the Himalaya occurs around 3,000 meters.

Resource extraction and collection in high elevation areas is not new in the HKH. The foraging and collection of alpine products are arguably some of the most enduring livelihood enterprises as rural families have supplemented or expanded food procurement and trading assets in the region for centuries (Choudhary et al. 2011). Research on high elevation livelihood activities is limited in part because of the challenges of accessing these areas and the seasonal dimensions since much of the region is under snow for long periods of the year. Nevertheless, the work that has been conducted by researchers and non-governmental organizations has documented shifts in these historic systems. This article examines a new alpine meadow-dependent livelihood activity tied to the collection of cordyceps (*Ophiocordyceps sinensis*) in the Garhwal region of upper Uttarakhand, India.

Cordyceps, an alpine medicinal fungus, grows in the high, cold, arid mountains and grows in meadows where the snow patches melt away in spring. It is most commonly found between 3500 and 4500 meters (approximately 11,500 to 14,750 feet) (Sharma 2004). Collection is difficult and requires a large investment of time (Ranjit et al. 2010). In north India local residents travel by foot often crossing treacherous mountain streams and slopes with friends and family members to collect this fungus (Caplins and Halvorson, forthcoming)
The meticulous work of collecting this niche product in high elevation spaces is conducted all day for days and weeks, often partly or completely replacing other work or household tasks. Research on cordyceps collection elsewhere in the HKH reveals it to be important for providing new income and economies of exchange. Some of this research also points to a range of negative impacts on local communities. The study presented herein is situated in the Garhwal, in the Indian state of Uttarakhand bordering China. This area remains poorly developed and marginalized due “not so much [to] the lack of financial resources, but [an] absence of [a] region-specific approach” (Sati 2005:345).

The Garhwal is inhabited by the Bhotiya, an Indigenous group (identified as “tribal” in state parlance) with a long history of trade and social interactions with the Tibetan cultural realm or ethno-linguistic realm of western China. The region and its inhabitants have been greatly impacted by the geopolitics of this international border along with Indian state policies regarding protected areas and natural resource access and use. These communities are currently navigating ways to adapt their livelihood systems to better fit in today’s economic and political realities.

Within this context, this article investigates the Bhotiya’s views on the commodity and market relations of cordyceps in relation to three different but interrelated aspect of collection. These different aspects include access to alpine meadows, access to the new market of cordyceps trade, and livelihood diversification strategies. From the analysis of 88 semi-structured interviews with collectors drawn from a variety of field sites, the following research question is addressed: What are the collectors’ experiences in access to alpine meadows, collection, and trade?
The overall aim here is to enrich the debate on the contemporary changes within mountain farming systems in developing countries, emphasizing the role of new spatial arrangements in rural livelihoods. Indigenous peoples’ own experience and local practices not only should actively contribute to how new economic policy trends are constructed, but also strengthen the theorization of mountain livelihoods, which are often interpreted as static and/or in demise (Rawat et al. 2010). Further, such experiences that are geographically embedded in the local contexts can be useful to enhancing rural agriculture and development policies in the HKH to better address Indigenous farmers’ specific needs and visions (Gururani, 2002).

The remainder of the paper is structured as follows. Section two elaborates the theoretical background on mountain livelihoods that informs the analysis of the data. Section three discusses the research setting investigated, as well as the data and the methodology utilized. Section four deals with the views expressed by Bhotiya cordyceps collectors concerning access to meadows for collection and the nature of the niche market. Section five deals with their visions on the economic resiliency, while section six presents the final discussion and conclusions.

**Mountain Livelihoods: Himalayan Niche Products and Commodity Chains**

The theoretical background of the paper is rooted in the literature on mountain livelihoods, and the broader paradigm of political ecology. Within the mountain livelihoods literature we focus on niche product development and their commodity chains. We also take into account the ways that local villagers are able to gain access to the mountain resources they need and how categories of social difference mediate this access. In this section we will first outline why political ecology is an appropriate framing for this research. Second, we will review the literature on mountain livelihoods in the KHK as it pertains to niche product development. Third,
we will detail what is known about how categories of social difference mediates access to natural resources, and more specifically cordyceps meadows and commodity chains.

**Why Political Ecology?**

Our purpose here is to examine the collection and sale of cordyceps through the lens of political ecology (PE). This lens is appropriate because the field of PE attempts to do two things at once; it attempts to critically investigate dominate accounts (or a-political ecologies) of environmental change, while also promoting alternative understandings (Robbins, 2004). In other words, a PE lens offers a way to see the collection and sale of cordyceps from different perspectives, in our case the perspective of the Bhotiya (rather than the perspective of the nation-state for example). One of the goals of a political ecology-driven analysis is to understand human-environment interactions through an investigation of resource access and control (Neumann 2005). Furthermore, political ecology provides an excellent framework for studying illicit livelihood activities such as cordyceps since its focus is on power dynamics, marginalization and global linkages (Bloomer 2008). There has, however, been more of a focus on how these illegal activities engage with regional and global economies rather than how illicit activities impact the local (Bloomer 2008). And, though the critical approach of PE has proven popular, the later aim—the promotion of “alternatives, adaptations, and creative human actions”—has been harder to meet (Robbins, 2006:12). The focus on alternative understandings, resources access and control, power, marginalization and global linkages lends itself well to the study of how rural tribal communities and regional markets alike are able to profit from such a valuable international commodity.
**Mountain Livelihoods and Niche Product Development**

A livelihood is understood to be the combination of the capabilities, assets, and activities needed to make a living (Scoones, 1998). In the Garhwal, livelihoods are many times centered around the family or household unit, with each individual in that household engaging in varied livelihood strategies. Mountain livelihoods in particular are complex assemblages of livelihood strategies which draw from numerous natural resources, and from the vertical landscape. Livelihood strategies include agricultural intensification or extensification, migration and diversification. Diversification can act to bolster the resilience of local livelihoods, but it can also result in increases in risk (Wu et al. 2014). In the Garhwal Himalaya there is "little understanding of the driving forces, processes and impacts of diversification within pastoral societies in mountain areas" (Wu et al. 2014:1344).

One form of diversification, which has been important for rural mountain people in the Himalaya is the collection and sale of niche products from the wild (Kandari et al. 2012, Olsen and Larsen 2003). In some cases, the collection and sale of wild products has enabled individuals and communities to accumulate wealth and shift out of poverty (King 2011). Opportunities for wild niche product development in the Garhwal include non-timber forest products (NTFP) and medicinal and alpine plants (MAP) among others. The ability to focus on the development of wild niche products, such as cordyceps, hinges on one’s ability to access these vertical resources.

**Accessing Cordyceps Commodity Chains**

Access is defined as the ability to derive benefits from something (Ribot and Peluso 2003). In the case of cordyceps, access mainly lies in accessing the alpine meadows where the cordyceps are found and accessing the markets where the cordyceps are sold. One way of
interrogating the way in which locals are accessing cordyceps meadows and markets is through an investigation of the cordyceps commodity chains.

A commodity chain is a “series of relations through which an item passes, from extraction through conversion, exchange, transport, distribution and final use” (Ribot 1998:307). A commodity chain analysis is "a method for analyzing how and for whom such market conduits operate" and "is a tool for understanding who benefits from natural resources, how they benefit, and how those patterns of benefit distribution might be changed" (Ribot 1998:308). Finally, an important aspect in the cordyceps commodity chains, this type of analysis allows for a better understanding of how extra-legal powers operate (Ribot 1998). Access analysis is, thus, the process of identifying and mapping the mechanisms by which access is gained, maintained, and controlled” (Ribot and Peluso 2003:160).

In the Garhwal, the commodity chains for cordyceps begin with extraction from the alpine meadows by local collectors, who sell to middle men who come to their villages, who then sell to Nepalese traders, who then in turn sell to the Chinese (Negi et al. 2006). Our commodity chain analysis focuses on the local collector, who collects the cordyceps from the alpine meadows and then sell the cordyceps to middle men. We define access as both the amount of the resource that the household collected and the price received for that resource, which represents ones access to the cordyceps meadows, and cordyceps markets (Woodhouse et al. 2013).

In order to collect cordyceps, one needs a certain amount of knowledge regarding the collection of cordyceps and access to the alpine meadows where they grow. Accessing cordyceps meadows in the Garhwal is shaped in part by local councils called Van Panchayat (Negi 2007). Accessing these meadows is further shaped by nation-state conservation and development
policies and the remoteness and inaccessibility of the Himalayan mountains (Bosak 2008, Wu et al. 2014). Finally, the ability to access and participate in commodity chains is also mediated by ones’ social position.

**Livelihood Impacts and Social Categories of Difference**

Social categories of difference are "ordering categories, based on differences" or perceived differences in society (Bodwitch 2014:3). These "[o]rdered categories are problematic because they inevitably, through perhaps indirectly, give rise to inequalities." (Bodwitch 2014:3).

In the Garhwal, people are differentially positioned in terms of access to and responsibilities for material resources (Newman 2005, Paulson et al. 2003, Robbins 2008). The ways that individuals and communities gain access to natural resources is mediated in part by ones social position (Rocheleau and Edmunds 1997; Xu et al. 2009). A number of recent studies grounded in the Himalayas have focused on how categories of social difference impact one’s ability and experience in accessing natural resources (Guruani 2002, O’Reilly 2006, Truelove 2011). Other studies find that social categories of difference impact local levels of poverty and inequality, which are difficult to transcend (Mosse 2010, Nightingale 2011). In other words, access to cordyceps has the potential to enable the continuation of inequality within a community and sometimes actually even exacerbate it.

In India, in the neighboring region of Kumaon, cordyceps was found to be important for improving the living conditions of poor households (Garbyal 2004, Sharma 2004). Sharma (2004) finds that cordyceps income is not distributed equally along the cordyceps commodity chain, and that local collectors are not seeing fair prices for this valuable commodity.
In Nepal, Childs and Choedup (2014) demonstrate that the livelihood impacts from the collection and sale of cordyceps are enabling those impoverished to fulfill their subsistence needs, while others are able to invest more on education, religious life, and social obligations. Thapa et al. (2014) also studied cordyceps in Nepal, and found positive benefits from collection at the community level, with improved infrastructure for education and hydropower.

Childs and Choedup (2014) also however highlight some negative impacts of the trade, which include an increase in drinking, unwise spending, and changing cultural values. Furthermore, there are questions regarding the impacts of the collection and sale on inter/intra-generational relations and equity, as some are able to transcend the historic social and generational hierarchies due to the economic boom.

In Bhutan, Wangchuk et al. (2012) show that a majority of the cordyceps income is spent on food, household expenditures, home construction and education. Cannon et al. (2009) identify the new income from cordyceps to be life-changing for locals. Herders did not feel the need to sell off livestock every year, and were able to better afford education and luxurious such as solar panels and mobile phones.

In Tibet (western China), Woodhouse et al. (2013) demonstrate that the collection and sale of cordyceps is alleviating poverty however, poorer household were receiving less of their income from cordyceps in comparison to wealthier households. Furthermore, the study found that an assemblage of social factors influenced access to cordyceps. The study shows that “younger, larger, pastoralist households with lower dependency ratios tended to collect more” and that “education and household size explained variation in price gained for the product” (Woodhouse et al. 2013:30).
Winkler (2008) suggests that many of the normal limitations to engaging in a new livelihood activity, including education and access to credit, are absent in the case of cordyceps. The author finds that nearly “all rural households who practice traditional subsistence herding and agriculture” engage in the collection and sale of cordyceps (Winkler 2008:298). Furthermore, the benefits of cordyceps flow directly to rural households, with relatively little captured by the state. In this area of Tibet, cordyceps income is used to pay for modern entertainment devices (TV/DVD), convenience foods and trinkets, new houses, new forms of transportation, and the rebuilding of traditional cultural sites such as monasteries (Winkler 2008).

**Research Setting and Methods**

*The Garhwal*

Uttarakhand is composed of two mountain regions, the Garhwal in the northwest and the Kumaun in the southeast (Rais et al. 2009). The region is broken into seven administrative subdivisions which include Hardiwar, Dehradun, Uttarakashi, Tehri Garhwal, Garhwal, Rudraprayag, and Chamoli. Our study site is in the Chamoli sub-district. The landscape is covered by family farms and is rich in biodiversity (Chandra et al. 2011). The 2011 Indian Census estimates the population of the Garhwal at 5,857,294. (*Figure 1: Map of study area*).

The topography of the Chamoli sub-district is defined by its steep valleys sides and turbulent rivers below. The study area and the larger Garhwal region makes up part of the Ganges River headwaters. The landscape is dynamic and landslides, mudslides, rock fall, flash floods, and other natural and human caused natural events are common.
The alpine meadows have unique microclimates (Silori and Badola 2000). Though the meadows do experience variation due to the nature of the local topography, the mean annual temperatures in the alpine areas are about 3.0 °C-4.5 °C with summer extremes including a drop to 6 °C at night to 50 °C in the mid-day sun (Nand and Kumar 1989). In the alpine areas winter dominates from October to April with snow reaching depths of about five meters (Nand and Kumar 1989). Besides winter, the monsoon season dominates most of the rest of the year in the alpine areas from June to September. The monsoons bring 50–90% of the annual rainfall to the mountains of the Garhwal (Chauhan 2015).

The highest peak in the local area is Nanda Devi (7,817m). Nanda Devi is worshipped by local people as a deity. The area surrounding Nanda Devi has been under protection since 1939 as a game sanctuary; 1982 as a National Park; and 1988 as a Biosphere Reserve. These ever increasing levels of protection and exclusion have resulted in severe restriction in local control and access to these lands (Bosak and Schroeder, 2004). The impact of these land designations are discussed in more detail later in the article.

*The Bhotiya*

The Bhotiya are the main ethnic group in our study area in the Chamoli district of the Garhwal. The Bhotiya have their own unique culture, traditions and religious beliefs. They are living in high altitude areas, with an average family size in the study area of 5-6 individuals (Phondani et al. 2010). The Bhotiya are considered a tribal community and were federally recognized as a tribal group in 1967 when they were assigned Scheduled Tribe status (ST) (Phondani et al. 2010). This designation among other things guarantees opportunities for employment, administration to universities, and seats in the legislature.
Today, the Bhotiya are primarily agriculturalists and wage labors, though this is only a recent phenomenon (Bosak 2008). Historically the Bhotiya practiced a form of seasonal migration known as transhumance while engaging in a complex use of the landscape including animal husbandry, agricultural production, the use of forest and alpine resources. This diverse set of livelihood activities allowed inhabitants to take advantage of limited mountain resources and trade relations with Tibet (Bergmann et al. 2008).

While in the alpine meadows grazing their sheep and goats many herders also collected a number of alpine and medicinal plants for home use and trade (Phondani et al. 2010). In the spring, these sheep and goats would be loaded as pack animals with local goods to be traded for Himalayan salt and other valuable commodities. This livelihood activity has disappeared due to the closure of the Indo-Tibetan border in 1962 along with other changes in land use dictated by the nation-state which has altered the lives of the Bhotiya (Bergmann et al. 2008, Negi 2007).

Methods

In order to understand the social and economic dynamics of collecting cordyceps as a livelihood strategy, the intensive fieldwork was conducted during the summer of 2014 in the Chamoli sub-district of the Garhwal. Data collection consisted of participant observation, collection group surveys, and informal interviews. This study grows out of over a decade of interaction with the research setting. Interviews were conducted by the lead author in Hindi with the assistance of field assistants fluent in Garhwali, Hindi and English.

My field assistants, local village leaders, and I selected 13 villages for the study. The choice to study cordyceps collection in these villages was due to the nature of the cordyceps harvest and sale, my research assistants’ relationships with other community members in this
area, and the geography of meadow sharing. My research assistants were willing to help me interview their family and friend connections in the villages selected. Researchers have noted the difficulty in studying cordyceps in the Himalaya as well as other niche products such as wild mushrooms harvest and sale due to the culture of secrecy of collection, therefore these connections were very important (Sharma 2004, Yeh and Lama 2013).

Due to the secretive and sometimes illegal nature of the collection and sale of cordyceps in the study area I have choose to remain vague about some of the details of my research. I will not be giving the names of my research assistants, the specific villages I conducted my research in, or the names of the meadows where villagers are collecting form. Instead, I will refer to my research assistants as such, the villages by number, and the meadows by alphabetic letter. I am concealing these details in order to protect my assistants and subjects.

These villages vary in their distance from roads and alpine meadows. These villages were selected to demonstrate a variety of levels of access to cordyceps meadows and markets. We choose to focus on all the villages that used four separate meadows. For instance Meadow A was used by only one village. Meadow B was used by two different villages and etc. as shown in the table below.

<table>
<thead>
<tr>
<th>Meadow</th>
<th>Villages Using</th>
</tr>
</thead>
<tbody>
<tr>
<td>Meadow A</td>
<td>(one) village 1</td>
</tr>
<tr>
<td>Meadow B</td>
<td>(two) villages 1 &amp; 2</td>
</tr>
<tr>
<td>Meadow C</td>
<td>(five) villages 1, 3, 4, 5 &amp; 6</td>
</tr>
<tr>
<td>Meadow D</td>
<td>(seven) villages 7, 8, 9, 10, 11, 12, 13</td>
</tr>
</tbody>
</table>
**Participant Observation**

Much of the data collected in this study was informed by participant observation. Participant observation allowed for a more contextualized understanding of local cordyceps collection and sale and was especially important for understanding the commodity relations of cordyceps (Lama 2007). Extensive participant observation took place in households, fields, on mountain trails, and camps in alpine pastures. I travelled to each village and each meadow to better understand the nature of these geographies.

**Informal Conversations**

Informal conversations occurred throughout the field work with female and male farmers, mountain guides, village leaders, traders, shop keepers, forest department employees and local activists. I did not take formal notes during these conversations, however whenever it was appropriate I would make detailed notes in my field journal recording these conversations. I was able to gain a lot of information though these informal conversations where those I was talking with didn’t feel like study participants per say. It was through these information conversations that I learned the most about the illegal nature of the cordyceps collection and sale.

**Collection Group Surveys**

Interviews were collected from 88 collection groups representing 13 different villages. The Indian caste system is formally illegal, but caste relations still have important implications. In some of the villages, there are two distinct social groups as defined by caste. The upper caste is composed of indigenous community members and the lower caste non-indigenous community members. The majority of the community in the region is Indigenous (Bhotiya) though there are
some general and scheduled caste community members. In order to better explain the composition of these villages I have developed chart noting the general make of each village below. I am not using census data, but rather my field data to population the cart. This is because the census data does not accurately reflect the composition of those actually living in the villages. Many times the census data could households that do not reside within the village. For instance, though a family may own a house in the village, they might for the majority of the year live elsewhere. I only accounted for households that had their primary residence for the summer in the village.

The Indigenous community members are ethnically Bhotiya and are recognized as a tribal group. The Bhotiya adopted the caste system with some of the elements of Hinduism later than many of the plains people, and chose to opt into the top two castes: the Brahmin and Kshatriya castes. The Brahmins are considered a priestly caste, and the Kshatriya is a warrior caste. Most of the Bhotiya people are then further grouped into mohallas, which literally means ‘neighborhood,’ and can be identified by particular last names. Mohallas were used to make further divisions of social groups within the village.

The other important social group within our area of the Garhwal is composed of non-Indigenous peoples who are of the scheduled caste (Guha 2000). The scheduled caste in India is actually considered to be below the four major castes. These scheduled caste community members live in a separate part of the village, receive lesser quality lands and are marginalized within the community. The scheduled castes also play an important part of community life, being required as drummers and other socially prescribed roles for the entire village, making them invaluable for the upper caste community members. The distinctions in caste in the Garhwal are
also not as strict as in the plains of India with a great deal of informal interaction between the upper and lower caste members (Guha 2000). *(Table 1: Village composition by household)*

In summary, functionally there are two major social groups in most villages: an indigenous community whose members have federal tribal recognition and a non-indigenous community members whose members have federal scheduled caste recognition and accommodations due to the limits of their social role (Guha 2000). Finally, in our study area, there is one village composed of only general caste people, and one community with some general caste community members. These social groups are furthered divided by *mohallas* or more practically by last name.

Quota sampling was adopted as probability sample was not possible due to the secretive nature of the collection and sale of cordyceps. Quota sampling is appropriate since random selection was not possible (Bernard 2006, Singleton and Straits 2010). The quota sample frame was created by dividing the households up by caste (if appropriate for that village) and family group (again if appropriate for that village). I then took a relative percentage of our interviews from each group in order to achieve a representation of the village. My aim was to speak with 25% of each village. In order to reduce bias, I treated each village as a discrete entity to employ geographic controls (Bernard 2006).

The data collection instrument was pilot tested in the field to ensure the research questions were; appropriately translated from English to Hindi or Garhwali, culturally appropriate, and addressing the information sought (Bernard 2006). The interview guide which was followed was the result of this pilot testing. Before we began any of the interviews, my research assistants and I discussed in great detail proper interviewing techniques.
My research assistants and I travelled from village to village to fulfill our quotas. We would discuss the social axis of difference that were relevant in the target villages, and then come up with a representative quote we hoped to get from each of these social categories of difference. We would then travel to the target village that day, and beginning wander around the village asking for willing participants. In most cases, we were granted interviews. There were only a handful of cases where participants replied that they did not collect (when we knew that they did), or simply refused an interview. My research assistants did have to spend time explaining the study, how it might help local people, and what we were going to do with the data.

During the interviews, my research assistants would ask the questions, and some follow up probes. Recording these interviews was out of the question, so all of the survey data was hand recorded. I would record their answers and ask follow up probes when I felt they were needed. In some cases I had to ask for translations or more local context to better understand the answers given. The surveys usually started out quite tense, but within a few questions, we would have relaxed the situation, and have fully engaged the interviewee. Since both of my research assistants were males, we were better able to interview other men. Young women were the hardest to get to agree to an interview. This reluctance of the young women to agree to participate in an interview was most likely for two reasons. One, both of my research assistants were male, which made the interviews less comfortable for the women. I feel that I would have been able to get more female interviewees if I also had a female research assistant. Most of my travels included both of my research assistants. The research assistants were from two different family groups which enabled us to connect with more villagers. This was the case because my two research assistants were from different families, or mohallas, as was explained earlier. My
research assistants were therefore able to leverage two different sets of family relations, one for each research assistant.

We interviewed only local level collectors as the other actors in the commodity chain were not accessible. The inaccessibility of these other actors is due to the very secretive nature of the cordyceps trade. Most of those involved in the cordyceps trade are acting illegally in one way or another and are therefore not keen to be interviewed by an outside researcher.

**High Alpine Politics**

The debate over who should have access and control over high alpine meadows and their natural resources is a hot topic in the Garhwal, and has resulted in a number of social movements over time. These movements have helped to set the stage for conflicting ideas about who should have access to and control over cordyceps and other alpine resources today. In order to better situate our understanding of the collection and sale of cordyceps as a livelihood and cordyceps commodity chains we will briefly outline a few relevant events regarding alpine resources and development in the Garhwal.

In this particular area of the state the most important mandates and movements in regards to human-environment interactions as they relate to cordyceps, the alpine meadows where they are found, and forests more broadly include the following: Natural resource policy during British rule and post-independence; the Chipko movement; the creation of the Nanda Devi Biosphere Reserve (and the preceding land designations); and the Jhapto Chheeno movement. These issues are rooted at different scales, but all help the reader to understand how local livelihood activities which use alpine resources have been regulated over time.
Indian Forest policy today, which also broadly applies to much of the high alpine meadows where cordyceps are found, both before and after independence has been heavily influenced by the British. Prior to the entrance of the British East India Company in the Himalaya in the early 1800s local forests and meadows were for all practical purposes under local control. In the 1860’s the British began to focus on scientific forestry as the most appropriate means for managing the natural resources in the Garhwal and elsewhere. When the British East India Company enters India and begins to extract wood for the building of their empire that forest resource rights became an issue. The management ideas of the British were focused on the desire to profit from trans-Himalayan trade and the building of an empire. These goals differed greatly from villager livelihood needs.

The beginning of formal recognition of village-based rights to local natural resources began in 1931 with the Kumaon Van Panchayat Rule (Kainthola et al 2006). This rule created Van Panchayats (Forest Councils) as administrative bodies for the local regulation of forest and meadows (Nüszer and Gerwin 2000). These councils were decentralized with some level of freedom for villages to self-regulate grazing, fuelwood and leaf litter usage (Nüszer and Gerwin 2000).

In the neighboring Kumaon region, most Van Panchayats were not established until after independence (Nüszer and Gerwin 2000). Nüszer and Gerwin assert that “the control over medicinal plant collection arises as a challenge for these institutions” (2000:115). However, the Van Panchayat forest areas are not all equally sized, and in the Kumaon some villages are left without any access to forest and grasslands (Nüszer and Gerwin 2000). In fact, some of the most shocking instances of inequality in regards to forest and meadow access is in the alpine areas
(Nüsser and Gerwin 2000). There are great regional and village to village differences in access to forests, pastures and natural resources (Saxena 1995). Furthermore, though much of the alpine pasture lands where cordyceps is found are controlled by Indian Forest Policy this is in part because Indian policy ignore pasture lands with no specific department having responsibility for “grasses and pasturelands (Saxena 1995:3).

When India gained its independence the switch from British rule to self-rule saw little changes in the management of these natural resources. Forest and meadow resources continued to be heavily managed for the use of the nation-state. The Chipko movement, was a one of the most notable times that the right to develop the natural resources in the Garhwal area was challenged.

The Chipko movement was a co-opted movement of the 1970’s (Gururani 2014; Rangan 2000). The initial aim of the Chipko movement was to regain access to development rights but over time the movement has gained mythic status. The Chipko movement can be found listed in political ecology timelines as the main event between the Stockholm conference and the Brundtland report, both highly influential nodes in international discussions of environment and development (Williams and Mawdsey 2006). Local communities wanted the right for small scale extraction of resources and were angered when the Forest Department not only denied the village requests for rights to local trees but instead gave rights of their forests away to outside companies. It was at this point that the local communities resisted the felling of these trees by hugging them. It was not that the villagers did not want the trees to be used, it was that they wanted the rights to extract these trees for their own use. A full discussion of this movement is beyond the scope of this paper, please see (Rangan 2000, Guha 1989).
One of the outcomes of the Chipko movement was the development of the Ministry for Environments and Forests. This governmental department was created at the national level to help steer natural resource development. Unfortunately, however this new level of bureaucracy actually further inhibited local level development opportunities. Livelihood opportunities based on the development of natural resources by locals became less possible. Furthermore, though much of the alpine pasture lands are controlled by The Ministry for Environments and Forests, this is in part because Indian policy ignore pasture lands with no specific department having responsibility for “grasses and pasturelands (Saxena 1995:3).

In our study area the Nanda Devi Biosphere Reserve (NDBR) also drastically impacts local access to alpine meadows and resources (Bosak and Shroeder 2004, Howe 2005). The NDBR is composed of a core zone and buffer zone. The buffer zone is open to human activity and habitation, while the core zone is almost entirely closed to human activity. In the case of the NDBR a number of villages lost access to the high alpine meadows which they customarily used for livelihood and religious activities, which drastically changed the livelihood activities of these villages (Bosak and Schroeder 2004). The NDBR policies banned the collection of natural resources from the core zone most of which is high altitude meadows and limited the collection of mushrooms on Van Panchayat lands, (Howe 2005). This is in part because the NDBR policy "ignores the linkages between people and the bugyals [alpine meadows] and forests of the core zone" (Bosak and Schroeder 2004:4).

The Jhapto Chheeno movement was a localized movement in the Chamoli district that took place in 1998. It was aimed at regaining control over alpine resources within the NDBR and has a foundation in the Chipko movement. Jhapto Chheeno translates to swoop and grab. This
very localized movement – was a response by locals to the enduring restrictions on forest and alpine resources and livelihood impacts previously mentions. This movement, consisted of a mass entry into the core zone of the NDBR. The *Jhapto Chheeno* movement was small in comparison to the *Chipko* movement outlined above, however it was very meaningful to in our study area, and signifies the ongoing tensions between the nation-state and local natural resource development rights.

Today in the case of cordyceps the story continues. Local, state and national policies both promote the collection and sale of cordyceps while also limiting access to the alpine meadows where the cordyceps are located. The government of Uttarakhand (GoU) has issued guidance about the exploitation of cordyceps. The GoU suggests that cordyceps be managed through the *Van Panchayats* with a committee of *Van Panchayats* formed to monitor exploitation and power vested in the *sarpanch* (the head of this multi-village council) (Negi et al. 2006). At the regional level the local branch of the Indian Forest Service (IFoS) patrols and attempts to enforces rules and regulations on their lands.

**Collecting Cordyceps in the Garhwal**

The interview data reveals that cordyceps have only been recently collected in the Garhwal region of the Himalaya. The majority of the collection began in 2001 when an outsider showed a local man how to find and collect cordyceps. Since its introduction to the area, the information about cordyceps has spread from one village to the next. Today almost all of the neighboring villages in the region collect cordyceps and most everyone in the local area knows about it.
Collection usually begins in May though it can start as early as April and as late as June. Collection begins when the paths to the alpine meadows, and the alpine meadows themselves, are clear enough of snow. The paths and meadows need to be mostly clear of snow. The weather also needs to be mild enough to travel at high altitude.

Collection groups gather in the early morning and travel up to the meadows where the cordyceps grow. The travel takes from between half a day to two days. Once in the meadows camps are located. Collection then takes place during the morning and afternoons, with villagers returning to camp at the end of the day. The collection of cordyceps is an important livelihood activity for many in the Garhwal as it provides crucial income for most families. A full description of the collection of cordyceps as a livelihood activity can be found elsewhere (Caplins and Halvorson, forthcoming).

The cordyceps then travel along a commodity chain from the Garhwal where it is collected to the world market. At the local level is the collector. Collectors are almost evenly distributed between male and female and include almost all ages and segments of the population. The youngest collector we found was 17 while the oldest was 60. These collectors also come from all the segments of the villages population. Scheduled caste, scheduled tribes as well as general castes are all able to participate in collection, though some are better positioned to take advantage. Once the cordyceps are collected, it is given to the head of the family to be sold.

Interview data and field observations confirmed that cordyceps can be legally sold to the government or illegally sold on the black market. All the individuals interviewed sell the cordyceps on the black market. This price the government is willing to buy at is very low. The
price on the black market may be up to ten fold the rate the one offered by the government. Because of this large price difference almost all of the cordyceps is sold illegally.

The majority of the collectors interviewed sell their cordyceps to specific cordyceps buyers. Some buyers are from the village itself, while others come to the village specifically to purchase the cordyceps.

**Accessing the Meadows: Cordyceps as the “Great Equalizer”**

A local village leader suggests that ‘Keera jari is the great equalizer.’ What this individual is suggesting is that in a culture which is historically very divided by social difference the opportunity to collect and sell cordyceps is not limited to those of a particular group (gender, ethnicity, and so forth). For instance, as Table 2 shows, there is almost an even split between males and females in the meadows collecting. Furthermore, as Table 1 also shows, the average age and years of experience collecting is almost the same between men and women. All castes/ethnicities, which in this area of the Garhwal consists of scheduled tribes, scheduled castes, and general castes are able to collect.

When we asked different collection groups who collected the most cordyceps, no particular social group emerged as being able to collect more. As Table 3 shows, out of 82 responses, 45 collection groups felt that larger families were the households that collected the most, a variable that is not dependent upon ones level of education, caste, or annual household income. Six respondents felt that no households collected more than any other, and that “everyone is average”. Some found that those who worked the hardest found the most, but again working hard, though it is a cultural construct and can be filled with locally embedded meaning,
is fairly open to all. No one suggested that a particular caste, gender, or family group found significantly more cordyceps than any other. Two respondents did suggest that the youth were able to collect more, so there could be a slight generational preference for younger collectors.

We are not claiming that it is as easy for a household from the scheduled caste to engage in the collection and sale of cordyceps as someone from the general caste, as anyone with a critical eye could argue differently. However, what local leaders assert, and we concur, is that the collection of cordyceps is one livelihood activity which is relatively open to all, and of which all different types of social categories of difference and households are able to engage in. For example, it is still more challenging for some households to engage in the collection and sale of cordyceps due to their different status within the community, but they are able to and do access the same permits, collection areas, and buyers. It is harder for some women to engage in the collection of cordyceps if they are for instance pregnant; however, the split of men to women in the fields is almost equal. Though it is surely harder for some of the lesser well off (socially and/or economically) households to engage in the collection and sale of cordyceps, when these household (or rather their members) are in the meadows searching the opportunities to actually find the cordyceps are almost equal. Searching for cordyceps is not enhanced by, for example; education, clothing, the size of phone, gender, or other either tangible or intangible resources.

Accessing the Market: The Emergence of a Cordyceps Black Market

All of our survey participants reported that their cordyceps are sold on the black market. The Forest Department is a legally sanctioned authority to purchase cordyceps from local collectors. The price offered by the Forest Department is only a fraction of the price offered by the black market, the second option for selling ones cordyceps. For example, Bhandari et al.
(2012) report that the Forest Department was offering 50,000 IR per kg while on the black market one could get between 400,000-500,000 IR per kg. In 2013 the Forest Department was offering 80,000 IR for a kg of cordyceps while on the black market buyers were paying between 600,000 and 1,200,000 IR per kg. This difference in price between what one can sell their cordyceps for openly and legally versus on the black market is vast. Given the tenfold difference in prices offered for the same commodity, all 88 of our survey respondents reported selling their cordyceps on the black market. We did not find anyone who reported selling to the Forest Department.

By offering a rate that is so low the Forest Department has created a situation where locals end up selling on the black market. It is not that locals are interested in selling on the black market per-say but for someone who is BPL (below the poverty line) this difference in income is pronounced. Two families reported that, the money that is earned for cordyceps is the only opportunity to realize cash income for the year. The price difference between the Forest Department and the black has led to the emergence of a black market for cordyceps.

Selling on the black market has resulted in a number of different problems. When asked what problems people have selling the keera jari, 15 of 88 respondents specifically stated that the police were a problem. Respondents connected the illegal nature of the trade and the police activity with the following: drops in price; the inability to sell their keera jari; concerns over getting arrested; and general worries or “tension” in regards to their ability to sell the keera jari they collected.

Perspectives on the relationship between police activities in response to the illegal selling of the cordyceps and the price one is able to get for their keera jari include the following: “buyer
not coming because police or guards come, if this happens then the price goes down;” “police problem-- [the rate] ...drops...because of police coming;” “price is lower because [of the] police problem.” These quotes shows the way that locals are making the connection between the illegal nature of the sale of cordyceps and limitations in their ability to access financial returns from the cordyceps. These local sellers feel that they are constrained in their ability to access cordyceps markets.

Perspectives in regards to buyers not coming to purchase the keera jari include: “buyer is not coming because of police problem, buyer gets arrested and money confiscated;” “worried that the buyer is not coming because its illegal;” “police problem, buyer does not come, so can’t sell;” “buyer is not coming because they get arrested so can’t come;” and “no government permission so buyers are not coming.” Again, these quotes show that the local sellers feel constrained in their ability to access cordyceps markets.

Some examples of local perspectives in regards to worries or tensions over the illegal nature of the sale of keera jari include: “police problems, lots of tension. Forest department problems [too], [we have] no permission. Forest department sometimes helps [the] police” and “buyer not coming, then sometimes they are asked to come to [the main market]. This is police types trying to catch villagers who are selling keera jari.” In other words, locals are concerned over the lack of legal access to cordyceps markets. This concern results in worry or tension in their interactions with the cordyceps markets.

Finally, at the end of the interviews, when respondents were asked if they had any final comments related to anything that was talked about, a number of people mentioned the need to legalize the keera jari. Respondents said things such as the following: “[It] should be legalized,
so can go looking for more buyers;” “in the future, need governments permission for buyers to come;” “police problem with buyer not coming, if in the future market is open then this is good;” “permit system needed for buyers to come;” “government needs to give permit for selling;” “direct sale/contact [would be good, so] not having to use a middle man (open market);” “needs to be opened for sale;” and “need to have an open market because there are lots of problems with buyers coming or not.” In other words, locals would prefer if the market for cordyceps was open to reduce the problems mentions above in regards to the illegal sale of cordyceps.

The power of cordyceps buyers is problematic in other areas of Uttarakhand, however it is not discussed in any detail in the literature. During field work, stories emerged from areas such as Pithoragarh and other regions where collection is more established. These stories focused on the power of the black market buyers- and rumors of murder of the lucrative trade exist (personal communication as recorded in the field notes).

The black market for cordyceps in this area of the Garhwal is headed by a regional business man. This man has numerous buyers who work for him. These buyers are either village residents or travelling buyers who move from village to village to purchase the cordyceps.

Travelling buyers first come during the collection season and continue to come over the months till about the New Year. Though a number of different men might travel to one village under the premise that they are all independent buyers, many times they are all working for the same head man. Buyers try to use deceit to convince villagers that they are offering a fair price. This is done by suggesting that ‘other’ buyers don’t offer a fair price. In other words, one head man orchestrates a situation where a number of different buyers come to a village and all
represent themselves as the ‘best buyer.’ This results in villagers not knowing who to trust or what a fair price is. This creates a great deal of confusion many villagers feel that they are being exploited.

Villagers are not sure what a fair price for their cordyceps is since buyers all offer different prices and for different reasons. This is demonstrated in the interview data, and reported in Table 5, where out of 87 collection group responses, 17 found the rate changes confusing and 12 are worried that they are getting cheated. Villagers expressed they concerns with getting taken advantage with comments like, “buyers...don’t know if they are maybe cheaters;” “some buyers are cheaters;” “buyer is a cheater” etc. Even when respondents didn’t specifically state that the buyers are cheaters, they find the prices offered for the cordyceps to be confusing. For example, people stated that “it’s confusing, because no fixed rate;” “it’s always changing;” “confusing, always changing;” “rate just drops without understanding;” “trouble with rate, [is it’s] not clear” etc. Furthermore 24 respondents reported that the buyers ‘grade’ the keera jari, a process which is also not clear to the sellers. ‘Grading’ entails dividing the cordyceps into categories based on some perceived quality, and offering less money for some cordyceps based on these different categories.

The black market buyers have created an unequal power dynamic between villagers and buyers. Villagers are not able to trust the buyers, and since the sale is illegal they have no legal recourse for poor treatment. There is no way for villagers to know what a fair price is or what constitutes a quality cordyceps specimen. They also don’t have any way to access reliable market information. Due to this lack of reliable information regarding the quality of cordyceps that
people have, and a fair rate for cordyceps on an open market, a number of different theories on when to sell, for how much, and to whom have arisen.

Villagers have a number of different theories for when to sell, whom to sell to, and how to sell their cordyceps. One of the most common concerns when selling ones cordyceps is the length of time that the cordyceps will remain fresh and of good quality once it is harvested. The length that cordyceps is “fresh” and does not go bad is greatly impacted by moistures levels of the atmosphere (monsoon season vs non-monsoon season) and the cordyceps itself. Post harvesting the cordyceps slowly dries. Like mushrooms, if the cordyceps is in an environment that is too moist then the cordyceps might mold or rot. However, if the cordyceps is in an environment that is conducive to drying the cordyceps is well preserved. Since the cordyceps is sold by weight, and the prices many times goes up over time, decisions as to when to sell are complex. If one waits till closer to the end of the year, then the price goes up, but since the cordyceps is drying during the wait the cordyceps will weigh less. There is also the risk that the cordyceps will get moist during the monsoon and go bad, resulting in no value. If the seller sells their cordyceps immediately, then the price offered will be less since it’s the beginning of the year, but the cordyceps will weigh more and there is less of a chance that the cordyceps will go bad.

In general, the longer one waits after the end of the cordyceps season the higher the price that the buyers offer. The first buyer might offer 6lak per kg, the second 7lak, the third 10lak and so on (a lak is 100,000). This increase in price overtime however is not a guarantee. For example, if the police is particularly active then the buyers might not come that month for fear of being caught. Or if the road condition deteriorates due to the monsoon rains then buyers might
not be able to travel to all the villages at all. Also, sometimes the buyers will offer rates that
decrease over time, perhaps if they feel that other buyers are not coming for the above stated
reasons. So when to sell and whom to sell to are very dynamic household decisions that are
based in many cases on theories and guesses with no real informational inputs.

Only four households reported that they sold to the first buyers that came to the village.
Of these four households, only two of them reported that this was due to the need for money
right away. They needed to buy food with the money. In these two families, cordyceps represents
the only income that they are able to realize in a year. The reason that these two households sold
immediately, even if they could potentially have waited to gain access to more money, was
because they desperately needed the money. When the first buyers came to the village, their need
for the money immediately trumped any other factors.

Though we did find some variation in a households ability to collect and sell cordyceps,
as was just noted with two households who sell to the first buyers due to the need for cash to
purchase food, in general a household’s ability to engage in the collection and sale of cordyceps
as a livelihood activity was generally equally. In the case of these two household that felt forced
to sell immediately in order to buy food, both of these households also reported that the
collection of cordyceps has allowed them to “go from BPL to APL” (below poverty line to above
poverty line). PBL and APL are governmental categorizations denoting the presence or absence
of poverty. In other words, though these two families were desperate for money, the collection of
cordyceps has still been accessible for them. This access is demonstrated in the households
ability to shift out of poverty.
It is clear that the ability to access cordyceps meadows and markets is important for gaining access to the benefits of this commodity. The alpine meadows where the cordyceps are collected from represent the beginning of the cordyceps commodity chain, and the traveling buyers, who travel village to village represent access to the cordyceps markets for locals. We also find that social inequality at the local level may be given an opportunity for decreasing.

The opportunity to collect cordyceps as an livelihood diversification activity is one opportunity that is relatively open to all who reside in these villages. In other words, the concern that local social inequality might be deepened or further entrenched, as was found in other studies regarding access to natural resources reviewed earlier, does not seem to be a problem in the meadows. In the meadows where collection occurs, accessing cordyceps is equally open to all social categories of difference. The collection of cordyceps as a livelihood diversification strategy might actually be able to play a role in reversing the current level of inequality in the villages.

What has resulted in unequal power dynamics is the development of an illegal cordyceps market. When locals sell their cordyceps they are subjected to unequal power relations with the illegal buyers. Due to the secretive nature of the trade, locals are not able to gain reliable market information, and don’t have any recourse if they are cheated. Locals, especially those who are in desperate need for money, are pressured into taking whatever rate is offered by these buyers.

The current structure of the sale of cordyceps results in inequality in the cordyceps commodity chain. Locals are able to access the cordyceps meadows with relative equality, however accessing the cordyceps markets results in a power dynamic between local collectors and traveling buyers. These travelling buyers are able to take advantage of those households who are more desperate for money.
A review of this case study results in three unique conclusions regarding illegal livelihoods based on natural resources.

**Communities Actively Assert their Agency to Secure Livelihood Resources**

In this case study, it is specifically shown that when people feel they have been treated unfairly, they are willing to break the law to gain access to what they perceive is their illicit right. Though the people in our study site do not regularly engage in illegal activities, they are willing to act illegally to access cordyceps and utilize what they feel are their rights to their alpine meadow resources. These households and communities feel that they have not been treated fairly, and are willing to take actions into their own hands. Though some of these communities do not have secure resource rights, they are still able to access the resource. This is a perspective that goes again a common assertion that subsistence farmers are passive, and only victims of development.

The tension, between the policies of the Forest Department and local communities has implications for Indian natural resources policies in general and conservation policies in particular. When making policies, if policy makers do not have the resources to enforce such policies, perhaps they would be better off not creating these policies. This is because, as we can see with the case of cordyceps, by creating policies that locals feel are unfair they make enemies of local people. These are the very same people that could be working towards some of the common goals which exist between local communities and the Forest Department. To be more specific, in the case of the NDBR and conservation, if locals were allowed to access the resources they need to fulfill their livelihood needs, they would not be opposed to the NDBR and its general conservation policies. As has been shown in other studies of the area, and in other geographies, locals are generally supportive of conservation. Local communities want to secure
their resources for both today and tomorrow, just as the Government of India wants to, however by viewing the locals as against conservation, or only interested in short term gain, they are placing a barrier between themselves and locals. Locals in this case support conservation, it is just the way that conservation is managed that is problematic.

On the one hand, locals help conserve the NDBR through actions such as catching and turning in animal poachers, religious festivals where locals affirm their commitment to their home and caring for the local environment, local resource measures to ensure resource sustainability. On the other hand, many locals are now engaging in activities that are in opposition to the NDBR and other conservation policies in order to secure a livelihood.

*Policies that Suppress the Local can Empower the Illegal*

The story of cordyceps demonstrates how when policies suppress local resource rights illegal actors are able to take advantage of such opportunities. Cordyceps are illegally sold on the black market, and because this sale is illegal, it cannot be controlled by the Government of India. The Forest Department does allow for the sale of cordyceps, but only at such a low rate that no-one is willing to do so. Since the black market is not sanctioned by the government it is able to operate without constraint. The results are that the local villagers are being taken advantage of with no avenue for recourse, and the black market for cordyceps is able to profit while the Forest Service is not. In fact, the Government of India is forced to expend resources on catching local livelihood actors as they collect cordyceps.

The implications of this finding suggest that policies should only be made if they are able to be enforced, and if they help to direct benefits to local people. By creating policies which are unrealistic, such as curtailing local rights to sell cordyceps openly, the Forest Department has cheated itself out of what could be a substantial profit (from the taxation of cordyceps), while
simultaneously needing to deploy limited resources to catch locals in the illegal trade. It has allowed the black market to profit in its place. Furthermore, as was discussed earlier in this section, it’s made enemies out of locals. This is particularly problematic in borderlands, where illegal activities are more rampant.

**Local Resource Rights Mediate the Ability to Profit from International Markets**

Cordyceps is a global commodity which is currently in vogue. Locals however can only profit from the highs of international markets if they are able to access local resources. Giving locals secure resource rights is one way to enable this. Cordyceps may go out of favor at some point; however another resource will most likely replace it.

The broader implications of the case of cordyceps in the Garhwal speaks to the importance of allowing people in marginal spaces (rural mountain environments in this case) to manage their own resources; and specifically NTFP/MAPs. Mountain livelihoods are widely accepted as being complex assemblages of a number of different livelihood activities. In mountain regions, taking advantage of a number of different niche environments and products is one of the main strategies for survival. Though the collection and sale of NTFP/MAPs might seem insignificant, the ability of a community to be able to exploit a particular environment or its product quickly and with confidence is one strategy for people who live in mountain environments. Mountain livelihoods are dynamic and ever-changing, and so are global markets. For rural mountain communities to be able to exploit their marginal positions, positions which uniquely places them to utilize cordyceps in a global trade, they must not be hindered in an already difficult task. Policies must enable them to use their resources for their survival on their own terms.
The reason that the Garhwal is considered a backward region by Indian scholars, and a marginal space by other academics, is not due to any inherent traits of the region. Before British control, during the height of the Himalayan trade, the Garhwal was understood to be a hub of international trade and its inhabitants were wealthy as they exploited their position as traders. Today, the people of the Garhwal are severely limited in their ability to leverage their resources. One could speculate that if the resource limitations which are currently being imposed on the region were lifted that the level of poverty in the region would decrease.

**Policy Recommendations**

The findings surrounding the collection and sale of cordyceps as noted above point to a handful of policy recommendations. These recommendations are designed to help support the current equality in access to the cordyceps meadows, and decrease the unequal power dynamics currently present in access to the cordyceps market.

*Legalize the Sale of Cordyceps*

The black market, where all of the cordyceps are sold is the sector that is profiting the most. In this instance, by making the sale of cordyceps fully legal, beyond just selling to the Forest Department, both the nation-state and local collectors can benefit. If cordyceps were legal to buy and sell on the open market, black market buyers would lose their power, the state could profit from taxing the cordyceps, and local people could sell their collection without fear of losing valuable income. When this fear of losing income is gone then the power of the black market for cordyceps will lessen.

The legalization of the open sale of cordyceps will also allow for better information flows. Currently, as was show in our data, sellers are very unsure of fair prices, and their long
term security in regards to the sale of cordyceps. Open markets allow for a much better flow of marketing information, such as the current rate that other buyers are getting. An open market would also better allow for households to scale up to the village level to try and attract more or better buyers.

Create Policies to Support the Collection and Sale of Cordyceps

Currently, in the collection and sale of cordyceps, there is relatively little difference between the ability of different castes, ethnicities, genders, and ages in accessing the benefits of cordyceps collection and sale. In order to continue this, no barriers should be put into place which would exclude any sections of the populations. For instance, if one were to make the sale of cordyceps legal on the open market, requiring the sellers fill out a lot of paperwork or travel long distances to faraway markets might begin to exclude some segments of the population. It would be helpful of policy makers ask how a policy might hurt or hinder any segment of the population before proceeding. Policies should be created that support the collection and sale of cordyceps.

A local forest department worker suggested that the market should be opened, as if the market was open then villagers could sell as an entire village, then no one would be cheated – and everyone would get a fair rate, including the nation-state if a realistic tax were enacted.

Conclusion

Our goal with this article was to present a case study that explores the ways that villagers navigate local, regional and extra local realities to gain access to cordyceps, one of the world’s most valuable natural resources, and engage in a new livelihood strategy. This case study first began by situating this livelihood diversification strategy in the broader context of conservation
and development in the region. We then explored the ability of communities to access cordyceps through an investigation of the cordyceps commodity chains. In this investigation we uncover the ways that current policies are enabling numerous positive benefits including the alleviation of poverty while simultaneously enabling the black market to also profit from the trade. We uncover how local people are in some ways transcending social categories of difference in accessing cordyceps meadows—‘the great equalizer’, but that accessing the cordyceps market proves more problematic. Finally, we have made a few suggestions on how policies can be made to help support the positive benefits of poverty alleviation and social equity, while attempting to limit the negative outcomes of a powerful black market and offer three distinct theoretical contributions. These contributions include a case study that is able to highlight the agency of communities in securing livelihoods and the implications of limiting local resource rights on both communities and illegal markets ability to profit from natural resources.

As the local populations are choosing to engage in the collection and sale of cordyceps as a new livelihood strategy, the tensions between local alpine resource rights and the priorities of the nation-state continue. Their however is a new twist to an otherwise continuing narrative of conflict between local vs nation-state priorities in regards to the development of alpine resources. Collectors and their families are able to realize great profits from the collection of cordyceps, a livelihood diversification strategy with relatively equal access in spite of the issues with regards to selling regulations as put out by the Forest Department. As was noted earlier in the paper, some households have actually move from below to above the poverty line due to this new livelihood strategy. This is an example of local subsistence farmers using their agency to choose new livelihood diversification strategies which results in notable positive livelihood benefits.
If the promotion of niche product development, such as the collection and sale of cordyceps, is to be supported by the state of Uttarakhand local people need to have full power and benefits in regards to its development. In the case of cordyceps, this means making the sale fully legal so that the black market cordyceps buyers are not able to exert control over locals. Legalizing cordyceps would also allow for a better flow of market information—and perhaps would enable locals to realize more income from the sale of cordyceps.
Map 1: Location of study site. (Cartographer Kelly Hopping)

Table 1: Village composition by household

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<th>Village</th>
<th>Estimated HH's living in village</th>
<th>Scheduled Tribe HH's (Bhotiya)</th>
<th>Scheduled Caste HH's (Not Bhotiya)</th>
<th>General Caste HH's (Not Bhotiya)</th>
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Table 2: Collectors by the numbers (N=88)

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<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Men</td>
<td>60</td>
</tr>
<tr>
<td>women</td>
<td>28</td>
</tr>
<tr>
<td>age span</td>
<td>17-60</td>
</tr>
<tr>
<td>average age</td>
<td>32</td>
</tr>
<tr>
<td>average women’s age</td>
<td>32</td>
</tr>
<tr>
<td>average men’s age</td>
<td>31</td>
</tr>
<tr>
<td>average experience</td>
<td>4</td>
</tr>
<tr>
<td>average women’s experience</td>
<td>5</td>
</tr>
<tr>
<td>average men’s experience</td>
<td>4</td>
</tr>
</tbody>
</table>

Table 3: Who collects the most? (N=82)

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>‘big families’</td>
<td>45</td>
</tr>
<tr>
<td>‘work the hardest’ (faster, further, longer)</td>
<td>25</td>
</tr>
<tr>
<td>‘most experience’</td>
<td>17</td>
</tr>
<tr>
<td>‘good eyes’</td>
<td>17</td>
</tr>
<tr>
<td>‘it’s all the same’ - everyone is average really</td>
<td>6</td>
</tr>
<tr>
<td>‘it’s just luck’</td>
<td>6</td>
</tr>
<tr>
<td>‘youth’</td>
<td>2</td>
</tr>
</tbody>
</table>
### Table 4: What problems do you have selling (N=87)

<table>
<thead>
<tr>
<th>Problem</th>
<th>Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>buyer not coming (no specific reason given)</td>
<td>30</td>
</tr>
<tr>
<td>buyer 'grades' the <em>keera jari</em></td>
<td>24</td>
</tr>
<tr>
<td>‘rate changes are confusing’</td>
<td>17</td>
</tr>
<tr>
<td>‘police problem’ (buyers not coming)</td>
<td>15</td>
</tr>
<tr>
<td>‘no problems’</td>
<td>15</td>
</tr>
<tr>
<td><em>keera jari</em> drops in value due to moisture</td>
<td>14</td>
</tr>
<tr>
<td>rate is too low</td>
<td>14</td>
</tr>
<tr>
<td>worried they are being cheated</td>
<td>12</td>
</tr>
<tr>
<td>multiple buyers coming</td>
<td>8</td>
</tr>
<tr>
<td>‘tension’ (stress of selling)</td>
<td>3</td>
</tr>
<tr>
<td><em>keera jari</em> drops in value due to police pressure</td>
<td>2</td>
</tr>
<tr>
<td>‘road problem’</td>
<td>2</td>
</tr>
<tr>
<td>‘forest department problem’</td>
<td>1</td>
</tr>
<tr>
<td>can’t sell all the <em>keera jari</em></td>
<td>1</td>
</tr>
</tbody>
</table>

### Table 5: Who do you sell to? (N=78)

<table>
<thead>
<tr>
<th>Type</th>
<th>Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>Local buyers (Villager)</td>
<td>14</td>
</tr>
<tr>
<td>Regional buyers</td>
<td>4</td>
</tr>
<tr>
<td>Nepali buyer</td>
<td>1</td>
</tr>
<tr>
<td>Anyone with a good price</td>
<td>34</td>
</tr>
<tr>
<td>Wouldn’t say</td>
<td>12</td>
</tr>
<tr>
<td>First buyer</td>
<td>4</td>
</tr>
<tr>
<td>Middle buyer (third, fourth or fifth)</td>
<td>10</td>
</tr>
<tr>
<td>Not the first buyer</td>
<td>4</td>
</tr>
<tr>
<td>Last buyer</td>
<td>3</td>
</tr>
</tbody>
</table>

### Table 6: Why do you sell when you do? (N=79)

<table>
<thead>
<tr>
<th>Reason</th>
<th>Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>That’s when the buyer comes</td>
<td>39</td>
</tr>
<tr>
<td>Best price is offered at this time</td>
<td>22</td>
</tr>
<tr>
<td><em>Keera jari</em> goes bad/drops weight if one waits</td>
<td>20</td>
</tr>
<tr>
<td>Need income right away</td>
<td>3</td>
</tr>
</tbody>
</table>
References


Gururani S (2014) Geographies that make resistance: remapping the politics of gender and place in Uttarakhand, India. Himalaya, the Journal of the Association for Nepal and Himalayan Studies 34.


Truelove Y (2011) (Re-)conceptualizing water inequality in Delhi, India through a feminist political ecology framework. Geoforum 42: 143–152.


CHAPTER 6 CONCLUSION

In this dissertation I have examined many of the social, economic and ecological facets of the collection and sale of cordyceps in the Garhwal Himalaya. More specifically, I addressed gaps in the literature surrounding cordyceps with a focus on 1) the socio-spatial geography of cordyceps collection in high elevation alpine zones, 2) the factors that shape opportunities to access local cordyceps meadows and markets, and 3) the commodity relations in which cordyceps are embedded.

I examined these gaps in the literature in a number of different ways. I delved into the policies and politics of resource rights in the alpine environments where cordyceps are found, to understand how households and communities were able to access this new alpine resource, and the implications of these policies and politics. I viewed the collection and sale of cordyceps as an emerging livelihood strategy and teased out the implications of this new livelihood strategy. Finally, I interrogated the commodity chains of cordyceps as this valuable fungus moves from the alpine meadows where it is collected to the markets where it’s sold to understand who was profiting, and who was not able to profit, from this new livelihood activity.

This chapter will summarize the broader implications of the dissertation, the limitations of the study, and further research needs. I discuss the broader implications of this study in terms of their geographic relevance. I begin by explicitly stating the empirical contributions of this study in the study region, the Garhwal, and then scale up to look at the broader theoretical implications of this study in the greater HKH region and even more generally to other mountain...
environments and/or peoples living on the margins of society both literally and figuratively. Finally, I identify the limitations of the study.

**Implications in the Garhwal**

The most important and obvious empirical contribution of this study is the finding that the collection and sale of cordyceps provides a meaningful and lucrative livelihood activity for people in the Garhwal, a rural geography were opportunities to diversify ones livelihood are limited. Furthermore, these findings point to the fact that the collection and sale of cordyceps as a new livelihood activity is especially good for those commonly less advantaged such as young females, poor households, and so forth.

The collection and sale of cordyceps is a livelihood activity that locals are uniquely positioned to exploit, and supports the culture and history of the region. Community members enjoy the work of cordyceps collection. This work occurs in the high alpine meadows which were once commonly used for grazing, religious activities, and the procurement of alpine resources. Many of these high altitude activities stopped entirely or declined significantly due to the geo-political events outlined earlier in this dissertation, however now with the collection of cordyceps these meadows are once again hubs of community activity. These historic community-alpine relationships are being renewed.

The income benefits incurred from cordyceps in the study area were overwhelmingly positive. The income supported food security, health care access, opportunities for education, long term investments and modern conveniences. The income also helped to move some families out of poverty and reduce their stress loads. This study provides empirical evidence of these
positive benefits. Even if cordyceps is no longer able to be collected and sold as a livelihood strategy in the future many of the benefits gained from its income such as home improvements, education, marriages and so forth, will continue to benefit households. These assets and resources cannot be taken away from individuals, households or families.

**Broader Implications**

This study points to the local impacts of the collection and sale of cordyceps in the Garhwal, however there are much broader implications outside this specific geography. This study like many others before it highlights the role of NTFP/MAPs for rural households. The study shows the way that an explicit spatial analysis can help uncover how people are able to access resources. Furthermore, the study demonstrates how people navigate access to local resources for their own benefit even when there is no political and/or legal support for these actions. The study also reveals how when local powers are suppressed, others (in this case the black market buyers) are able to use their power to gain benefits to these resources. Finally, the study demonstrates how local resource rights are impacted by international markets.

**NTFP/MAPs are Valuable Resources for Rural Livelihood Diversification**

Households (or rather their members) across the world rely on natural products which can be collected from their local environment to either use at home or sell. It is clear that people in the Garhwal are accessing cordyceps as a way to diversify their livelihood strategies. By doing so they have bolstered the resilience of their livelihood. The case of cordyceps is unique in the value attributed to the resources (Shrestha and Bawa 2013), however this study like many before it highlights the importance of NTFP/MAPs for rural and/or mountain livelihoods.
An Explicit Spatial Analysis can Uncover How People Navigate Access to Natural Resources

This case study shows how an explicit spatial analysis can help enhance one's understanding of how people navigate access to local livelihood resources. This dissertation looked at how people maneuver themselves spatially (along trails, in meadows) to secure access to the resources they need. The dissertation also shows how an explicit spatial analysis can expose how different villages are uniquely positioned to access particular natural resources. Finally, the dissertation hints at the implication of the scale of access. Since the communities in the Garhwal negotiate access at the village scale, access to cordyceps is secured for all members of that community. This demonstrates how by negotiating access at the community level, all the households, individuals and social categories of difference within that community also equally gain access to the resource. Access for a lower caste woman is negotiated for at the same time as access for a wealthy male. This is the specific result of the scale of the resource negotiations.

Communities Actively Assert their Agency to Secure Livelihood Resources

In this case study, it is specifically shown that when people feel they have been treated unfairly, they are willing to break the law to gain access to what they perceive is their illicit right. Though the people in our study site do not regularly engage in illegal activities, they are willing to act illegally to access cordyceps and utilize what they feel are their rights to their alpine meadow resources. These households and communities feel that they have not been treated fairly, and are willing to take actions into their own hands. Though these communities do not have secure resource rights, they are still able to access
the resource. This is a perspective that goes again a common assertion that subsistence farmers are passive, and only victims of development.

The tension, between the policies of the Forest Department and local communities has implications for natural resources and conservation policies. When making policies, if policy makers do not have the resources to enforce such policies, perhaps they would be better off not creating these policies. This is because, as we can see with the case of cordyceps, by creating policies that locals feel are unfair they make enemies of local people. These are the very same people that could be working towards some of the common goals which exist between local communities and the Forest Department. To be more specific, in the case of the NDBR and conservation, if locals were allowed to access the resources they need to fulfill their livelihood needs, they would not be opposed to the NDBR and its conservation policies. As has been shown in other studies of the area, and in other geographies, locals are generally supportive of conservation. Local communities want to secure their resources for both today and tomorrow, just as the Government of India wants to, however by viewing the locals as against conservation, or only interested in short term gain, they are placing a barrier between themselves and locals. Locals in this case support conservation, it is just the way that conservation is managed that is problematic.

On the one hand, locals help conserve the NDBR through actions such as catching and turning in animal poachers, religions festivals where locals affirm their commitment to their home and caring for the local environment, local resource measures to ensure resource sustainability. On the other hand, many locals are now engaging in activities that
are in opposition to the NDBR and other conservation policies in order to secure a livelihood.

*Policies that Suppress the Local can Empower the Illegal*

The story of cordyceps demonstrates how when policies suppress local resource rights illegal actors are able to take advantage of such opportunities. Cordyceps are illegally sold on the black market, and because this sale is illegal, it cannot be controlled by the Government of India. The Forest Department does allow for the sale of cordyceps, but only at such a low rate that no-one is willing to do so. Since the black market is not sanctioned by the government it is able to operate without constraint. The results are that the local villagers are being taken advantage of with no avenue for recourse, and the black market for cordyceps is able to profit while the Forest Department is not. In fact, the Government of India is forced to expend resources on catching locals as they collect and sell cordyceps.

The implications of this finding suggest that policies should only be made if they are able to be enforced, and if they help to direct benefits to local people. By creating policies which are unrealistic, such as curtailing local rights to sell cordyceps openly, the Forest Department has cheated itself out of what could be a substantial profit (from the taxation of cordyceps), while simultaneously needing to deploy limited resources to catch locals in the illegal trade. It has allowed the black market to profit in its place. Furthermore, as was discussed earlier in this section, it’s made enemies out of locals. This is particularly problematic in borderlands, where illegal activities are more rampant.
Local Resource Rights Mediate the Ability to Profit from International Markets

Cordyceps is a global commodity which is currently in vogue. Locals however can only profit from the highs of international markets if they are able to access local resources. Giving locals secure resource rights is one way to enable this. Cordyceps may go out of favor at some point; however another resource will most likely replace it.

The broader implications of the case of cordyceps in the Garhwal speaks to the importance of allowing people in marginal spaces (rural mountain environments in this case) to manage their own resources; and specifically NTFP/MAPs. Mountain livelihoods are widely accepted as being complex assemblages of a number of different livelihood activities. In mountain regions, taking advantage of a number of different niche environments and products is one of the main strategies for survival. Though the collection and sale of NTFP/MAPs might seem insignificant so some, the ability of a community to be able to exploit a particular environment or its product quickly and with confidence is one strategy for people who live in mountain environments. Mountain livelihoods are dynamic and ever-changing, and so are global markets. For rural mountain communities to be able to exploit their marginal positions, positions which uniquely place them to utilize for example cordyceps in a global trade, they must not be hindered in an already difficult task. Policies must enable them to use their resources for their survival on their own terms.

The reason that the Garhwal is considered a backward region by Indian scholars, and a marginal space by other academics, is not due to any inherent traits of the region. Before British control, during the height of the Himalayan trade, the Garhwal was understood to
be a hub of international trade and its inhabitants were wealthy as they exploited their position as traders. Today, the people of the Garhwal are severely limited in their ability to leverage their resources. One could speculate that if the resource limitations which are currently being imposed on the region were lifted that the level of poverty in the region would decrease.

**Study Limitations**

This study was limited due to language differences, my positionality, the ecology of cordyceps, and the secretive nature of cordyceps collection and sale. My inability to understand and communicate in Garhwali, the local language, heavily shaped the information I was able to learn. Furthermore, my long standing relationship with many of these rural mountain communities, coupled with my status as an outsider, greatly influenced the opportunities I was afforded in gathering information regarding cordyceps collection and sale.

There are gaps in the literature regarding the ecology of cordyceps. The dynamic nature of the cordyceps regarding its need for a host species and underground habitat make its study challenging. There is currently only limited empirical data to guide our understanding of the impacts of collection on the reproduction of the organism—and to inform sustainability concerns. More ecological data focused on the fungi’s biogeography over time could be used for informing resource use.

The study was also greatly limited due to the secretive nature of cordyceps collection and sale. Given the nature of collection and sale, that virtually all collectors and sellers were at some point acting illegally, I was unable to get a representative sample of collectors. My study
attempted to mediate this limitation as best as possible, however a representative sample would be superior, especially in understanding the implications for social categories of difference.

I was also not able to interview any of the cordyceps buyers. Again, all of the buyers were acting illegally and in some cases were controlled by a local black market organization, so gaining access to them was not possible. Gaining a better understanding of how these illicit commodity chains operate could help to infer some trends in regards to collection numbers but also where the majority of the benefits rested. In other words, who benefits the most, the local collectors, the local buyers, the regional buyers and so forth?

**Future Research Needs**

As was noted earlier, we desperately need cordyceps collection data over time. This data would be best if it come from the community itself with the support of a scientist. The communities are currently managing their own permit systems, and could if they choose to collect their own collection data. In fact, given the secretive nature of cordyceps the communities are probably the only ones that would actually be able to collect such data. Any outside entity would be seen as a threat (some more than others) and a full disclosure of collection numbers would be unlikely in such a case. Villagers already know where each other collect, and so shrouding ones actions, or under-reporting would likely occur at a much lower rate within the village context.

There also needs to be a locally led regional project regarding the resource’s sustainability. This needs to occur at the grass roots level, with village councils meeting with neighboring village councils. This activity could follow a participatory research model where
those currently experimenting with different conservation activities could share with each other. Sharing of this nature is important, due to the relative newness of the resource. Communities across the region are dealing with the same issues, and trying different techniques. The region is large and diverse, but some areas are having success in their collection practices, and could offer lessons learned and suggestions to others. There is a need to assess these diverse and emerging efforts to monitor their effectiveness and help develop sustainable collection arrangements. Are these efforts effective at meeting collection objectives and maintaining sustainable cordyceps populations?
References (Chapters 1, 2 and 6)


14: 428–436.


O’Reilly K, Dhanju R (2010) “Your report is completely wrong!” (aapkii report ek dum


