“COCK-A-DOODLE-DO!” A CLIMATE CHANGE ALARM

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ABSTRACT

This dissertation is for Master of Education in Environment Education and Sustainable Development, Kathmandu University, Nepal.

Abstract Approved by Assoc. Prof. Bal Chandra Luitel Suresh Gautam
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This study inquires: What are lived climate change experiences of Rai people of Champe? How are their health, their domestic animals' health and crops' yield affected by warming of temperature? Has there been any threat to farmers; subsistence or cash crops? What are the impacts of climate change on other socio-cultural and ecological units of Rai society? How does indigenous knowledge system of food security support Rai people to build climate resilience? I soaked into lived experiences of Rai people and interpreted those experiences for better understanding of interrelationship among climate change, Rai people, their socio-cultural and ecological entities and indigenous knowledge for food security. Using hermeneutic phenomenology I began problematizing the issue of climate change in indigenous Rai people along with my autobiographical experiences. Using narrative inquiry I collected and generated my data. Also, I used various metaphors like *Khola, Rato Bhale*, tiger, *khetala, bhakari, koseli* et cetera for metaphorical discourse. Guided by anthropogenic global warming theory and Habermas' practical interest, I reflected my own experiences and understandings of various climate change phenomena. I attempted to portray lived experiences of Rai people to perceive climate change fundamentally based on their lifeworld. Finally, I discussed the existing indigenous knowledge of food cultivation, harvesting, storing and preserving together with the environmental ethics orally transmitted through folktales.

DEDICATION

For my late *fupa* who taught me my very first steps…

DECLARATION

Hereby, I declare that this dissertation has not been submitted for the candidacy of any other degree.

July 12, 2013

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A dissertation of Master of Education in Environment Education and Sustainable Development has been submitted by Vijaya Tamla and presented on July 12, 2013 at Kathmandu University School of Education.

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I understand that my dissertation will become a part of permanent collection of Kathmandu University Library. My signature below authorizes to release of my dissertation for any academic purpose.

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Vijaya Tamla

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CHAPTER I

A HOME CALL; BACK TO CHAMPE AND MY PEOPLE

It was one cold dark dawn of December 1991. Cocks that always did Cock-A-Doodle-Do right before the first streak of sunlight stroked on our tin's roof cleaving the darkness were quiet then. I was sleeping in our new tin roofed house; as our aged ancestral thatched house had by 1989's earthquake, in Kunakharka[1]. The gossips and laughter bursting in between people gathered at our courtyard woke me up. It was chilling cold, so I covered myself with quilt, curled my body like a snail in its shell and tried to sleep ignoring the voices outside. But, the noise did not let me take a nap. When I spread my hands while getting up, I usually found my fupa[2]beside me. But, that morning, in the faint light of tuki[3], after rubbing my eyes twice with my little fists I saw him fastening laces of his 'dukuni[4]' and hastily climbing downstairs following the voices.

Three types of cattle sheds we had. First one was buffalo shed; thirty four buffalos were untied and lined up five herds guarding them while marching down. Second one was cow shed; sixteen cows and ten oxen pairs were similarly lined up and moved. Finally along with those cattle we reached the third shed where about eighty sheep were reared. The captain of the sheep with bell hung in its neck was lined up at the first followed by its population. I, hanging on fupa's fore finger turned

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[1] *Kunakharka* is a village in Sworyang, ward number two of Champe VDC (Village Development Committee). It literally means 'In a Corner'

[2] *Fupa* means grandfather; also referred as *Kopa*

[3] *Tuki* is traditionally a kerosene lamp. But, nowadays it also refers to a led lamp rechargeable from solar

[4] *Dukuni* is waist coat woven by *muma* from sheep's wool

back, mimicking him, leaned my head towards left and observed at the cattle marching down the hill following our lead. There were men, women and children in between the cattle ship. We all were marching towards Roktuma besi[5]*.*

By carefully crossing rivers and streams we reached 'dera'[6] *in besi. In winter, the rivers had lesser volume and current, else, a swift river could sweep away wooden bridge, cattle, and weak person who dared to cross the river through its bosom.*

"STRAIGHT TO ARUN[7]*!"*

My fupa had warned me against swimming or crossing any river during monsoon. He used to carry me on his shoulders, holding me with left hand and a long bamboo stick for support with right hand while crossing rivers. I used to grasp his hairs tight. I never feared river current before, until I had witnessed kaila depa[8]*'s eldest son jumping down the waterfall and never returning back, "Straight to Arun" reverberated in my ears.*

Last winter, when I visited my village for my fupa's barkhanta[9]*, we had to buy milk from our neighbors to prepare rice pudding and search for Rato Bhale*[10] *for sacrificing during ritual in the whole village. Once, we used to have abundant number of cows, buffalo and cocks at home. From the milk, fupa used to prepare milk products; curd, ghee and sell in market. In two decades, everything changed. There were few chickens, a couple of pigs, a buffalo and a pair of oxen. Nevertheless, while*

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[5] *Besi* is lower alleviation or basal area of a hill

[6] *Dera* is shed built near farm for temporary settlement during farming season

[7] *Arun* is one of the tributaries of Sapta Koshi, the largest river of Nepal

[8] *Depa* is uncle older than one's father or father's elder brother

[9] *Barkhanta* means annual ritual done in memory of deceased family member

[10] *Rato Bhale* literally means a Red Cock. However, it is used metaphorically

sitting on radi and pakhi[11], once made by muma[12], I became nostalgic of my ecstatic childhood days.

A community tap has been constructed near our home so we do not need to travel miles to fetch water from river anymore. But, the ferocious river had turned into a feeble brook. I saw children fearlessly crossing it unlike us in back days, the howling of the river used to scare us the most. Perhaps except during flash floods nothing would reach 'Straight to Arun' like fupa used say, I thought beholding at the bosom of Lale Khola. As I walked along the bank of Lale Khola, I saw springs that fed the river drying. Then and there a question stroked my mind, "How long would the brook turned river meet the water demand of the villagers?"

Background: Moving Champe

I was born in Kunakharka, Champe 2, Bhojpur district. This region is in eastern hilly part of Nepal. Many changes have occurred in my village in last two decades. Some of the changes might be due to whim of '*bikas*[13]' such as construction of agricultural roads linking villages to Bhojpur headquarter and other districts, entry of diesel mills, electricity wires and introduction of advance technologies; televisions, cellular phones and internet or decade long Maoist insurgency when rural villages like ours were mostly affected politically, economically and socio-culturally. However, some of the changes such as change in precipitation pattern and volumes of rivers have definitely occurred due to climate change and global warming.

Changing Climate; a Boon or a Curse

Change is a dynamic process. To stop change is an inevitable task. With the passage of time there is always a change in every global and local aspect; whether it is

[11] *Radi* and *pakhi* are mats traditionally prepared from sheep's wool

[12] *Muma* is grandmother also called *koma* in *Dungmali* language

[13] *Bikas* is a Nepali word for 'development'

ecological, social, political, technological or economical. In the later decades there has been a paradigm shift in the global phenomenon. Globalization has been accelerated by the development of socio-cultural, political, economic and political interlinks (Hamilton & Webster, 2012). Although the whole world has turned into a small global village, there have been various challenges associated with the advancement of global scenario. One of the burning challenges is climate change.

Lately 'climate change' has become a buzz word in global scenario. The reports of Intergovernmental Panel on Climate Change, the scholarly studies of scientific society, and tangible evidences indicate that climate change is becoming one of the greatest threats for life on earth. For my Masters dissertation, I chose to conduct a research incorporating the issues of climate change, Rai people and their indigenous knowledge of food security for climate resilience.

Climate change is an environmental change of any scale that spontaneously changes the functions of local system and affects the earth system. No matter how much a person tries, s/he cannot deny the fact that certain changes are on-going both in local and global level by either natural or artificial processes.

Indigenous People and Their Indigenous Knowledge for Climate Resilience

Champe is a village of multicultural, multilingual, and diverse country, Nepal. Fifty nine indigenous nationalities are legally recognized with distinct language, religion, customs, folklore, culture, knowledge and ancient territory in Nepal. There are still groups of indigenous people beyond the right to affiliate on the federation (NEFIN, 2005). Indigenous nationalities of Nepal are supposed to be discarded from main streams of national plans and policies. They seem to be legally abandoned from their historical natural heritages, biodiversity, traditional foods, medicines, agro-biodiversity, skills, technology, knowledge, customary values, traditional ethnics and

sacred sites. Indigenous peoples are contributing own cultural wisdom on restoration, conservation, and wise use of biodiversity, natural resources, and traditional knowledge associated with their life from time immemorial. They have been providing ecosystem services.

Indigenous and other traditional people are rarely considered in academic, policy and public discourses on climate change, despite the fact that they will be greatly impacted by impending changes (Salick & Byg, 2007). Indigenous communities which rely upon traditional ways of living are vulnerable to the impacts of climate change. The contribution that indigenous knowledge and farmers' innovation make in the context of food security cannot be underestimated (Woytek, Prasad, & Mehta, 2004). Indigenous communities have historical account on climate change. Therefore, indigenous knowledge systems may possess valuable lessons regarding successful climate change adaptation strategies for food security, ecosystem management and water resource management. The indigenous knowledge must not be ignored by academia, plans and policy makers and general public.

We, Rais are one of the twenty four indigenous hilly nationalities of Nepal (NEFIN, 2005). Anthropologists suggest that Rai belong to Kirants of Tibeto-Burmese origin. Therefore, Tibeto-Burmese dialect can be noticed in the language of Rai. Although *Mundhum* is the holy text of Kirants, Rais are multi ethno linguistic groups. Rai worship mother-nature. Our major occupation is agriculture followed by textile. We widely celebrate *Udhauli* during fall and *Uvauli* during spring. These festivals are observed to mark seasonal change, farming pattern, migration of birds and animals and to pray and thank earth for good crops.

Pest management knowledge of Rais is one of the examples of environment friendly indigenous knowledge. Mewahang Rai has indigenous knowledge of pest

management (Sherpa, 2005) that is heavily depended upon in areas where chemical pesticides have yet not reached. Common pests such as stem borer (i.e., *chillozonellis*) attack stocks of wheat and maize. The grounded pulp of the *Khira* leaf is spread on the wheat crop and the scent of the pulp kills the pests. For pest control in paddy, through the irrigation channel the pulp is introduced into the paddy field. In the case of specific pest attacks, like the rice moth which creates clusters of rice on paddy, they are combed out with sticks and the moths deposited in the water; to ensure decomposition, the process is carried out in sunlight. In case of maize, the dried disease-infected stalks are manually removed.

Climate change could have a serious threat on the traditional practices of indigenous Rai people. At the same time, indigenous practices could be suitable for building climate resilience as they could be more environmental friendly and use locally available means and resources.

Forming My Problem Statement

I am highly motivated by three personalities; Al Gore, the former vice president of United States of America, Iman Singh Chemjong, a Kiranti historian, linguist, folklorist, lexicographer, writer and philosopher, and my *fupa*. *Fupa* is not an international or a national figure recognized by the world but his contributions for social reformation in our village have immortalized him even after his demise.

When ‘Climate Change’ was regarded as the greatest hoax by Bush cabinet Al Gore did not stop his climate change campaign across the world. In 2007, he shared the Nobel Peace Prize with Intergovernmental Panel on Climate Change (IPCC). Similarly, Chemjong was one man army to collect an arsenal of religious and cultural histories of Kirants at a time when such activities were discouraged by the monarch of Nepal. Like Chemjong, my ambition is to make the discarded indigenous knowledge

on coping climate change counted by the nation. Through the lenses of *fupa*, I could experience each phenomenon of my study; perception, climate change and indigenous knowledge differently enhancing my own conscious awareness.

According to Forster, et al. (2007) Methane, one of the principle greenhouse gases has significantly increased by human activities related to agriculture. Probably my *fupa* did not know about greenhouse gases such as Methane and its major biogenic sources; rice cultivation, biomass burning and ruminant of animals. We, the Rai people of Champe are highly dependent upon agriculture and animal husbandry. So, we are contributing in production of Methane. Similarly, our dependency on forest for firewood contributes in Carbon emission. Thus emission of greenhouse gases ultimately leads to climate change. However, Nepal's total greenhouse gas emission contributes 0.025% of total global emission only but we are equally facing the consequences of climate change (CCNN, 2010).

According to the Third Assessment Report from the Intergovernmental Panel on Climate Change (IPCC, 2001), the planet is already experiencing climate change impacts on biodiversity, freshwater resources and local livelihoods. Using present climate change trends, by 2100, the average global temperature may rise by 1.4 ˚C. to 5.80˚C. Similarly, according to the Department of Hydrology and Meteorology, Nepal's annual rise in temperature in between 1977 and 1994 was about 0.06^{o}C and that in between 1976 to 2005 is 0.0597^{o}C (as cited in CCNN, 2010). Global and local rise in temperature adversely affects precipitation pattern. Precipitation and agriculture are interlinked for subsistence farmers like Rai people. Wouldn't the socio-economy adversely affected?

Likewise, while dealing with the climate change issues and indigenous Rai people myriad questions arise. For example; with the continuity of climate change

which has been accelerated by anthropogenic activities will we, indigenous Rai people be able to continue our traditional social, cultural and economic practices? What sort of significant indigenous knowledge is held by Rai people to adapt and mitigate climate change? If there are some significant indigenous knowledge and techniques, why are those knowledge and techniques not brought in mainstream of policy formation? What roles can indigenous knowledge play for climate resilience?

My Research Questions

This study aims to understand the perception and understanding of Rai people regarding the phenomenon, 'climate change' based on their socio-cultural and ecological experiences. May be Rai people are vulnerable to climate change. Finally, this study intends to highlight those indigenous knowledge and techniques which have been locally practiced and benefited the local community. There are myriad issues intertwined to climate change and indigenous people. It would be near to impossible to explore the entire agendas. Thence, following research questions are set up to meet the specific errands.

- What sort of lived experiences about climate change do Rai people have?
- How has climate change affected socio-cultural and ecological dimensions (e.g.; lifestyle, health, agriculture, social dis/harmony) of Rai people?
- How does indigenous knowledge of food security of Rai people support climate resilience?

Rationale of my Study

I have chosen three major foundations for this research study; contribution to knowledge, policy reformation and my own satisfaction.

Knowledge Contribution

In least developed countries like ours, adequate researches are yet to be done. I believe that once the climate change vulnerability of indigenous people and their present indigenous knowledge to tackle climate change are identified, mitigation and climate resilience becomes easier at grass root level. Indigenous people might be coping with climate change even before the globe realized that climate change is really happening!

Indigenous knowledge systems are applied in climate change mitigation and adaptation in Africa (Nyong, Adesina, & Elasha, 2007). Similarly, Rais of Champe might have developed local strategies for adaptation to reduce their vulnerability to climate variability and extremes. Or, they might have been taking benefits of climate change in agriculture. There might have been wealth of traditional knowledge being passed from one generation to another for prediction of weather and climate in Rai community. A region deprived of a functioning meteorological station, might not be deprived of local knowledge which could help in prediction and forecasting of event. Such forecast could warn the local people. Once the research is carried out and Indigenous knowledge systems of Rais are identified, it would definitely contribute in knowledge identification.

Moreover, it could open many other research doorways to this region for Climate change and indigenous knowledge. It would contribute to the sustainable development issues (i.e., incorporating Indigenous knowledge in environmental management, protecting vulnerable communities against climate change hazards).

Policy Reformation

The two MDGs, ‘Poverty alleviation’ and ‘Environmental Sustainability’ cannot be achieved by Nepal unless the issues of climate change vulnerability of

indigenous people are well studied. In most of the VDCs like Champe, Government of Nepal lacks climate change resilience mechanism increasing the vulnerability of country people. Indigenous people like Rai become more vulnerable to climate change risks than any other communities.

This research intervenes into the experiences of indigenous Rai people, the impacts of climate change on their socio-cultural, and ecological aspects of livelihood, vulnerability and indigenous coping strategies. This research makes meaning of the lived experiences of indigenous people regarding climate change. It echoes the unheard voices of Rai people of Champe as local perceptions and indigenous knowledge barely become the focal point of local or national level policy formation.

This research to some extent intervenes into the government's unilinear planning and policy formation and implementation for climate change adaptation and mitigation. It tries to aware the planners, developers, scientists and policy makers about the indigenous sovereign to save indigenous ways of life and cultural norms. Thence, such indigenous knowledge systems could be integrated into formal mitigation and adaptation policies of Nepal.

Personal Justification

By being able to identify and share about the indigenous knowledge system, socio-economic, cultural and ecological impacts of climate change in the livelihood of Rais and their lived experiences, I feel self-satisfaction. It is my great pleasure to be able to make some contribution towards my community.

Chapter Summary

Climate change has become a subject of my interest due to various factors; from my personal experiences of drying rivers in my countryside to global concerns

regarding its scientific statistical evidences of the uneven rise in temperature, rapid extinction of species, threats to aboriginal communities, death tolls due to heat waves, flash floods, drought and other disasters. Based on our academic courses, everyday news about the consequences of climate change and my personal experiences of it, I choose to study how climate change and Rai people are communicating with one another.

It majorly invites socio-ecological challenges in the livelihood of people. Indigenous or aboriginal people who have less political and socio-economic advantages are more vulnerable. My major objective is to understand those changes and challenges through the living experience of Rai people. Long before the development of modern science, which is quite young, indigenous peoples have developed their ways of knowing how to survive and also of ideas about meanings, purposes and values (Magga, 2005). Therefore, I opt to understand the climatic experiences of Rai people, impacts of climate change on their livelihood, identify their vulnerability to climate change risks and their indigenous coping strategies against climate change.

CHAPTER II

REVIEWING LITERATURE

An Overview of this Chapter

Climate change became my vivid field of interest during the Conference of Parties COP 15 being held in Copenhagen, Denmark in 2009. I began reading the newspaper articles dealing with climate change issues and COP meetings. After joining EESD in Kathmandu University, we dealt with numerous issues of global climate change; its evidences, its causes; natural and anthropogenic, its impacts on biodiversity, human health, water resources, agriculture, food security, forests, et cetera ways to adapt and mitigate it to reduce vulnerability, global and local efforts to address the issue. The lessons we dealt in courses like Global Change (EESD 502), Fundamentals of Ecology, Environment and Sustainable Development (EESD 501) and Global Climate Change and Sustainable Development (EESD 508) helped us to build a concrete concept of Climate Change, Ecosystem Services, Biodiversity conservation, Indigenous Knowledge.

How to conduct literature review for my study? I was confused. On consulting one of my professors, I first encountred 'Getting started reviewing literature' by Bryman (2008). He says that the existing literature is reviewed to know what is already known about the researcher's area of interest so that s/he would not simply 'reinvent the wheel'. I also did online-surfing to clear my concept on 'literature review'. I found concise concept on literature review on an online library of University of California Santa Cruz (UCSC, 2010). The UCSC University Library (2010) defines literature review as surveys of scholarly articles, books and other sources (e.g. dissertations, conference proceedings) relevant to a particular issue, area

of research, or theory, providing a description, summary, and critical evaluation of each work. The purpose is to offer an overview of significant literature published on a topic.

Thus, I surf websites of trusted organizations like World Bank, United Nations Framework Convention on Climate Change (UNFCC), Intergovernmental Panel on Climate Change (IPCC), Nepal Federation of Indigenous Nationalities and peer reviewed articles relevant to climate change and indigenous community in Kathmandu University Library and online journals like Emerald and Springerlink to explore existing research paradigms, theories, perspectives, methodologies, data collection tools and techniques, government policies and projects carried out on the field of my interest, enrich the concepts of my research title. They help me avoid spinning the same wheel of research.

Thematic Review

I am attempting to generate meaning out of three phenomena through this research; first, the experiences of Rai people about climate change, second, the impacts of climate change on socio-cultural chains among Rai People and their environment and thirdly, the indigenous knowledge of food security of Rai people for climate resilience.

Socio-cultural and ecological vulnerability. Vulnerability is an aggregate measure of human welfare that integrates environmental, social, economic, and political exposures to a range of harmful perturbation (Bohle, Downing, & Watts, 1984). One of the foci of my study is socio-ecological vulnerability of Rai people due to exposure to climate change. Vulnerability is the degree to which a system is susceptible to or unable to cope with adverse effects of climate change (IPCC, 2001). Similarly, Vogel and O'Brien (2004) regard vulnerability as a dynamic differential

concept dependent on time and space, (as cited in TERI, 2010). These characteristics of vulnerability provide me a concept that climate change risks faced by Rai people could be different from other regions due to topographical difference. Also, their coping strategies may vary from other indigenous groups. My units of vulnerability analysis are individuals, families and communities of Rai people. Similarly, I am aware that along with the passage of time the colors of vulnerability could be different. During the identification of vulnerability of Rai people on socio-economic and cultural aspects, some of the relevant criteria of IPCC like magnitude, timing, persistence and reversibility, distribution of impacts, and potential for adaptation seem lucrative.

Indigenous knowledge. I wondered what roles Indigenous Knowledge System could play in achieving Millennium Developmental Goals. I found each of the goals linked with environmental condition of a country. In the words of Woytek, Prasad, and Mehta (2004) there is not one of the Millennium Development Goals to whose achievement indigenous knowledge cannot contribute. Despite of the immense ability in indigenous knowledge, it has been excluded from the mainstream policies.

These literatures convinced me that the information held by Rai people is valuable in terms of knowing the local perspectives on climate change. If their indigenous knowledge is explicitly explored, meaningful lessons could be learnt. The lessons could be one of the potential measures to achieve MDGs of Nepal like poverty alleviation and environmental sustainability.

Theoretical Review

Theory provides backbone to a research. While conducting theoretical review, I came across various research philosophies; positivism, post-positivism, interpretivism, criticalism, postmodernism, and integralism. I incline towards using

interpretive theories to analyze the perception and experiences of Rai people on climate change. The most relevant paradigm I discovered for my research is interpretivism driven by 'practical interest'. Likewise, I apply climate change theory along Habermas' theory of practical interest.

Climate change theory: anthropogenic global warming. Anthropogenic global warming theory is the most widely known climate change theory (Bast, 2010) that claims greenhouse gases, primarily Carbon Dioxide, Methane, and Nitrous Oxide emitted due to human activities as the dominant causes of global warming in last five decades. Although, there are many other climate change theories based on solar variability, ocean currents, bio-thermostat, planetary motion (Bast, 2010) and cosmoclimatology (Vardiman, 2008); a new climate change theory denounce anthropogenic global warming theory, however, those theories are merely concentrated on limited aspect of climate change. It would be futile to increase emission of greenhouse gases, claiming the gases not being responsible for dramatic rise in temperature and playing the blame game pointing towards animated objects like 'solar variability' or 'ocean current' or 'planetary motion'. Don't these latter theories that claim Carbon emission and increase in Carbon concentration in atmosphere do not have any relation with global warming fulfill the interests of countries like the U.S.A. and Australia who emit excessive Carbon by fossil fuel combustion at high rate for economic growth at the cost of ecological degradation? Cannot we become accountable towards consequences of anthropogenic activities on environment, and attempt to decouple economic growth and environmental degradation?

Anthropogenic global warming theory makes us accountable for our own misdeeds. This theory suggests that artificial greenhouse gases are responsible for

floods, droughts, severe weather, crop failures, species extinction, spread of diseases, ocean coral bleaching, famines, and other hundreds of calamities (Bast, 2010). Al Gore in An Inconvenient Truth and scientists associated to IPCC advocate this theory. Moreover, Al Gore regards 'anthropogenic global warming' not just a theory but fact (Guggenheim, 2006). The reason I choose this theory is; its way of being critical towards anthropogenic actions and ourselves; *Homo sapiens sapiens*!

Theory of practical interest. Practical interest is one of the three Habermas' interests of knowledge. Jurgen Habermas is a German philosopher of twentieth century who influenced the whole world. According to Habermas (1974) the 'practical' interest, an attenuation of the positivism of the scientific method, is exemplified in the hermeneutic interpretive methodologies outlined in the qualitative approaches earlier (e.g. symbolic interactionism). Here research methodologies seek to clarify, understand and interpret the communications of 'speaking and acting subjects' (as cited in Cohen, Manion, and Morrison, 2007).

The practical interest is driven by interpretive and communicative process. Bohman and Rehg (2011) mentioned that interpretive or cultural hermeneutic sciences reside on 'practical interest' to secure and widen the possiblities of symbiotic understanding in conduct of life. The interpretive process helped me to get into inter-subjectivity of climate change and indigenous people. This philosophy goes beyond the positivist accounts of natural and social sciences.

In the words of Grundy (1987) the practical interest is a fundamental interest in understanding the environment through interaction based upon a consensual interpretation of meaning (as cited in Butler, 1997). Unlike technical interest that focuses on establishing control through action on the environment, practical interest focuses on understanding and meaning making through action with the environment.

Unlike emancipatory interest that seeks autonomy from the environment, in the search of complete freedom practical interest does not abandon the pragmatic aspects.

Bliss, Monk, and Ogborn (1983) believe that action in practical interest is represented by two processes with research purpose of meaning making and communicating the complex environment (as cited in Smyth, 2006). According to Miles and Huberman (1994) the first process is to derive a relational network that provides wide scope of thinking about the research and conceptualizing the problem. Second, it provides a means to record, code, search, condense, and link ideas and data so that deeper connections can be revealed as a researcher's analytic progression moves from lower to higher levels of abstraction, from the initial conceptualization through to the articulation of the conclusions (as cited in Smyth, 2006). Smyth (2006) says that tentative conceptualizations inform the research design and data gathering processes with successive analysis informing the conceptualizations as a researcher interprets the data and makes meaning from it. He further argues that to establish conformability and remain consistent with the practical interest, instead of acting in isolation with preconceived expectation a researcher regards the data as the source of the study's findings. Thus, practical interest is a prerequisite for my research as it guides the interaction between my research participants as researched and me as researcher to form a foundation of understanding and knowledge.

Review of Previous Research Studies

In recent days, the role of traditional ecological knowledge systems created by indigenous people is subject of interest to many researchers. Traditional agricultural landscapes and community conserved areas, a journal article by Brown and Kothari (2011) deals with the traditional agricultural landscapes built by the indigenous people through dynamic interaction with nature over time. The purpose of the study

was to explore questions related to special values of the traditional agricultural landscapes and indigenous community.

Nyong, Adesina, and Elasha (2007) argue that developmental projects that are launched in rural communities with an expectation of positive impacts on their lives often neglect the local perception, local participation and local culture. According to them, indigenous knowledge system adds values in climate change studies in number of ways like facilitating efficient communication to disseminate and utilize climate change mitigation and adaptation options, providing platform and mechanisms for participatory approaches, resemblence with scientific methods, et cetera. Most importantly, I was stunned by the fact that inhabitants of Sahel, Africa adapted to extreme climatic conditions that even exceeded the predictions of IPCC models over the years. Similarly, who knows? Rai people have also been doing the same, however unnoticed!

Tsosie (2007) in her journal article 'Indigenous People and Environmental Justice: The Impact of Climate Change', advocates that indigenous people are deprived of their right to environmental self determination. Rather than being enforced the policy and regulation of the government in the name of climate change mitigation strategy, indigenous people should also be provided a share in order to mitigate the catastrophic harm. Tsosie denounces the international dialogue on climate change that focuses on a strategy of adaptation and mitigation to climate change through projected removal of entire communities, if required. Therefore she claims such strategies as genocidal to indigenous culture, tradition, politics and entire groups of indigenous people. Her research article is critical towards the sterotypic policy formation by federal governments. Although, I won't be conducting this research too critically, on reviewing her article, I became aware of the fact that

indigenous people are even forced to evacuate their traditional land for so called mitigation to climate change catastrophe. Is it just to remove indigenous people from their own land? Isn't it violation of human rights to disrespect the soveriegn of indigenous people to determine for their traditional ways of living, socio-cultural, economic and political practices? Afterall, indigenous people have least share on this human induced climate change.

Similarly, one of the key conclusions of Bhadwal (2010) is that the agriculture sector is one of the key sectors of focus because it bears large sensitivities in terms of changes in weather patterns, nature of socioeconomic implications associated and large scale concerns that relate to the availability of food.

Salick and Byg (2007) say that indigenous people are regarded as valuable source of information about the experiences of climate change at local level. According to them climate models based on computer can only paint the bigger picture of climate change and provide estimates for the likely consequences of different future scenarios of human development, they are not very good at providing information about changes at the local level.

After going through 'Indigenous Peoples of Nepal and Traditional Knowledge' by Sherpa (2005), I became aware about rich traditional knowledge held by indigenous Nepali people. His article presents twelve distinct traditional knowledge regarding pest management, weed control, cross breeding of Animals, labour exchange, *Pongmar* (i.e., medicinal herb to cure poison), *Simrik* (i.e., medicine to prevent infections and cure injuries in bones of cattles), et cetera.

I learned a lesson that traditionally facilitated adaptive strategy to climate change requires continuity before they extinct unidentified. A research conducted by Ford, Smit, and Wandel (2006) in an indigenous community of Igloolik, Nunavut,

Canada shows how indigenous community have adaptive capacity to climate variability. According to their research findings traditional knowledge of land use, resource use, group mobility, and strong social network of Iglulingmiut have helped them successfully adapt to extreme climatic stresses. However, societal and biophysical changes have increased the vulnerability of people to climatic risks and have challenged their adaptive capacity. Thus, interaction between societal and biophysical components would influence the implications of future climate change in a community.

These articles gave me additional insights that my research could be more than exploring the experiences of climate change by indigenous people who have valuable traditional knowledge systems. Rai people's norms and values regarding nature, their traditional ecological cultures, threats faced by them, and ways out to sustain those values in future would be the additional fields of research. Indigenous ecological knowledge systems, cultural practices and social institutions in adapting and coping climate change could be important socio-ecological indicators to measure climate resilience of Rai community. What climate change risks or benefits in agriculture sector have Rai people experienced; would be my field of inquiry because Rai people are directly dependent upon agriculture.

Policy Review

To ensure environmental sustainability, one of the Millennium Development Goals, Government of Nepal has set up two targets;

i. Target 9: Integrate the principles of sustainable development into country policies and programmes and reverse the loss of environmental resources.

ii. Target 10: Halve, by 2015, the proportion of people without sustainable access to safe drinking water and basic sanitation. (CBS, 2007)

To meet target 9, Government of Nepal focuses on forest area, protected area, energy use, Carbon emission and consumption of Chlorofluorocarbons, CFCs. Similarly, to meet target 10, access to improved water sources and improved sanitation in urban and rural areas are chosen as indicators. Can environmental sustainability be ensured by afforestation and improving sanitation only? Are these measures competent to mitigate the potential threats of Climate Change which are mostly unpredictable? Traditional medicinal knowledge of treatment could be an integral part of environmental sustainability. By, boycotting climate change, indigenous people, and their knowledge in policy level, MDGs like poverty alleviation and environmental sustainability may not be obtained.

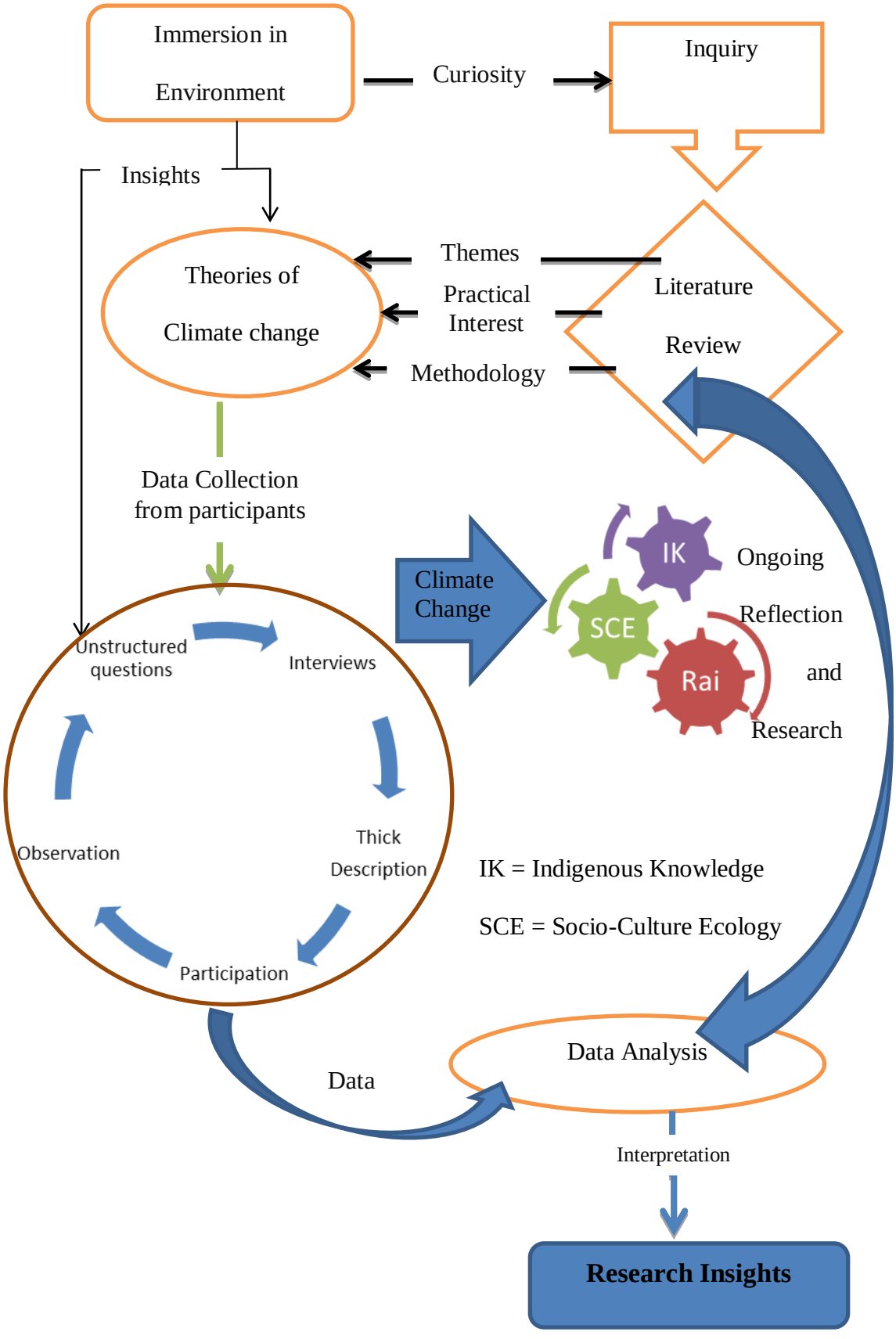
Although the Environment Protection Council of the then His Majesty's Government had identified the 'identification and mitigation of the adverse environmental impacts to the greatest extent' very less has been done on the field of building Climate Change Resilience in local and national level. Nepal Environmental Policy and Action Plan (NEPAP), National Adaptation Programme of Action (NAPA), Local Adaptation Plan of Action (LAPA), National Capacity Self-Assessment (NCSA), et cetera are some of the national level endeavors to deal environmental issues including climate change.

According to NEPAP (1993), under 'Environmental Education', it is directed to incorporate environmental concerns in all formal education programs and in non-formal education and training programs. Air, water, soil and noise pollution and issues of sanitation and diseases have only been the major environmental concerns in curricula till secondary level. Only in higher level of education issues of climate change has been dealt. So, the national curriculum has been lagging to aware the

people of Champe regarding the climate change issues. It causes lack of awareness and less preparedness for the unpredictable risks of climate change.

It is only recently 'Strategic Program for Climate Resilience (SPCR)', as a Pilot Program for Climate Resilience (PPCR) has been proposed by the Ministry of Environment. In 2010, at hotel Dwarika, Kathmandu, I had an opportunity to attend one of the negotiation sessions organized by PPCR where the delegates of Ministry of Environment, Asian Development Bank (ADB), International Finance Corporation (IFC), and World Bank were present. It is 110 million US dollars project, 60 million credit and 50 million grant (Ghimire, 2010), yet the donors were not fully satisfied on the mobilization of fund. Ministry of Environment dealing with PPCR had very less number of staffs in its cell. Although building climate resilience of watersheds in mountain region, resilience to climate related hazards, resilience for endangered species, climate resilient communities, et cetera are the areas of intervention of SPCR, it has also ignored the issues of indigenous communities and their vulnerability to climate change risks. However, when I met Anil Chitrakar, the negotiator of PPCR project, the donors have agreed on 160 million US dollars grant to Nepal. Will that money every reach on building resilience against climate induced catastrophes in grass root level? Or will it end up warming up pockets of few bureaucrats and politicians like any other foreign aid, increasing debt of Nepal towards the donors?

Conceptual Framework



Adopted from (Smyth, 2006)

Chapter Summary

Climate change is not a mere hoax perpetuated on mankind like James Inhofe, one of the senators of Bush cabinet said (Guggenheim, 2006). It is happening for real on earth; naturally and by anthropogenic activities. With the industrial era, along with industries automobiles, manufactured goods, intensive agriculture et cetera are introduced. Half of the world is powered by fossil fuels. Ozone hole in Artic, rise in global mean temperature, glacier retreat, collapsing of ice caps are the evidences of global warming caused by over greenhouse effect. Natural disasters like drought in Senegal for last four decade are sensational news of climate change. International agencies like UNFCCC and IPCC are appealing for global concern to collectively deal climate change.

Issues of indigenous people at local level have been under the shade of these international and national errands. There are articulated literatures that reflect the scientific works lately done on indigenous people, their vulnerability to climate change, traditional knowledge they hold and recommendation based on the findings. Before indigenous knowledge extinct as they face threats from climate change, urbanization, globalization, insufficient attention from the government (as mentioned by Sherpa, 2005) they have to be identified. The literatures I went through suggest me that Rai people might have unique experiences of climate change and they may bear valueable indigenous knowledge which might be contributing on building climate resilience. I am encouraged to collect the climate change experiences of Rai people and their indigenous knowledge through interaction, participation and observation. Being guided by Anthrogogenic Global Warming Theory and Habermasian Practical Interest I collect data, interprete the phenomena and synthesize meanings.

CHAPTER III

MY RESEARCH METHODOLOGY

My Methodological Review

I had done some researches based on quantitative approach. Survey method was used. My experience was not very satisfactory. I went to the respondents with closed ended questions, prejudiced options and returned back by ticking the boxes. What I really missed in my report writing was the experiences shared by the respondents. I wanted to mention but, I did not have any space to do so. Although I am a novice to qualitative research and moreover, very novice to hermeneutic phenomenological paradigm and narrative inquiry, by reviewing the literature of the researches done by this interpretive approach, I felt that I could fill the gap by narration and interpretation of lived experiences of my research participants.

My interest is better fulfilled by interpretive research paradigm than nomothetic paradigm of positivism. That is how I came across various perspectives; 'life-worlds' of Flick, Kardorff, and Steinke (2004) where 'day to day actions' of research participants as members of a society under different physical and cultural circumstances are studied, 'self-reflective nature' of qualitative research (Creswell, 2007), understanding 'phenomena' through different lenses (Cohen, Manion, & Morrison, 2007), and 'storytelling to create compelling framework of writing' as discussed by Bryman (2008).

Philosophical Consideration

My research is based on interpretive paradigm of qualitative research design. As an Interpretive researcher I embrace an open-ended research design process that allows emergent research questions, emergent modes of inquiry and emergent

reporting structure (Taylor, Settlemaier, & Luitel, 2009). To discover the subjective meaning through interpretation of communicative actions of my participants (Cohen, Manion, & Morrison, 2007), I have framed following ontological, epistemological and axiological assumptions.

Ontology

Ontology is the study of existence of reality. Willis (2007) regards ontology as the 'nature of reality or existence or being' that is not 'out there' but exists relatively in the form of multiple mental constructions based on socio-ecology of individuals who hold the 'truths'. One of the ontological questions for my research is 'How do Rai people perceive climate change?'. Similarly, what climate change means to them is other facet of inquiry. Rai people's perception and meaning of climate change could be different from one participant to another. For some climate change could be boon whereas for some it could be curse. As a researcher I am aligned to interpretive paradigm. So, instead of identifying an emperical reality, I am trying to interpret relative multiple facets of 'climate change' through perspectives of my research participants. Each facet of 'climate change' is constructed by socio-cultural and ecological experiences of each research participant. Thence, constructive ontological arguments based on relativism and subjectivism help me understand the existence of two major entities; climate change and Rai people in my study.

Epistemology

Epistemology is metaphysical backbone of qualitative research which is one of the ways of 'knowing'. For Creswell (2007) epistemology is about 'how a researcher knows about what s/he knows'. Similarly, Willis (2007) regards epistemology as 'what we can know about reality and how we can know it'. For me, it is a way of constructing my own values, meaning and understanding through multiple

interpretations of lived experiences of Rai people along with reflection of my own lifeworld. ‘What are the indigenous knowledge that can contribute in building climate resilience?’ is one of my epestimological questions. Based on such constructive epistemological assumptions which are internally constructed, I aim for collection of subjective knowledge that might vary from one participant to another.

I have an innate relationship with Champe. I was born in Kunakharka village of Champe. I share ancesteral linkage with one of the Rai leanages. Climate change has become one of the most interesting field of my interest not only in academia but in personal life. In this research, I being an insider dig out the emic perspectives of Rais. I believe that being an aborginal of Champe, I am able to shorten the distance between my research participants and me. Besides that, I spend ample amount of time in the field with my participants. By using constructive epistemological approach in my study I try to explore and experience beliefs, faiths and intuitions of Rai people. Thereafter, my endeavors are to logically interpret and frame the insights into subjective knowledge.

Axiology

Creswell (2007) regards ‘axiology’ as the role of values in research. The answers of ‘How did *fupa* shape values in me and construct my ways of understanding?’ guide my axiology. Similarly, Rais have their own traditional values and belief systems. What roles do those values play in their livelihood and traditional knowledge systems? Are there threats to their value sytem due to climate change? These questions are my subjects of inquiry so that I am able to acknowledge the research as value laden. On the basis of my research insights, I discuss the explicit values that shape my interpretation conjucated with that of my participants.

Rhetorical Criteria

One of the arguments in judging the trustworthiness of a qualitative research is shifting the responsibility from researchers to readers. Moreover, aesthetic or rhetorical criteria have been considered as one of the basis to judge the trustworthiness of the research. Nevertheless, there are criticisms to the plurality of opinions. The critiques favor for realistic approach for rigor and trustworthy knowledge discovery. I, being aware about the pros and cons of these aspects, have carefully used narration and argumentation as my major rhetoric. My research insights are articulately expressed keeping the empirical knowledge synthesized from epistemology under key consideration.

Moustakas suggests writing a brief creative close that speaks to the essence of the study and its inspiration to us in terms of the value of the knowledge and future directions of our professional-personal life (as cited in Creswell, 2007). I am following Moustakas' recommendation in 'creating a research manuscript'. I have tried to begin my first chapter with autobiographical statement about my experiences signposting towards my research topic, incidents that would make readers curious, social implications and relevance of topic followed by research questions. I have been reviewing relevant literature, data bases, and procedures for study selection, data collection, data production and research methodology. I have adopted a conceptual framework of Smyth (2006) followed by a chapter on Methodology. After conducting the research, I present my insights with textural and conceptual descriptions, and synthesize meanings and essences of experiences. Finally, in the last chapter, I have included summary, implications and outcomes of the study.

Procedural Considerations

Hereby, I discuss about my considerations for research procedure. I define my methodology, study area, participants, methods of data production and data analysis, maintaining quality standard, and ethics.

Methodology

According to Paul Ricoeur, father of symbolic hermeneutics[14], meanings are not given directly to us, and that we must therefore make a hermeneutic detour through the symbolic apparatus of the culture. Primarily I use hermeneutic phenomenological research methodology for intervening in my study by focusing on subjective experiences of individuals and groups of Rais in Champe (Kafle, 2011). However, for analysis, interpretation and generation of meaning from my insights I use narrative inquiry as my research method because for me stories create meaningful ways (Elliot, 2005) of understanding interaction of Rai people with ongoing climate change. Narrative inquiry helps me to reflect and understand complex human lived experiences (Webster & Mertova, 2007).

Narrative inquiry as my research method. Finding a suitable research method is a herculean task. Although I was crystal clear about using a method of interpretive paradigm, I was not sure which method would resonate with my research questions and associated inquiries. When I came across Webster & Mertova (2007), I figured out a clearer picture of a coherent research method i.e., narrative inquiry for my study. Since my study is interdisciplinary, narrative inquiry could help me interpret complex and constantly changing human experiences. Nevertheless, narrative inquiry has a potential drawback of collecting excessive data in the form of

[14] Symbolic hermeneutics recuperates the principal sacred symbols that modern humans have forgotten but whose meaning is at the root of our language, our thought and our practices

stories as it attempts to gather ‘whole story’ (Webster & Mertova, 2007). In order to minimize chances of continuously burrowing data, at times I intervene narrative inquiry with hermeneutical phenomenology because narrative inquiry is holistic research approach which focuses on a set of human experiences whereas the later communicates understandings of particular ‘phenomenon’ at certain points. Similarly, hermeneutic cycle targets to uncover better understanding of the phenomenon (Kafle, 2011). Coupling these two methods to construct and reconstruct storyteliing, I aim for versimultitude.

Apart from applying a coupled research methods, I personalize my process of storytelling. For peculiar local terminologies I describe as footnotes. Similarly, to provide textual gesture for expressing startles, shocking, and loudness, I use ‘UPPERCASE’. This is not to contradict APA (i.e., American Psychological Association) style of formatting dissertation but to express a loud tone or voice of my participants. Similarly, I use different ‘modes of address’; I, We and They, depending upon my locale as a researcher. Using ‘I’ and ‘They’ I explore etic perspectives whereas ‘We’ helps me to experience emic perspectives. I would like to explore, understand and interpret perception and experiences, socio-ecological relationships and indigenous knowledge of Rai people to cope climate change. Although, I find multiple opinions in the field, I extract the commonalities. My endeavors are to uncover issues of climate change and indigenous Rai people as phenomena rather than seeking for facts and accuracies.

Study Area

My study area is Champe Village Development Committee (VDC), one of the 63 VDCs of Bhojpur district. It is 1,596 m above sea level. It lies in North Eastern part of Bhojpur district. The area of Champe VDC is 16.26 square km. Champe has a

high school and four primary schools. When I asked an employee at Champe VDC about the VDC's demography he said that according to the population census 2011 there are 116 households of Rai people out of 590 households in the VDC. The total population of the VDC is 3,518 out of which 683 are Rai people. 19.41% of the people of Champe are Rai. Champe has been a trade center for *Lekh*[15] and *Besi*. Since last 90 years farmers sell their products, buy necessary products in local market, *hatiya*[16] which is held fortnightly at Pokharitar of Champe (Shrestha C. , 2010).The major occupation of Champe people is agriculture. They are subsistence farmers. Rice is their major subsistence crop followed by maize, wheat, mustard, soybean, et cetera Cardamom is the major cash crop of this VDC. About 500-600 tons of cardamom is annually grown (Shrestha C. , 2010).

Participants

Rai people of Champe VDC are my potential participants. Ward number two, three and nine have majority of Rai residents. Therefore, these three wards are my primary region for participant selection. I select thirteen local Rais including myself as my participants through stratified sampling. The grounds of stratified sampling (Flick, Kardorff, & Steinke, 2004) are profession, age, gender and place of origin.

Data Production Methods

I develop an interview schedule and conduct semi-structured and narrative interviews (Flick, Kardorff, & Steinke, 2004). The questions are mostly open ended. Teachers, students, farmers, elders, youth, and women are my interviewees. By listening to their stories (Elliot, 2005) I try to figure out their past and present practices, experiences and perceptions regarding climate change. I record the

[15] *Lekh* is region at higher alleviation; high altitude area of hills or mountains

[16] *Hatiya* or *haat bazar* is a local market that occurs fortnightly in villages like Champe

interactions with the informants using a recording device after consent from participants. I do participant observation. For my personal references to generate data, I do photography of socio-cultural, agricultural or other economic activities of the participants. Also, with the participants' consent, I try to film the cultural, and socio-economic practices. Later, I interpret the essence of those practices to develop climate resilience.

Analysis and Interpretation

Simply reviewing data from the lenses of objectivity or subjectivity might not provide a clear understanding so I search for meaning of each phenomenon to my participant during our interaction. Primarily I follow hermeneutic phenomenological procedures for data analysis by reflecting lived climate change experiences of my research participants. Together with their reflections I intertwine my self-reflection. This helps me to compare and contrast (Flick, Kardorff, & Steinke, 2004) story-life of my participants with my own experiences lived-life. For further analysis of data I use narrative inquiry because narrative is closer to reality and it captures culture (Webster & Mertova, 2007). After generating data in the form of stories, they can be studied from different dimensions such as Habermas' communicative lenses to understand how culture and lived experiences of Rai people construct knowledge of climate change. Also, I interpret and analyze chronological dimension of stories, meaning of events and social dimension communicated through narratives by participants (Elliot, 2005). I listen to, observe at, refer incidents, analyze and interpret meaning and experiences of participants regarding climate change, climate change impacts faced or panicked on, and their indigenous ways of food preservation for coping climate change.

In later part, I conduct ‘metaphorical analyses’. During my conversation with research participants, various terminologies arise which are metaphorically more meaningful than literally. The term ‘climate change’ may not be directly understood by my research participants, in that case I try various metaphors and see in which they fit well. Also, to confirm the spontaneous metaphors used by the participants, I collect ‘thick descriptions’.

In short, I conduct onion-like layers of interpretation of the phenomena using hermeneutics and narrative analysis (Flick, Kardorff, & Steinke, 2004). Although, traditionally hermeneutics or narrative analysis is about making sense of a written text, but for me the unwritten stories, perceptions and storytelling of experiences of Rai people act like a ‘transcript’.

Quality Standards

The question of what standard can be used to measure the scholarly value, quality and trustworthiness of qualitative research is frequently asked, but the responses in the corresponding articles, text-books and manuals are either very general or unsystematic. The further establishment of qualitative research in the overall landscape of empirical social research will depend essentially upon defining appropriate criteria for its evaluation (Flick, Kardorff, & Steinke, 2004).

How can one judge the quality of a qualitative research? Can the measuring tools of quantitative research like objectivity, reliability, internal or external trustworthiness be used for qualitative research? Or similar to postmodern concept of rejecting any quality criteria for qualitative research is adopted? However, for my study I would like to set up a referential system to maintain the quality standards. The referential system would be ‘‘thick descriptions’, ‘pedagogical thoughtfulness’, ‘faithfulness of interview situation’ and ‘authenticity’.

I gather ‘thick descriptions’ to investigate and assure that the events described by the respondents are in respect to their trustworthiness. For the broader speculation of my research issue and avoid single-sidedness understanding from an individual method, I practice pedagogical thoughtfulness. Interview situations are flexible; no pressure is used for the informants, openness is maintained, I as a researcher do not create power-difference against my informants or be skeptical to their every response. Finally I attempt to provide sufficient care to the statements of interviewees and underlying value structures during research process. Although, I am interpreting the commonalities of responses, I am not missing the multiple opinions of informants during the research process. If any new orientations of information came across during collection of ‘thick descriptions’ that would be properly studied and addressed.

Ethical Consideration

During research process and drafting research paper, I am aware of the legal bases; collection, storage, transmission and publication of sociological data. I preserve the ‘right to privacy’ (Cohen, Manion, & Morrison, 2007) and ‘right to determine personal information’ of my participants. Confidentiality and anonymity are also maintained. To avoid ethical troubles and conflicts with the informants, additional strategies for guaranteeing anonymity are applied. I follow the ‘principle of informed consent’ (Cohen, Manion, & Morrison, 2007).

The involvement of an individual in my research is voluntary and pre-information about the objective of my study is given to every potential participant. My research is not an ‘under cover’ one. However, my research is somehow exploratory so it is not convenient to convince my potential respondents that climate change is really happening and they ought to have experienced it.

To gather trustworthy information I present my research interests to my participants. Also essential adjustment with the potential informants is maintained to induce their willingness to participate. This does not mean I pretend about my feelings, or deceive and spy on my informants as Herbert Gans criticizes qualitative researchers. I myself belong to Rai community, so my endeavors are to stand on the shoes of other Rai people. No deception but realization. When required I have even advised respondents on the aspects where I am confident for instance; 'rain water harvesting' to mitigate crisis of water availability.

Finally to reassure ethical issues in my study, I follow the principle of 'damage avoidance'. None of my respondents would fall into trouble or face any sort of risks for the information they have provided to me during research process. My utmost endeavors are to strengthen anonymity of my informants. No personal data that would cause threat to my respondents are released or published. Nevertheless, knowledge transmission part is carefully under taken.

Chapter Summary

In this chapter, first I have discussed how I landed on interpretive research paradigm. Secondly, I have shared my ontological, epistemological, axiological and rhetorical criteria as philosophical considerations based on constructivism. Thirdly, I have defined details of my procedural considerations like hermeneutic phenomenology and narrative inquiry as research methodology, study area, research participants, methods and techniques of collecting and producing data, process of data analysis, maintaining quality standards and ethical considerations to maintain trustworthiness of my research insights.

CHAPTER IV

NOT A MARE'S NEST; CLIMATE CHANGE IN CHAMPE

The poplars are felled, farewell to the shade,

And the whispering sound of the cool colonnade

The winds play no longer and sing in the leaves,

Nor Ouse on his bosom their image receives.

[William Cowper, 1784]

An Overview of this Chapter

In this chapter, as a hermeneut I am going to share and interpret lived experiences of my research participants. It is a response to my first research question; "What sort of lived experiences about climate change do Rai people have?" Being a Rai myself, my motive is to excavate emic perspectives to analyze the climate change scenario in Champe. Also, I attempt to incorporate my experiences, opinions and understanding of events related to climate change in Champe.

It is often believed that scientific and technological advancement overshadow religion and faith with reasoning and evidences whereas Rai community still is attached towards *Kirant*[17], *Mundum*[18] and ancient ways of living. Most of the villagers participate in *hom*[19]. After *hom,* priest forecasts tentative days of rainfall. Superstitious! One might say. But it rains on that day! Miracle! So, at times, I become skeptic about my own experiences, understanding and 'truths' I grew up with. So, at

[17] *Kirant* is religion followed by Rai people

[18] *Mundhum* is holy text of Kirant transmitted orally from one generation to another

[19] *Hom* is a ritual conducted for well-being or to end a catastrophe. It is also done or predict for an event; here it's done to forecast precipitation

times I even fail to locate my start point and end point (Herising, 2005) and run out of words. Nevertheless, I console to myself; even though I fail to find 'proper' terminologies to express, learning does not stop happening even in emptiness! Learning passes through me like a transverse wave does through vacuum. It is a filling in itself despite of the emptiness. That is how I move on during ambiguity and crises.

Whimpering Rivers; a Response to Climate Change

I use local rivers like *Lale Khola, Bhude Khola, Jere Khola, Chintaloong Khola* and Rai people of my village as my pointers to organize evidences of climate change. People born and people die. People migrate in and out of the village. But, these rivers are the perennial witnesses of climate change. I have spent good deal of time with some of these rivers. Rivers do not converse like human beings do. But, I have overheard the cries and woes of these rivers. I have stood on the bosom of *Lale Khola* and felt its weakening heartbeat.

I have felt as if these rivers not only have their own painful voices but they also carry on joys, laughter, sorrows and woes of generations of Rai dwellers. Rai people directly depend upon these rivers for drinking water, water for household purpose, water for cattle, poultry, irrigation, and recreation like swimming and fishing. So, together with the painful voices of rivers I consider the experiences of Rai people as well. Hence, by conversing with my research participants, by observing their day to day activities and by involving myself in some of those activities I observe different facets of climate change like that of a 'crystal'. Les Pereira (2007) refers to Valerie Janesick's, 2000 argument of crystallization for extensive inclusion of multi-perspectival approach to understanding. Similarly, hereby I am opting for crystallization of my phenomenon; 'climate change experiences and perceptions' of

Rai people to develop perspectival understanding in me (Pereira, 2007) so that my understanding of the phenomenon would not be a mare's nest!

Death of a Demon in Bhude Khola; Natural Indicator of Climate Change

Bhude Khola flows downstream through ward number two. It is the major source of water for drinking, household and irrigation purposes for the people of ward number two. No one exactly knows why the river is called 'Bhude Khola'. But, literally 'Bhude' means 'a person with fat belly'. Hence, Bhude Khola seems to be personified, as at the fountain before flowing down through narrow, stiff and stony way, it spreads wide forming a natural reservoir which looks like a big belly of a person!

Sharmila Rai, 26 is one of the permanent residents of Sorayang, ward number two, Champe VDC who grew up fetching water from *Bhude Khola*. She is a primary school teacher. She is married to Sujit Rai of Shiktel. Sujit, widely known as *Shiktele* brother-in-law among youngsters and son-in-law among adults, runs a rice mill in the village near *Lale Khola*. They have a son of three years old.

"We had to go fifteen minutes away to *Bhude Khola* from home to fetch water for drinking and household purpose. Since, once was not enough, every day we ran four to five times to and fro from home to the river and vice versa," said Sharmila when I asked her about the water availability in the village during her childhood days.

"Later, your *fupa* brought taps near every house in the village." She added.

I became nostalgic about my *fupa*. I had spent my early childhood years with him. At five, I was brought to Kathmandu to be taught in English medium school, we used to boast as 'boarding school' back then. Saran Bahadur Rai, a retired British Gurkha Army, reformist, farmer and my *fupa* worked hard to build drinking water

taps in the village. He requested Gurkha Welfare Service[20] (GWS) to provide financial assistance to build community taps in the village. In 1990, GWS built a drinking water tank in upper *Kunakharka.* Its source of water is *Bhunde Khola*.

"Had it not been your *fupa*, the villagers would have been running to different rivers to fetch water. No matter either it's during the King's or Rana's or Panchayat's or after 2045's Multi party's or now so called republic's rule no one has ever made any significant contribution for common people like us." Sharmila told me expressing her frustration to the failure of local and national government on providing water and sanitation facilities.

Regarding the water availability in those taps, Sharmila has experienced drastic differences. She was amazed to find the taps drying before noon during *Chaitra* (i.e., March/April) in recent years. This year, she experienced decrease in volume of water from the tap and early drying of water.

"Water comes with less force in taps these days. Usually in monsoon the flood causes landslide and the water canal to our village water tank gets blocked by debris. But, in this season, may be the river's volume has tremendously decreased." She gave her opinion on the cause of lesser availability of water in recent days.

In *Chaitra* (i.e., March/April), during the night time some water is collected in the tank. However, everyone fetches water in the morning not only for drinking but for sanitation purpose as well. Some villagers even irrigate their kitchen garden with the tap water. So, it is likely that the tank empties before noon.

"*Tin Tale Chhanga*[21] is losing its water volume since 1995. Similarly, *Bhude Khola,* and *Lale Khola* are gradually drying," Sharmila said being nostalgic about her

[20] Gurkha Welfare Service (GWS) is an organization of former British Gurkha Army that supports the former British Gurkha soldiers, their families and communities.

childhood days when she along with her girlfriends used to go to take shower beneath *Tin Taley Chhanga*.

I remembered while I was travelling by the bank of *Bhude Khola* on my way to Bhojpur Bazar last year (i.e., 2012); the river which used to howl had turned into a stream whose scream no one could hear. During my childhood, I feared of going near the river. I thought a demon lived in the river and it would engulf me. Now, the demon is dead!

An impression of 'demon' in howling river built a communicative action as Habermas suggests framing my lifeworld's horizon of shared beliefs which was already in play (Flynn, 2004). However, the transformation of river from a scary dwelling of a demon to an ordinary stream induced me to cross my horizon of beliefs and meanings. This is how my horizon of shared beliefs and meanings, from fear of demon to demise of demon, widened due to change in my lifeworld context and resources for understanding.

Lale Khola's Altering Hydrology

Lale Khola has two major natural springs as its sources of water; *Aitabarey* and *Swahan Dhara*. Apart from these two springs where public taps are built; *Lale Khola* is a source of water for drinking and household purpose for people living near its banks. Furthermore, it provides water for irrigating cardamom and small vegetable farms or kitchen gardens of the people.

When I was about four, I often felt coldness next to my bed every time I woke up before the dawn. Once, I woke up earlier due to a nightmare. I saw my mother trying to wake up on sly. As she got off from the bed and went out of the room, I

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[21] *Tin Taley Chhanga* literally means three storied waterfall i.e., waterfall as high as three stories house.

followed her without letting her notice me, she went to *vaansa*[22], I stopped at the door and peeped in '*vaansa'* rubbing my eyes. She put three *gagris*[23] in a huge *doko*[24], carried it on her back using a *'namlo*[25]', tip toed out of the house trying to avoid sound that may awake me, but, I was already catching her *lungi*. She tried to send me back into bed but, I resisted with faint sobbing. I was scared of dark. She held my left hand with her right and *namlo* with her left. She did not have a torch or '*ranko*[26]'. Under the crescent's light, she was guiding me to walk along through a small path between meadows, slippery rock steps, tall bamboo bushes, and cold wind howling through the bamboo leaves. Finally, we reached Lale Khola. She put the *doko* on a stone and the *gagris* below a waterfall. One after the other the *gagris* were being filled. Mother kept back the filled ones into the '*doko*'. Meanwhile, frightened I caught her *lungi* tightly. I was scared if a ghost hidden in the woods would make me its prey exactly like my mother described when I disobeyed her, "If you became naughty Santu, the ghost of *Ritthey Baje* would come and take you away into the forest to eat you." After we, actually mother, were done filling up the *gagris*, she kneeled on the floor, put *namlo* on her head and jolted a bit to stand up. Thereafter, we returned back home passing through the same petrifying way.

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[22] *Vaansa* literally means kitchen but it is a sacred place for Rai due to the presence of *chula* (i.e., traditional stove having three stones called *Sutu loong*, *Taramang* and *Mechalumang*, and *Thungma loong* floor of *chula* where foods are cooked by burning firewood)

[23] *Gagri* is a cylindrical water vessel with narrow neck made up of Copper or alloy

[24] *Doko* is frustum shaped basket locally made up of *choya* that is usually used to carry *gagri* filled by water or fodder or agricultural tools on one's back with *namlo*

[25] *Namlo* is rope knitted from jute fiber

[26] *Ranko* is blazing bunch of dried and cleaved sticks of bamboo

Fetching water for once in early morning was not enough. Apart from the basic purposes; drinking, cooking food, washing dishes, washing face, going toilet, and preparing liquor *jaad*[27] or *rakshi*[28] was required for cooking *'kudo*[29]*'* for cattle, drinking water for cattle, and to water kitchen garden. Since water was needed not only for us but for our cattle as well, everyday either mother or *fupu*[30] used to go to *Lale Khola* for four or more times to fetch water. Each time it took about fifteen to twenty minutes to go to *Lale Khola* and return home with *gagris* filled by water in the huge *doko*.

After the community taps were built in our village, our everyday struggle to fetch water decreased. Since the taps are closer to residential areas, a lot of time and energy are saved now.

Every time, I visit home, I go to *Lale Khola*. It is the nearest river from our home. The wild bushes were wiped and replaced by cardamom near the banks of *Lale*. A mill is established near it, so that the running water could be used to cool down the hot engine. People living near the river have diverted it a little to irrigate their small kitchen gardens. At first, I thought using the river water for multiple purposes by the people caused decrease of water volume in the river. But, as I enquired about the river with Sharmila and *Shiktele* brother-in-law who are the owners of mill, few other local Rai people and *muma*, I heard different stories.

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[27] *Jaad* is alcoholic drink prepared by fermentation of grains; rice, wheat, maize, or fruits

[28] *Rakshi* is homemade wine prepared by distillation

[29] *Kudo* is food for cattle prepared by boiling *bhus*; remnant of crushed maize or wheat or rice husks, with water

[30] *Fupu* is paternal aunt; one's father's sister

According to Sharmila in *Chaitra*, 2068 (i.e., March/April 2012) there had not been any rainfall, in *Chaitra*, 2067 (i.e., March/April, 2011) there had been heavy rainfall and in *Chaitra*, 2066 (i.e., March/April, 2010), there had been drought. One of the reasons of drying of rain-fed-watershed during *Chaitra* (i.e., March/April) could be lack of precipitation. Also, the unusual precipitation pattern of the recent three consecutive years indicates impacts of climate variability on hydrological cycle. Although, there has not been any significant climate change impact studies done on the local hydrologic regime in Champe or entire Bhojpur, changes in global climate might have significant impact on local hydrological regimes. Such alteration in hydrological regimes affects ecological, social and economic systems (Dibike & Coulibaly, 2005).

'The Rain God' on the bank of Lale; climate change myth. On 28th March, 2012 we had a gathering at *Shiktele* brother-in-law's mill that is on the bank of *Lale Khola*.

"In monsoon, due to downpour, volume of rivers increased. The rivers roared ferociously. People feared of rivers. Every year *Lale* also used to take away someone's cattle. Once, *Birkhe Maila's* son lost his life in *Lale* while attempting to save a Buffalo. To evade such catastrophe, annually people worshipped *Swahan Dhara* with pure *jaad*, sacrifice cock and pig, form a pool of blood by blockage of the river for a while, and finally let that pool of blood flow into *Lale*. Similarly, *Shikteles* worshipped *Aitabarey* every year with a goat. Since, adult Rais do not eat goat, they offered the meat of sacrificed goat to the children. It was a custom. People believed that *Lale* get thirst of blood, so it kills cattle and human with its fury during flood in monsoon. By sacrificing and worshiping *Lale*'s sources, Rai people believed demons

in *Lale* would be kind and have mercy on lives; their thirst could be quenched by the blood of cock, pig and goat, and they would be pacified by the sacrifices.

Well, scenario has changed now; people do the same rituals in *Aitabarey* and *Swahan Dhara*; to evade loss of livestock not due to flood but due to lack of sufficient water in *Lale* for animals to drink. Now days, monsoon are drier, even if it rained, it would be heavy, causing flood and landslide near the banks but neither the rain would last long nor the flood. In recent years *Lale*'s volume has decreased significantly."

Shiktele brother-in-law said. Others nodded in agreement.

When I enquired them about the causes of change in Monsoon and drying of springs that feed *Lale*, each one had a different version.

According to Jay Bahadur Rai (60) the main cause of *Lale's* drying is untimely rainfall. His understanding is that *Lale* is primarily a rain fed river. The rain God has been very busy lately. "How many people live in this world? All of them do not live in Sorayang. Everyone is the God's child. The God is one and his uncountable numbers of children live worldwide. So, he has to distribute water equally to everyone. Sometimes in *Amrika* (i.e., America), *Belayat* (i.e., England) Africa, *Bharat* (i.e., India), *Chin* (i.e., China) and in Nepal also, the God has to go all around the world."

"If your *Huchil*[31] is so kind and powerful, why cannot HE understand our sufferings; due to untimely rainfall, maize has not been planted, irrigating paddy field is later but now how will we prepare *Byaad*[32]? Where should we take our cattle to drink? *Lale* is drying," *Shiktele* brother-in-law asked to Jay Bahadur.

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[31] *Huchil* - Shiktele brother-in-law has obsession of addressing man as *huchil*, literally meaning hawk and woman as *makuri*, literally meaning 'lady spider'. But, here by saying *huchil* he is referring to the God.

[32] *Byaad* is swampy field for growing paddy seedlings

"Brother-in-law, for two days all villagers are asked to attend *hom* in New Goddess' temple in ward number three. Last year as well, after doing *hom*, it had rained, may be this year as well it will rain. Today is the second day of *hom*. In the evening priest will do *chinta*[33] and reveal the day for rain," Min Bahadur Rai (18), a ninth grader in Champe High School and resident of ward number two informed us about a ritual in the village.

Before anyone could say a word, Jay Bahadur stepped forward, raised his fore finger of right hand in air and said loudly, "*Hom Som* cannot bring rainfall. I told you guys, the rain God is busy. Why is not raining on time being such an issue? If it's not raining at present, instead of panicking; we should take good rest, eat well, be stronger and wait for our turn; the God to come with rain.

Once it rains, then we can irrigate our field, work day and night, if not rice, having *khole*[34]. We should not be greedy. With patience, let's wait for our turn!"

"Don't be superstitious *kaka*[35] this is the twenty first century, age of science. There is no rain God. Have you met with him? It is due to deforestation. *Huchils* chop down the trees for firewood and timber at alarming rate. So, the springs are not getting sufficient shade of the trees. They are drying day after day. Similarly, water cycle is disturbed."

"*Shiktele* son-in-law, you call me superstitious? Who makes a quick prayer every time while turning on these machines in mill? The so called educated people like you in the village advocate about afforestation. But, look around, in our days,

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[33] *Chinta* literally means 'to worry' but here it is a transcendental act

[34] *Khole* is a poor person's diet that is prepared by higher ratio of water to rice grains with little salt added

[35] *Kaka* is my father's younger brother

there were not much trees in the village, we used to go to jungle for *Bhasme*[36], still it used to rain. Now, many trees are planted in *Sorayang,* still it is not raining on time. Your minds are corrupted. Have some faith on God. It's not trees that can bring rain, it's the rain God; the RAIN GOD."

Mountains of Sins Disrupting Hydrologic Cycle

A hot debate fluttered round the mill. Meanwhile, voices of *muma* summoned my consciousness. "The main reason of *Lale* drying, no rainfall, evil diseases in crops and chickens, epidemic in village, less harvest, and many disasters those are yet to be seen is corrupted human beings. In *kaliyug*[37] myriad sinners are born. The mountains of sins have risen so high that the clouds which brought rain are checked, serene water flowing through the rivers, healthy plants and good harvests are absorbed by sins of the sinners. Our mother earth can no more carry the weight of sins.

In our days, i.e., in 1950s and '60s during rice harvesting season, whole day and night we had to guard rice grains in *aagan*[38], not because someone would steal, but because someone would deposit their harvest in ours. Such glorious were those days, fifty to sixty *muri dhan*[39] in a ten *ropani*[40] field. Now, we hardly harvest ten *muri dhan* in the same field. These days, you have to guard the *dhan,* not because someone would pour their harvest but, someone might steal our little harvest right from our own *aagan*."

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[36] *Bhasme* is a tradition where people used to cut down the wild shrubs and sow seeds of maize or legumes

[37] *Kaliyug* is 'Age of Downfall' which is regarded as climax of corrupted period

[38] *Aagan* is courtyard i.e., open space in front of house.

[39] *Dhan* is Nepali word for rice with husk

[40] *Ropani* is Neapli system of land measurement. 1 *ropani* = 521 square meter

I was stupefied while imagining people sneaking to others courtyard to drop their grains. Meanwhile, I was brought back from my imagination by a loud voice, "*Oe* grandson, you are over here?" as I turned clockwise towards the street Sherey *fupa*, Sher Bahadur Rai is his full name; one of my long distant grandfathers in relation, an elderly man with grey hairs wearing shorts, *laure* hat, handling a grandpa umbrella on one hand and a rucksack bag on the other, was standing.

"My dear grandson, visit my home whenever you get free time."

During our courteous conversation Sherey *fupa* invited me to his house. Promising him to pay a visit, I took his mobile number for in case I got lost on the way to his home. Thereafter, we departed.

Later in the evening, hot topic of discussion in whole village was the priest's claim of precipitation within two or three days, *Chaitra 17* or *18* (i.e., March 30/31).

"Will it rain?"

"Yes," elderly people said. "The priest has never failed in reading the stars and clouds."

"NO, those are mere co-incidence, its superstitious," young people said.

"SUPERSTITIOUS! PRIMITIVE!" echoed in my head, but we had yet to witness if it would rain.

An Incessant Rain: Altering Monsoon

Picture 1: Incessant Rain: A photo from my courtyard in the afternoon of 30th March, 2012

Pre Monsoon

Dark clouds screen the blue sky
Rain showers sweeping the dust in air
Pigeon shelter, flapping their damp wings
Sweet homes of rats and snakes drown
To summon mates, handsome frogs croak
A country girl slips down a *kanlo*
Farmers in *ghum* carry on *ropai*
Worn out roof combatting the downpour
Batuli collects rainwater beneath it
A wanton couple romancing under a tree
A tractor by the swampy road
Splash! Muddy water all over them!!!

Today is 30th March, 2012. Sky is gloomy. Dark clouds are hovering around from early morning forming layers of thick curtains hiding the Sun behind. The dawn seems to be dusk. *Muma* opens wooden doors, unlocking the chickens kept in small chambers. The chickens clumsily spread their wings and jump off their sheds. Unlike other days, neither they knock each other with their beaks nor chase each other in hyper excitement. They do not scratch the floor with their paws. Lethargically forming a queue, they tip toe around the vegetable garden and look around for worms.

A hen locates an earthworm. Unlike other days, it does not rush to grasp it. It slowly moves towards the worm. Other chickens just gaze at the hen moving off the

queue. But, they do not seem to show any interest. They do not race to grasp the prey and duel for it. Today they are not fighting for shade under orange tree. They are in peace. *Muma* brings stale rice from kitchen and disperse the rice in *aagan*. The chickens come towards *aagan* hearing *muma'*s "*trrruuuph… ah aah aaah… trruuph aah.*" In *aagan* they disperse and calmly pick up rice like a small child picking up pebbles by counting; one, two, three...

"Is the forecast of the priest coming true?

No, I won't believe until the rain showers!"

Around eleven o'clock, the day seems to be night, abruptly the precipitation begins. *Muma* hurries to gather the chickens and send them into their sheds. I help her chase the chickens. In few minutes, our dry *aagan* turns into a pool of water. An incessant rain pours till seven in the evening. While having dinner in *bhansa* under the light of solar *tuki* I see *muma's* joyous face. She asks me if I wanted some more soup noticing dry rice in my plate. I nod. Leaning forward to pour a spatula full of soup, she says to me,

"Tomorrow, you do not need to water the vegetables."

Across Bhude Khola: A Shift from Natural to Anthropogenic Change

Today is 4th April, 2012. It has already been around a week that *Sherey fupa* invited me, but I was being unable to manage time to visit him. After completing some chores at home, I head towards his house. After twenty minutes of uphill walk, I reach a *chautara*[41] next to GWS' water tank where the water is channeled from *Bhude Khola*. I take rest for a while, drank cool water from nearby community tap, and continue my errand; reach Sherey *fupa's* house.

[41] *Chautari* is rest taking spot usually built in memory of deceased ones

"Climate change used to happen naturally in the past, but now this phenomenon is mostly human driven. Anthropogenic activities are the major cause of the dramatic change in climate. Rise in Carbon emission due to industrialization and transportation, deforestation, intended wild fires, and pollution due to unplanned settlement are the causes of climate change and global warming. Had there been no ecological degradation, climate would not have changed in such alarming rate. See these days, the environment is not refreshing and the rain does not fall on time. Water springs are gradually drying up. In the past winters there used to be snowfall. But, from twelve to fifteen years onwards, from *Mangsir* to end of *Poush, Magh* (i.e., from November to February), whole village is covered by *tusaro* (i.e., heavy fogs). Yet, I do not feel very cold, like I used to."

Sherey *fupa* is one of the educated *Sorangey* Rais. He is a retired educationist. Lately, he is involved in cardamom farming and social activities. While conversing with him regarding climate change, he seemed to be aware of scientific theories of climate change. Moreover, his own lived experiences convinced him of the on-going changes in climatic conditions.

"Many flora and fauna found in our village has become extinct. The wild grasses like *dab dabe, ghoda khari, bilaune, champ, gayo, khorandey, fir firey,* et cetera are no more seen in forests. Similarly, rhododendron no more blooms in *Falgun* (i.e., February/March). Many good varieties of rice, wheat and barley have been extinct.

Top consumers like tiger, jackal, fox, bear, et cetera are barely seen even if we went to deep jungle. Various species of vulture and eagle have extinct. Chirpings of *Kaphal pake chara* (i.e., a type of pheasant that sings when *Myrica esculenta* locally called *Kaphal* gets ripened), *bhui jureli* (i.e., *Pycnonotus;* usually found in paddy

fields), *gol simal* (i.e., also known as *mani chara*; regarded as good luck for good harvest and wealth), cuckoo et cetera are no more heard. However, animals like squirrels and monkeys have increased in number," *fupa* said taking a long breathe.

Jere Khola; Planting Only Yours Isn't Fair!

This year is 2012, there is no rain, spring has dried and there is no water for irrigation of paddy field. Some years back, it rained till mid-Baisakhs (i.e., late Aprils). But, thereafter rainfall has become unpredictable. We largely depend upon rain fed canals. Since there is water scarcity in canals last June we had a major dispute with one of our neighbors in the issue of water for irrigation.

I was studying for class test at school when I heard my pa[42] *shouting;*

"Finally, our turn had come to puddle our paddy field; you channeled the water towards your field again? Oppressor!"

"Flow of water is so less. My paddy field is not irrigated properly, how will I transplant the seedlings? Let me irrigate one more day. In one day you won't die of hunger, will you? Or spiders won't build cobweb in your bhakari[43]*, will they?"*

"What? COBWEBS? Surke Maila are you calling a fight? Planting only yours isn't fair!"

"Why would I, as if I found no one besides you to quarrel? Give the channel till the dusk."

"No way, don't I have a family too? My field is drying, if it dried how would I plant rice? Children would die of hunger!"

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[42] *Pa* means father in *Dungmali* language, one of the languages spoken by Rai

[43] *Bhakari* is a store room usually on the top floor of the house. 'Cobwebs in *bhakari*' is a rustic curse for poverty, no grains in *bhakari*, and misfortune.

Surke Maila used to be our good neighbor. But, since that day, he and pa quarreled for water, neither he nor his family talk with us. His children used to play in our backyard. Nowadays, they do not come around our house. I feel bad about it.

Suresh Rai, 20 shares a bitter experience with his neighbor due to dispute in access to water resource. He is a student pursuing Bachelor in Bhojpur Multiple Campus, Bhojpur. He completed higher secondary education from Shree Saradha Higher Secondary School, Pyauli. He had appeared SLC from Champe High School, Champe. It was Shree Chandeshori Primary School where he learned his first alphabets and gained primary education.

According to him, dryness that usually occurred during *Jestha* (i.e., May/June) has shifted earlier to *Magh-Falgun* (i.e., February/March). Few years back, there used to be heavy rain till mid of *Baisakh* (i.e., April). His experience about recent dryness in Champe indicates variability in local climatic conditions.

Jere Khola flows through ward number three. Farmers who have *khet*[44] in ward three depend upon this river for irrigation. Lately, due to less rainfalls and drying of springs, there has been lesser availability of water. Farmers who lived in harmony often have disputes regarding water access for irrigation of their field.

Even the availability of drinking water has similar fate. When I inquired him about drinking water availability Suresh says, "Seven years ago, the community tap was far for us. We tried to use water pipe and bring water home. But, our neighbours did not allow us to do so. There was a spring in our *khet* so we built a small cistern at the source, a private tap at our house and supplied the water." He is happy now, they do not have to stay on queue on community tap or quarrel with neighbors to supply the water home through pipe.

"Monsoon used to be the hardest," he remembers.

[44] *Khet* land is swampy field, usually suitable to grow paddy

"Seven years back, once *ma* had gone to fetch water. It was raining. On her way back she slipped down a huge *kanlo*[45] with three *gagri* in *doko*. She was hurt on her back and those *gagris* crashed into a stone and were crushed. The funniest thing was; she was not worried about her wound and back pain but, about those three *gagris.*"

Suresh says that apart from large wild animals, many species of birds have also got extinct in recent days. *Jureli, Dhukur, Fista, Chuiya* (i.e., a type of bird that eats rice grains dropped on floor), *Rupi, Nyauli, Lampusrey* (i.e., a type of bird which used to be heard a lot is no more heard), and *Bhadrayo* are no more seen or heard of. With subtle smile on his face, Suresh admitted that he together with his friends in childhood hunted many *Bhadrayo*s, just to roast and eat its head. "There was a saying if we ate *Bhadrayo'*s brain, our brain would be very sharp," Suresh said.

Experiences of Suresh regarding birds remind me of a documentary of a helpless bird having nothing to feed its chicks screened in An Inconvenient Truth where Al Gore describes how seasonal change is affecting the breeding of migratory birds in Netherlands (Guggenheim, 2006). Since last three decades, caterpillars come out weeks earlier than the birds hatch their eggs, leading to food scarcity. Similar, ecological imbalance might have occurred in Champe as well, causing disappearance of various bird species.

Dwellers near Chintaloong Khola: Environmental Politics

Chintaloong Khola is the major source of water for residents living across its banks and residents of ward number nine of Champe. It originates at Helaucha and flows towards Champe. In Bantawa language 'loong' means 'rock'. Through a cleavage of a huge rock the river flows. Next to the cleavage, there is 'Gaumukhi

[45] *Kanlo* is steps on hillsides

Dhara', a tap that has 'mouth of cow' like opening. "DON'T TAKE THE PRASAD[46] *HOME! Have them all here," Suddhi depa used to yell every year we kids were around the tap after the priest completed 'dhara pooja'(i.e., worshipping of tap) and distributed prasad to everyone present.*

Today is 7th April, 2012 I went to see *Gaumukhi Dhara* after having my lunch. The *Dhara* reminded me of Suddhi *depa*. His full name is Suddhi Bahadur Rai. He is 63 years old and permanent resident of ward number 9, Champe. He runs a small shop for his living. When I went to meet him, he was sitting in his shop listening to his old fashioned classic radio by holding it with both hands close to his right ear. As he saw me approaching towards his shop, he put down the radio on his table and held his spectacles that were resting on his chest hung by thread. They were anchored by a black thread around his neck. He squeezed his face, twisted his head towards left that nearly dropped his *Dhaka topi*[47] and focused at my face with wrinkles around his eyes.

"Namaste *Depa*"

"Aahh..Namaste! Namaste! When did you arrive?"

"Last week!"

"This village looks deserted without youths like you. Either there are old people or women or children left. Our youths are engulfed by the Gulf monsters."

When I informed him about my research, he laughed at me and said, "How fast time slips away. You were a tiny naughty kid, running without undergarment here and there, now you are a learned man! Seventeen class you study in! Amazing! Sit, have a cup of tea, tell me about your parents, life in Kathmandu, I will definitely be

[46] *Prasad* is sacred food first offered to the God while worshipping and later distributed as God's blessings

[47] *Dhaka topi* is traditional and national Nepali cap

your respondent. Lots of people come here for conducting survey. Survey for road, survey for community forests, survey for finance. So, this line, from here till there, is survey line. They begin surveying from here."

He laughed gesturing at me from the street on the other end to his house.

Suddhi *depa* has partial deafness. Time to time, I had to raise my voice and repeat what I had already said twice. At that moment, when I raised my voice, he would laugh and say, "Speak low; are you going to pierce my eardrum?" After having plenty of personal talks, we gradually started invading towards the topic. He was full of surprises. First, he listened to me as if he had heard about climate change for the first time. Second, he began speaking, "Oh Climate Change! I have also heard about it in the radio; Ozone layer depletion, Green House Gases, Rio De Generio in Brazil during Girija's (i.e., late former prime minister Girija Prasad Koirala) regime. Rio + 20, is going to happen right? Environment has become a matter of politics!"

When I enquired about his personal experiences, he said, "Isn't timely rainfall one of the indicators of climate change? Well, three-four years down the line, there has been untimely rainfall. Instead of *Ashad* (i.e., June/July), it rains during *Mangsir* (i.e, November/December). We face heavy rainfall after prolonged drought. During drought, forest fires occur time and again. Last year, in *Tin Taley forest*[48], there was disastrous forest fire. Not only the woods were in blaze but many wild animals and young birds in nests burnt into ash. Similarly, the availability of water used to decrease only in *Jestha* (i.e., May/June) in the past whereas now, by *Falgun* (i.e., February/March), four months ahead, the water sources start drying."

"Metawe? – Haa!

[48] *Tin Taley* forest is one of the community forests literally meaning 'Three Storied Forest'

Likhawe? – Naa!"

"I heard this proverb when I was in Terai, *'Mitawe? Haa! Likhawe? Naa!*" Suddhi *depa* said after taking a long break.

I did not get what he meant. But as he elaborated, he was indicating deforestation. The proverb has metaphors '*mitawe*' and '*lekhawe*'. '*Mitawe*' symbolizes deforestation. People say 'yes' for deforestation whereas they say 'no' to '*lekhawe*', i.e., afforestation; planting of trees.

Picture 2: Office of community forest user group in Champe that was established in 2065 B.S. (i.e., 2008)

Picture 3: *Kalika Devi* Community Forestry User group's office that was established in 2052 B.S. (i.e. 1995)

"A decade back, there was a whim of 'Plant trees, save forest for environmental conservation'. People planted trees on bare hills. Currently there are four community forests in Champe. They have formed Consumers' Committee. But, I don't see that functioning well. The financial transactions are not transparent. Where do they spend the budget? No one knows.

They do not think about selling Oxygen to developed countries and earning dollars. They are merely concerned about firewood, timber, swattar[49] *only. People here quarrel for 'a doko of swattar'. Isn't this time of using better technology? There*

[49] *Swattar* is collection of dry leaves in forest, used for making manure

is not one biogas plant in Champe! We are comfortable to burning firewood. I have told your dema[50] to use LPG (Liquefied Petroleum Gas) cylinder. But, my wife does not agree. She says that the cylinder might burst. Well, I cannot convince my own wife, whom else could I convince about improved technology?"

Conventional VS Climate Technology[51]: Gap In-between Theory and Practice

At that moment, I realized that 'to know something and to implement what one knows' are two different aspects. I too had a hard time convincing *muma* to purchase solar panels for electricity. It was not because we could not afford. It was because, *muma* regarded it would be dangerous to use. Once when she was in Kathmandu, she had seen a house ablaze due to short circuiting of an invertor. "What if same happened, and this house would burn into ashes?" she always said and found *tuki* safer. But, finally when the whole villagers used solar *tuki*, *muma* agreed to purchase one. It was tough for me to communicate and intervene into the normative beliefs (Flynn, 2004) of my *muma*, because at times my communicative actions not only seemed 'less motivating' but were over ruled by *muma*'s communicative power.

Listening to Suddhi *depa*, I imagined how he might be feeling; as I was feeling pathetic for failing to convince my *kaka* to build a bio gas plant or use LPG gas. The reasons he denied were that it might be expensive to build the plant, and if dung was used for biogas, how could manure for field be prepared? Food cooked on biogas could be unhealthy, we already have solar panel so there is no need of bio gas to light bulbs, there are enough trees in the forest to provide us with firewood fuel, and LPG gas is expensive, unreliable and difficult to be supplied during monsoon due to poor condition of road. Well, he had few points which I could not deny. Although

[50] *Dema* means aunt who is wife of *depa*

[51] Climate technology refers to any technology that does not emit Carbon or any Greenhouse gases to induce global warming and climate change

the road way was good during summer and winter seasons, during monsoon, no vehicles would run. The road turns into swamp during monsoon. So the supply of LPG might not be possible throughout the year. Another factor is distance of our house from the road. Although the road way has touched almost every ward, it passes through the upper region of our ward. From the road, it takes twenty minutes of downhill; uphill would take longer. In addition, *muma* is comfortable with firewood and maize's *khoya* (i.e., solid inner part of maize; remnant after harvesting the seeds).

"You can see the agricultural road has touched our V.D.C. (i.e., Village Development Committee). The road came, that is good but, along with the road, it became easier to wipe the forest. '*Mitawe? –haa*!' is happening. Road has become a boon for bad guys to smuggle the timber," Suddhi *depa* had said.

I was surprised to see on my way home, agricultural road had been extended to every village. Even at places where there was very less human settlement. Is building road everywhere development? Is this how the local government spending their annual budget? Or is it the central government that was directing to construct roads that looked haphazard and unplanned. The tragic part was; deforestation to construct those roads. On the way, I saw people rocking saws on the stems of trees, huge trucks loaded with logs being driven towards the city, and the area being deforested. Who would stop those people?

Seeing at the logs lying on the damp grasses and woodcutters taking rest on the same dead trees that they felled down, the verses from William Cowper's "The Poplar Field" rang on my ears;

"The poplars are felled, farewell to the shade,

And the whispering sound of the cool colonnade

The winds play no longer and sing in the leaves,

Nor Ouse on his bosom their image receives."

They are better when they fall

"Chopping down trees; bad bad BAD;
Our teachers in school; teach teach TEACH
But, they also chop trees; down down DOWN
For firewood for timber and for sale sale SALE
Unemployed I was. But, no more I am!
I have a job, job and JOB
Pays me well; I earn breads for all, all and ALL
About these trees, who cares? I DON'T
They are better when they fall, fall and FALL
That way, we get money, money and MONEY"

-A boy from my village

I saw a boy from our village; he was one of the woodcutters. I stopped by and conversed with him for a while. He was a school dropped out. Few weeks back he got a job of a woodcutter. He was small but could rock the saw as hard and quick as an adult. When I asked him about climate change, he answered, "Why are you asking me? You must know it. If you really do not know, visit Poudyal sir in School. He will answer you."

Extinction of Aboriginal Species and Invasion of Uttis (*Alnus nepalensis*)

Another resident of ward number 9 of Champe, who depends upon the water brought from *Chintaloong* is Bam Bahadur Rai, 55. He is a businessman by profession. I had asked him to share his understanding and experiences of climate change.

He said, "Due to the excessive use of fossil fuels and primitive use of alternative energy resources like solar, there has been drastic change in climatic conditions resulting natural disasters like *Anabristi* (i.e., less precipitation), *Atibristi*

(i.e., heavy precipitation), drought, flood, landslide, extreme heat, et cetera is climate change."

There used to be abundant trees of *Dhalne* (*Castanopsis indica*) and *Chilaune* (*Schima wallichii chois*) species. Those trees used to be healthy. Their timber used to be of good quality and free from *mau* or *dhamira*. Since last two decades, those species of trees are infected by *dhamira* and *mau.* I had never noticed *Uttis* (*Alnus nepalensis*) two decades back. But, now, *Uttis* has spread all over the forest. *Uttis* grows faster and the region where it grows other species of trees is not found.

Birds like *kalo chime*, sparrow, and *jureli* (i.e., bulbul) are not seen or heard much. Large animals like tiger, fox, and *salak* (i.e., a type of reptile) have extinct. Due to disappearance of tiger, deer population has increased. With the increase in deer population, hunting and poaching of deer has increased. Due to disappearance of fox, number of mice has increased. Mice destroy house and field. *Salak* has been illegally traded for its skin.

Since last eight to ten years, there has been lesser precipitation, drying of water springs and lesser availability of water during regular irrigation time. The perennial sources of water dry by *Kartik* (i.e., October/November). So it has directly affected agricultural system. For example, in the past, maize used to be sown by *Falgun* (i.e., February/March), but it has shifted to mid or late *Chaitra* (i.e., March/April). Rice used to be cultivated during *Ashad* (i.e., June/July), but now depending upon the precipitation, it may shift to *Jestha* (i.e., May/June). Since, most of us depend upon agriculture; change in crop cultivation and harvest pattern has brought many changes in our lifestyle. Due to the shifting of agricultural pattern, the production of crops has decreased. In the past, we used to grow hundred *muri* rice in *khet*, now in the same field it is difficult to harvest twenty *muri* rice."

Synthesis of Climate Change Facts

Precipitation pattern is one of the key indicators of climate change. All of my participants have experienced alteration in precipitation cycle in Champe, though their way of understanding the causes are different. Since hydrological cycle is sensitive to climate change, along with it other components like water runoff in rivers (Cruz, et al., 2007) and water availability in springs are adversely affected. Due to sensitivity of hydrologic cycle, spring-fed perennial rivers have turned into seasonal. This could be due to lack of timely water recharge in earth.

My participants have also experienced rise in temperature. Sherey *fupa,* one of my participants regards the dramatic loss of glaciers due to rise in temperature as an indicator of climate change. The glaciers used to be seen in past throughout the year every morning on peaks. Similarly, his perspectives align to anthropogenic climate change theory. Other participants like Suresh, and Suddhi *depa* also stand on similar ground to Sherey *fupa*. However, *muma* and *Jay Bahadur* have their own theories of climate change. These theories are constructed by their socio-cultural setup. Ghimire (2010) said that changes in precipitation and temperature patterns affect the availability of fuel wood, fodder, grasses and drinking water. People are likely to face longer distances to collect such supplies, which might become scarce gradually. These factors increase workload of people, and indirectly affect their physical and emotional health. In case of Champe, various community forest user groups are formed in order to minimize the hazards regarding firewood, fodder and grasses that Ghimire (2010) shared. Likewise, Rai people in Champe have built water tank near natural springs and turned stone spout taps into modern ones which can be opened and closed. Otherwise, they were facing complete water scarcity in dry seasons. Apart from precipitation and temperature, my participants have experienced changes in floral and

faunal diversity. Many floral and faunal species are extinct or are in the verge of being so.

Thus, these experiences of changing precipitation pattern, rise in temperature, decrease water runoff in rivers; especially during summer seasons, drying of springs, lack of drinking water availability, extinction of biodiversity and spreading of particular species like *Uttis* shared by my respondents clearly indicate that climate change is happening in one way or the other. However, their perspectives about the factors causing 'climate change' are diversified. For them, climate change facts are constructed by their socio-cultural background. Participants like Sherey *fupa*, Suresh and Suddhi *depa* regard theories of natural science to cause global warming and climate change. They are more aligned to anthropogenic global warming theory because they regard human activities like deforestation, excessive use of chemical fertilizers and pesticides, burning of fossil fuels to run machines and means of transportation, hunting and poaching of rare animals and birds and other anthropogenic activities to be inducing current dramatic increment in local and global temperature and causing climate change. However, participants like Tulsi Kumari Rai regard climate change as a natural phenomenon that cannot be altered by human interest. She is aligned to non-anthropogenic climate change theories (Bast, 2010). Moreover, elderly generation like *muma* regard rise in evil nature in human beings inducing natural catastrophes, diseases, insects in crops, scarcity of resources and crises situation as punishment by mother earth. So for her climate change is a consequence of human beings abandoning ethics, humanity, values, norms and respect towards nature. She sounds like an eco-feminist to me. Her construction of climate change facts are based on intangible human behaviors. Thus, her perspectives draw a new boundary amongst theories of climate change i.e., anthropogenic climate

change theory based on eco-feminism and intangible culture of paying tribute to natural resources, biodiversity and ecology.

Chapter Summary

I was very surprised at the fact that people used to worry about if someone would sneak to their house in order to drop the surplus paddy harvest. Now, the time has reversed. Rai people have been experiencing the effects of climate change; drying of water resources, untimely rainfall, decrement in rice yields and other serials, et cetera. However, these country people have diverse perceptions on climate change. Aged people like my *muma* take it as the omnipotent God's curse to corrupted mankind or business of divine Rain God whereas literate ones like the school teachers and Suddhi *depa*, perceive climate change as a human driven phenomenon. Similarly, some of the villagers took climate change as an inevitable phenomenon because they perceived it to be driven by nature. As I spent my time with some of the rivers like *Lale, Bhude,* and *Chintaloong* I not only became nostalgic about my childhood and *fupa* but, became more aware about the dramatic changes going on. The incident of precipitation after forecast by a priest at the end of *hom* made me question at myself about spirituality and science. At a place where meteorological station has not been functioning since last one decade, these perhaps *hom* is meteorology and our priests forecast weather very calculatedly that the forecasts do not fail.

CHAPTER V

SOCIO-CULTURE AND ECOLOY; TRIAD IN CHAMPE

An Overview

In earlier chapter, we dealt with climate change experiences of Rai people. Those experiences shaped their perceptions and understanding of the phenomena; global warming and climate change. While dealing with experiences of Rai people of Champe, we came across various experiences related to socio-cultural and ecological aspects of Rai society and environment. This chapter is reflection of socio-cultural and ecological impacts of climate change on different entities of Rai society. Also, it deals with my second research question; how has climate change affected socio-cultural and ecological dimensions (e.g.; lifestyle, health, agriculture, social dis/harmony) of Rai people? Hereby I use metaphors like 'scarcity of *Rato Bhale*' to hint the socio-cultural crises of Rai people due to changing ecology. Similarly, I have tried to address interdependence of one dimension to another. Let's see how my quest for *Rato Bhale* paves a path towards burning issues of increasing health hazards, disease infections, increase in pest population, rise in drought, declining agricultural production and ecosystem services, a controversial issue of climate change causing 'eloping of wives', and vulnerability of Rai people towards climate change consequences.

My Quest for a Rato Bhale: Endangering Ecology

I got *pa'*s phone call at a midnight of April 2004 in my hostel. "*Muma* is severely sick," he said. Someone from the village had informed *pa* about *muma'*s condition. The next day, I caught a direct night bus from Gongabu Bus Park, Kathmandu to Hile, Dhankuta. Country road had been constructed from Hile till

Legua. Since the last bus had already left, I walked a bit and took shelter in a boarding house at Pakhribas that night. The next morning, I woke up early and kicked off my 'on foot' journey towards home. Unlike now, there was no road transportation service across Legua. We had to cross a long suspension bridge over Arun by paying Rupees two and climb uphill to Jarayotar tracing back our evolutionary wheel from being bipedal to four footed animal for walking, No, crawling!

At around seven in the evening, I reached home. *Muma* was lying in bed; high fever, sweating, lean and thin, sunken eyes, sunken and wrinkled cheeks, and semi-consciousness. With one of our neighbor, I headed towards Bhojpur, headquater of Bhojpur to book aeroplane ticket. Air travel in hilly area is not only risky but inconvenient. We returned home frustrated, as the then Royal Nepal Airline Corporation (i.e., referred as RA), the only air service provider in Bhojpur has halted the service due to cloudy weather since last two weeks.

To our surprise, on returning home we saw *muma* working in kitchen. That night she told us stories of hardship of her days in *Bhaise khet*, paddy field which once belonged to us. Everyday *fupu* fed *Rato Bhale's soup* to *muma*. In few days, *muma* started working in *bari*[52]. I, who had gone to bring her to Kathmandu for medical treatment, returned back by devouring *Rato Bhale's* delicious *wachipa*, meat and soup almost every day during my stay.

Having 'boiler' chicken in Kathmandu had come up to my neck. As I was in country, I wanted to have local *Rato Bhale*'s *wachipa* (i.e., also called *tite* in Nepali). To prepare *wachipa*, *Rato Bhale* is burnt along with its feather. The black powder of burnt feathers is collected. Similarly, the head, the legs and wings of *Rato Bhale* are

[52] *Bari* land means field at higher altitude of hills i.e., not swampy like *khet* land due to lack of access to canals, rivulets or rivers for irrigation. Sometimes kitchen garden is also referred as *bari*

cut into pieces and fried. Rice, salt, and spices are added to it. Thereafter, water and the powder of burnt feathers are added and boiled. The *wachipa* soup is ready.

Compared to boiler chicken, the local ones are tastier and more nutritious; or this is the standard assumption about local chickens in Rai community. Since my *kaki*[53]was pregnant, at least once a week, she was fed local chicken's soup and *wachipa*; to make her stronger as *muma* said. Therefore, there was shortage of chicken at home. Although we had a hen and a cock, *Muma* would not permit to sacrifice either of them for me because they were kept as *beu* (i.e., seed). They had a dozen of young chicken; six of which were pullets. *Muma* rare them up like a mother does to her offspring.

I could not tell anyone about my hunger to devour local cock's delicious *wachipa*. I roamed around the village. Obviously I spent a great deal of time interacting with villagers. However, my hidden intension was to search and find a 'healthy' *Rato Bhale*! As soon as I got confirmed that the house owner did not have any grown up *Rato Bhale* then I would hurry to end the conversation and check in the next house. Since, my village tour for *Rato Bhale* did not turn out to be fruitful; I had to wait for *haat bazar*. Fortnightly there is a *haat bazar* in Pokhari Tar, Champe-9. I went to the carnival to purchase *Rato Bhale*. Although I searched the entire place, I did not find anyone selling chicken. "May be I came a bit early," I guessed because many sellers with *doko* were settling in some empty stalls or were trying to find a space on floor in between other settled sellers.

Super Expensive Rato Bhale; Incubation of Socio-Ecological Challenges

I could see a lot of changes in the market. There were not many stalls like it used to be. In the food stalls *Mo:mos* and *chowmein* had replaced *sel roti*. Coca cola,

[53] *Kaki* is *kaka*'s wife

Pepsi, Mirinda, Fanta, Real, Fruity, et cetera drinks had replaced local curd, *mohi*, local *jaad,* and homemade wine. Ravi's shop was the most crowded one. Ravi owns a mobile shop that sells new mobiles and repairs the old ones. But the queue of people was neither to purchase cellular phones nor to repair them. Everyone was struggling to grasp Ravi's attention so that s/he could order him to upload Hindi movies' songs in mobile phone.

So, technology has brought a significant change in the social environment of Champe, I thought. Finally after going around the *haat bazaar* nearby office of Community Forest's Users Association, I saw a man with some chickens enclosed in a basket made up of *choya*[54]. I asked him to produce the biggest *Rato Bhale*. He produced one, when I asked for the price I was more than surprised!

TWO THOUSAND RUPEES!

I changed my mind of having a 'healthy' *Rato Bhale*. I asked him for an affordable one. He produced cocks of Fifteen Hundred, Thirteen Hundred, and finally a small one of One Thousand!

Well, I thought it would be wise to be economical. After all, only *muma* and I were at the house. On my way back, I started thinking why was the cost of a *Rato Bhale* so expensive? I had even asked this question to the seller. According to him, it's difficult to raise local chickens. They would start with twenty; some might die of unknown diseases, some cockerels become prey of jungle cats, some cockerels, even before being matured, are bought by villagers for *pitri pooja* (i.e., an annual ritual to worship ancestors), and only some finally survive to reach the market. But, were those the only answers? I asked to myself. Wasn't it too expensive to rate a cock which was

[54] *Choya* is long, thin, rectangular thing obtained by slicing bamboo. It is traditionally used in tying fences, making *nanglo, doko, dali, ghum, bhakari*, et cetera

hardly one kilogram as One Thousand Rupees? Cocks were not even weighed! I remembered that in our childhood days, we could find many farmers coming up in *hatiya* with their cocks, hens and chickens. But, currently, there were hardly two sellers. Are local species of *Rato Bhale* a mere macho symbol of chicken being lesser in number due to adaptation problems? *Muma*, *Shiktele* brother-in-law and other villagers shared with me about the unknown causes of death of pullets and cockerels. In summer, our entire chickens were swept by strange disease, I remembered *muma* saying. Whether these local breeds are affected by climate change or not could be another matter of study, whereas my quest for *Rato Bhale* was not easy and very satisfactory at the end.

Why is it a big deal to find a *Rato Bhale* in the country, where almost everyone rear and breed chickens? *Rato Bhale* is a natural alarm whose 'COCK-A-DOODLE-DO' wakes up people every morning. *Rato Bhale* is required for every ritual. A woman is pregnant, *Rato Bhale'*s soup is regarded as a must diet to strengthen her and gain good health. A baby is born, during his birth ritual, *Rato Bhale* is needed. During *dhara pooja* (i.e., worshiping tap), *pitri pooja* (i.e., worshiping ancestors), *baan pooja* (i.e., worshiping forest) and any other kind of rituals *Rato Bhale* is a must. Is the scarcity of *Rato Bhale* and gradually fainting COCK-A-DOODLE-DO of *Rato Bhale* signifying our vulnerability towards climate change? Is this crisis indicating an entrance to incubation period of socio-ecological vulnerability of Rai people of Champe?

Plethora of Diseases: A Response to Rising Temperature

"Whenever there is drought, there is lesser availability of water not only for drinking and household purposes but also for irrigation. We are compelled to leave

our fields barren. Similarly, our domestic animals get sick. This month five of my chicken died," Sharmila said.

This is not only the voice of Sharmila, but, most of the people whose houses I passed by and inquired about the number of chicken they had had similar fate. When she said about the chicken, I remembered how carefully *muma* was taking care of chickens at home.

"Nowadays, we should protect chickens not only from jungle cats, fox, *mal sapra*, and cold, but from strange diseases as well." *Muma* said to me one evening. Health-post of our village was closed for weeks because the health assistant was on leave. Even the district hospital was deprived of adequate number of medical doctors, to have a veterinarian in a remote village like ours was out of the question! Therefore, despite of the deaths of chicken or other domestic animals due to unknown diseases, no post-mortem studies are done. Hence, the causes of deaths remain as an enigma.

According to Suresh Rai, since last three years, a lot of communicable diseases have spread in the village, especially, *luto* (i.e., itching), allergies, pneumonia, jaundice, et cetera. He said that although serious diseases spreading via mosquitoes have not been clinically noticed, mosquitoes that were only found in *besi* have entered in the village which is in higher elevation compared to *besi*. Since our region was regarded as colder place and we never experienced mosquito bites during our childhood, the information about mosquitoes invading the village surprised me. Thereafter I remembered a lecture of Professor Roshan M. Bajracharya back in university and 'An Inconvenient Truth' where my professor and Al Gore had illustrated regarding the migration of species, specially insects like mosquitoes, from lower lands to higher altitudes due to rise in temperature respectively. "So, average temperature of the village might be increasing and this phenomenon is inviting

various (un)identified diseases in human beings, livestock, vegetables and crops," I thought.

According to Tulsi Kumari Rai (50), peculiar seasonal change has been experienced lately. Extreme temperatures are experienced in winter and summer. In winter it is too cold for fortnight to a month, thereafter the coldness becomes mild. Similarly, in summer, extensive heat is experienced. Although there was no health post in the past, sick people used to go to district hospital in Bhojpur. Then, I had not heard about people falling sick due to jaundice. Since four-five years from now, many people suffer from jaundice during summer.

According to Cruz, et al. (2007) in South-East Asian countries including Nepal due to climate change poses substantial risks on human health. Research findings of Kovats et al., (2003) suggested that the insect-borne infectious diseases strongly modulated by future climate change included malaria, schistosomiasis, dengue fever and other viral diseases (as cited in Cruz, et al., 2007, p. 487). A projection made a decade ago is happening in Champe. My participants used to experience mosquitoes only at *besi*, however these days even in village i.e., at higher altitude where mosquitoes never appeared in the past have started appearing. With the rise in temperature insects like mosquitoes migrate to higher aleviations (Guggenheim, 2006). As mosquitoes are vectors of many infections and diseases such as malaria, filaria and leishmaniasis, public health of Champe is vulnerable.

Climate Change Beats Agriculture

Tulsi Kumari Rai (50), professionally a teacher in Champe High School says that there used to be timely rainfall in the past whereas now it is draught during crop cultivation period. Due to various factors like untimely rainfall, decrease in number of domestic animals and less availability of laborers, various alternative ways are

practiced like; building canals to supply water for irrigation, using chemical fertilizers and insecticides. Yet crop production has not improved.

"The population of Champe has not increased much in last decade however the crop production has gone down. There has been shift in cultivation pattern. For example by *Falgun* (i.e., February/March) farmers used to sow maize seeds but three years from now, no one sows maize seeds on *Falgun* (i.e., February/March). You can see, this is late *Chaitra* (i.e., March/April), yet many have not sown the seeds. Similarly, *hiudey bali*[55] did not exist before six seven years. But, lately, farmers grow winter crops. Although farmers use about one *muri*[56] of chemical fertilizer in one *ropani* field, the crop production is not compatible to that of initial days. Grains harvest from one's field used to be sufficient except for few peasants, but now very few farmers harvest sufficient grains.

Rice produced in our field is not enough always, so we have to purchase rice in the market whenever we have insufficient production. However, during good harvests, I sell some amount of rice in average market rate. These days with the arrival of road, the price of imported rice is cheaper than the price of locally produced rice. Although, local rice is better than the rice from Terai in terms of taste, but cultivating rice has become a herculean task. Many people have switched their occupation from farming to employment in Middle East as laborers, security services such as; British Gurkha Army, Singapore Police, road construction, building construction, coal mines in border areas, chopping down trees, and sawing timber in village. Due to these factors farm laborers are expensive. Hence, people are discouraged to do farming.

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[55] *Heudey bali* means crops grown in winter

[56] *Muri* is local system of measurement; one *muri* is approximately 57 kg

Lal Dhoje, one of the widely grown rice varieties in *Lekh* used to be juicy and delicious. But, recently it has become extinct. In *Besi*, *Attey* is no more grown. Some farmers started to grow *Belbuthi* instead of *Attey* some ten to fifteen years ago. After few years, *Attey* was replaced by *Nilo/Rato Dankle*. During the early days, these new varieties yielded good harvest. But, currently their production has gone down. Similarly, in Soryang, a village in ward number two, Champe, *Masina Basmati* a very delicious and aromatic rice variety no more grows. Very few farmers continue growing *Tulasi* in Soryang due to its decrement in yielding," Tulsi Kumari Rai being melancholic about the better rice yield in past said.

According to Bam Bahadur Rai, "The average annual production of cardamom in Champe used to be 500 *maan*[57] but currently the production has gone down. Currently even the price has gone down. Once, during the regime of *Makune* (i.e., Madhav Kumar Nepal), the cost of one *maan* of cardamom was NRs. 72,000! Now it is about 38-40 thousand only. May be political situation also plays a role in the crop cost, however, the cost might have gone down due to our poor production, degrading quality as peculiar disease is spreading in many of our cardamom farms."

Min Bahadur Rai said, "Farming has become comparatively easier due to availability of chemical fertilizers and pesticides, and construction of irrigation canals but, rice produced in a season would be sufficient for six months only, remaining months we purchase from others or market with the money we earn by selling cardamom. We cultivate four types of cardamom; *Chip sai, Ram sai, Ghol sai* and *Dambar sai*. *Chip sai* is the smallest in size and the cheapest in price. Its current price is NRs 38,000 per *maan*. *Ram sai* is smaller than others but larger than *Chip sai*. *Ghol sai* is larger than *Ram sai* but smaller than *Dambar sai*. *Dambar sai* is the largest and

[57] *Maan* is local system of measurement. 1 *maan* = 40 kg

the most expensive cardamom. Its current price is NRs 40,000 per *maan*. We are suffering from multiple sides. First price of cardamom is decreasing. Second cardamom plants are being infected by new diseases. Third when we propagate the cardamom, the productivity of the new plants is degrading. Fourth, we are clueless about mitigating these challenges. So, farmers are in panic situation."

My participants have experienced rise in average temperature in Champe and increase in resistive pest population. According to Rosenzweig et al. (2001) studies done in temperate regions of Asia show that higher temperature increase pest population (as cited in Cruz, et al., 2007, p. 483). "I do not feel cold as I used to in past winters," a comment by Sherey *fupa* clearly points out that winter temperature has also increased. Due to warmer winter temperature, winter killing of insects declines. Similarly, higher temperature and Carbon level in atmosphere create favorable environment for weeds to grow (Cruz, et al., 2007). In Champe, we manually 'pick up and throw' weeds. "In recent days, more number of *khetala*s is required to manage weeds in maize field than in past," *muma* said to me. Thus weed management requires more human energy, time and economy.

The socio-cultural rituals of indigenous hilly people have close linkage with rice (Khattri, 2005). Rice cultivation is dependent upon abundant availability of water. Since, the irrigation canals are not well developed. Farmers depend upon precipitation. Alternation in precipitation pattern affects the rice cultivation pattern. Since rice production is intimate to socio-economic aspects of Rai people, it has affected their traditional cultures and festivals like *Sakela*.

Since Rais are subsistence farmers, rice cultivation is closely linked with our traditional customs, rituals, cultural and political aspects apart from livelihood. In between the politics of multinational seed companies, climate change, lack of

adequate research in mitigating diseases in major cash crops, and visionary agricultural plans and projects along with agriculture socio-economy of Rai people are at stake.

Drought is one of the results of downscaling precipitation (TERI, 2010). Drought induces lower decomposition rates which may cause accumulation of organic material on the forest floor disturbing nutrient cycle and fire regimes as ramifications (Hanson & Weltzin, 2000). Also, the study carried out by Hanson and Weltzin (2000) shows that due to drought, the disease resistivity of plants decreases, young saplings die and the trees suffer from diseases.

Climate Change Declining Crop Production; Reality or Myth

"Vijaya Climate Change is day after day being a political issue rather than pure science." Qianggong Zhang, Associate Professor at Chinese Academy of Sciences and my *ga*[58] shared with me last March, when he had visited Nepal to collect air pollutant samples from stations built in five different places in Kathmandu to investigate the traces of chemical air pollutants and their transportation from one place to another.

So the changes that are happening around like reduced productivity of earlier paddy grains, necessity of introduction of new seeds every couple of years in field could be due to giant multinational seed companies rather than mere climate change. How do large scale companies control food? How are farmers forced to change their pattern of farming? How are food farms turning into food factories? These issues are well dealt in a documentary 'Food Inc.'. This documentary was recommended to me by Zhang *ga*. Although, agriculture in Nepal has not significantly transformed from food farms into food industries like in developed countries, but the regular change in

[58] *Ga* is abbreviation of *Gaga* meaning brother in Chinese language

varieties of paddy cultivated in Champe, somewhere sows the seeds of skepticism against the seed companies that have genetically modified the seeds promising better yield to farmers. Most of the farmers complained that a variety of rice would grow well for a couple of years, thereafter the production quality and quantity starts declining.

Loss of Social Norms and Values: Explicit Theory of Climate Change

Jay Bahadur Rai caught my wrist and whispered, "Due to climate change the entire environment of this village has gone upside down." I nodded my head becoming slightly curious, he continued, "Due to this climate change one's wife elopes with another man, another man's wife has affair with another third man. In the village, it's difficult to identify which child belongs to whom. A matter to worry is, one's wife might come back to oneself after a chain of affairs."

Confused!

Had I expected such peculiar reply, the reply would not have surprised me.

"*Depa*, and how are those effects of climate change?"

"These so called educated people living in town don't have common sense! If climate did not change in such a manner, farmers of Champe would stick to agriculture, animal husbandry and other traditional occupations. Do you know that the production of rice has gone down by seventy-five percentage? From last year, new diseases in Cardamom has spread and ruined almost every farmer's production. At one hand income from cash crops has decreased due to inadequate production whereas in the other hand inflation of everything has gone up. Poor farmers are sandwiched in between! Do you think farmers would continue their inherited occupation?"

Still I did not understand the connection between changing human relationships and changing climate.

"People are changing their occupations. Nowadays, youths are not enthusiast about working in soil. They regard farming as the last option. They have built hierarchy of priorities. Most of the youths in this village first try to enroll in British Gurkha Army, second in Singapore Police, third Indian Army, if they could not succeed, then in Nepal Army, if not in Army then in APF (i.e., Armed Police Force), if they failed in APF, then Nepal Police. Those who fail in all these or have lesser interest to become security personnel, and then they apply for Gulf countries or at least go to India to work in coal mines."

I remembered *muma* telling me about our family history. Our *fupa* had eight siblings including him. He inherited a small piece of land as his *angsa*[59]. Since the so called aristocrats used to dominate us for being 'poor', *fupa* joined British Gurkha Army. With the money he earned, he bought many 'expensive' paddy fields. After getting retired, he returned back to village and started reformation in agriculture, irrigation channels, education, drinking water access and other social issues. He was even imprisoned for initiating to establish a primary school in *Kunakharka*.

"*Oe keta*, where are you lost?"

"*Depa,* but men used to migrate outside to earn money in our *fupa'*s time as well…"

"Yes, yes, but, not in such a scale. Men hardly return back to village, like men in those days used to do. There used to be intimacy between those men and their family. Remember, in those days those men outside and their family here did not have these sophisticated mobile phones to communicate, they depended upon postal letters;

[59] *Angsa* is division of paternal wealth among the 'sons' as heirs.

many of them did not know how to write and read, they had to rely on others. But, nowadays, you do not see even a child without a mobile in his/her pocket."

"Is not it good to have access of technology?"

"Good? Men work in gulf countries for years; wives here get tired of waiting for them. If they came once in Dashain or in other vacation, their only work would be to sow their seeds in the wombs of their wives. Time has changed a lot; today's wives do not have patience and tolerance like in old days. After all, everyone seeks love, affection and company. So, a woman might be married to a man, bore a child of another man, lived with another man, and remarried with the next one to conceive half biological sibling of the first child."

"Whose fault is this?"

"CLIMATE'S!!!"

Although, Jay Bahadur tried to convince me with his theory of climate change bringing occupational hazard, compelling youths to disengage from agriculture, motivating towards occupations in foreign land, migrating away from home, failing distance relationship, and falling for extra marital affairs or divorcing with new hopes of company inviting disharmony in societal norms and values. However, I was not fully convinced.

Climate Change Induces Resource Conflicts

We have already witnessed an example of conflict over water resources faced through a bitter memoir of Suresh having his father's conflict with *Surke Maila* over the issue of water in earlier chapter, through the experience shared by Suresh Rai in "*Jere Khola;* planting only yours isn't fair!" which led to social disharmony not only between those two individuals but among their families and relatives. Similar conflicts occur time and again in our village. We have also faced conflicts with our

neighboring farmers while irrigating our fields. We have to guard the canal even at night so that nobody could foul play our turn of irrigating field.

According to Tulsi Kumari, *Gojeni Dhara* and *Tesmari Dhara* have not completely dried but are in the verge of drying. The amount of water flowing from these taps has significantly decreased in recent days. The sources of water of these public taps are natural springs and *Chintaloong Khola*. Near these sources *khet* are present so during *byad* preparation (i.e., preparation of paddy seedlings in the field) the water is channeled to the field. So, the public tap gets dried. If the water level decreased in the sources, there would be conflicts between residents of ward nine and farmers. Many times the villagers who consume water from those taps and the farmers who channel the water into their fields have quarrels.

The social conflicts for access of resources like water, forest products, fodder, timber, et cetera have recently increased due to limited availability. Since the demography of Champe is somehow stable, change in hydrological cycle, change in average local temperature, et cetera phenomena due to climate change seem to be a reason for scarcity of resources further leading to social disharmony and conflicts.

Tiger Tiger No More Burning Bright: Ecological Imbalance

I went to visit *Sherey fupa* again, this time while conversing about the new diseases that had been infecting cardamom of almost every villager in Champe, my eyes got entangled on a rifle hung on wall. It looked classic to me. Abruptly I inquired about the rifle.

"I had two guns, the other one was automatic that Maoist took during insurgency. This is old, but it is my favorite one. I used to go for big games in jungle when I was young. That one, pointing at a skin of a dear hung next to his rifle, was my last hunt. In those days, hunting a deer was not as easy meat as these days. People

feared of large carnivores like tiger, spotting a deer, chasing it and taking the right shot were skills of very few great hunters. But nowadays deer are found almost like goats. So there is no more fun going for games. Similarly, whenever we liked having fish, we used to go to river with our *balchi*, catch some fishes, bring at home and fry. But, these days, there are no fishes in our rivers. So, fishing culture has almost become extinct."

On March 31st 2012, I meet Suresh Rai. As we start talking about wild animals, his eyes open wide. By slapping his thigh with his both hands at intervals he shares me following story;

I used to accompany my father in pastoral works. When I was in sixth grade, as usual we had taken our cattle to the jungle for grazing. While returning home in the evening, suddenly a tiger came on our way. With fear, we held our breath. The herd of sheep was the only barrier between the tiger and us. The tiger ate six sheep, other sheep got scattered, and we hid behind the woods.

Another incident was when I was in seventh grade; we had taken cattle to graze in grassland near the jungle. In the afternoon, suddenly we heard screaming of sheep. We went running towards the spot. Two sheep had already been victim of a tiger. The tiger did not eat the sheep with head facing towards West but, it took the second one into the jungle.

Once while returning from khar[60] *bari, I had seen a tiger sleeping near the stream. Since, I had to cross the stream to return home. I dropped a huge rock from the hill. It woke up and ran towards the jungle.*

---

[60] *Khar* is a type of wild tall grass that is used to make thatched roof or broomstick.

On May 22 or 23 2006, a tiger made our pregnant cow its prey while it was grazing near the jungle. Similarly, few months later, another cow was also hunted by tiger. During those days, we used to have a lot of field works. So, while working in the field, we used to let our cattle graze freely in the forest situated in next hill. That evening, it rained. As we were tired, we did not go to fetch the cattle. That night the cattle took shed in the jungle. The next day when they returned, one of the cows was missing. Father and I went to the jungle. On the way we found carcass of our cow. The tiger had only eaten its fancho(i.e., mammary gland). Since we had no idea about what to do, we left it there. After few days, only hard bones were left. May be the tiger came again and ate.

Since, three four years, such incidents have not taken place. Our cattle can graze safely in the jungle. We can take them to the jungle, leave them there and do our works in the field. They can return back to the shed on their own in the evening.

With the disappearance of tigers, there has been rise in the population of deer. In last three years, I have tasted three deer. Three years back, we were mending our roof, a deer came running towards our house; it was being chased by a dog. Karma daju[61] *caught the deer, and we had feast in the village. Two years ago, we were returning from mela*[62]*, we saw a deer falling down from a steep hill. We brought it in the village and had another feast. Last year, a deer was grazing in corn field of Danda Ghare*[63]*, we caught it and had the third feast.*

Disruption of Food Chain

Hunting was a culture among Kirant people. Even in Mahabharat epic Kirants are described as hill dwellers good in archery and war skills (Chemjong, 1966).

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[61] *Daju* means elder brother

[62] *Mela* literally means a carnival, but here it refers to working in field

[63] *Danda Ghare* is a Rai family whose house is at top of a hill

According to *Sherey fupa*, he used to go for hunting deer. To bring deer at home was a matter of pride. In the jungle, there used to be fear of tigers. Deer were not easily available. However, now the population of deer has gone high. Deer can be seen in maize fields. The population of larger animals like tiger and bear has gone down. May be that is one of the reasons of increase in population of deer. As the population of deer has gone up, resources in forest are limited so they have started encroaching human territory. One day I had even met a group of teenagers going towards jungle. They said that they were going to catch deer.

In the past the local people suffered from wild animals' threat. At times, they had to bear loss of livestock due to wild predators like tiger. However, in recent days, time and situation have reversed. Tigers are not witnessed like in the past. Deer coming in settlement areas, fields of people indicate that the population of deer has increased. It could be due to lack of predators of deer in higher trophic level, increasing their probability of survival. Lack of wild predators has eased the works of farmers as they could leave their livestock in the jungle for grazing without any fear. Also, they do not have to bear any economic loss as their livestock are safe from wild predators. However, the rise in deer population has brought tangible and intangible problems in the village. Many subsistence farmers have to bear loss of grains not only due to rodents but due to deer as well. Due to lack of awareness villagers often catch, kill and have wild deer.

Koseli: A Wasteland for Future Generation?

"Brother your nephew is coming from Bhojpur (i.e., headquarter of Bhojpur district) tomorrow morning. Please join us for lunch."

Yesterday, 27th March 2012 on my way home I met Daya Ram Rai, he invited me for lunch. I could not deny. While *muma* and I were having dinner last night, I informed her about the invitation.

"What *koseli* will you offer them?" *muma* asked me. I had not thought about taking anything. So, I slipped my lower lip and raised both of my shoulders with hands gesturing "I don't know". She suggested, "Take those sweets and some spices that you brought from Kathmandu along with you. You should not go empty hands."

Today, I woke up at six. I have fetched four-five buckets of water from the tap to sprinkle it over garlic and onion in our kitchen garden. Since not a drop of rain has fallen, like everyone's, our *bari* land is also drying. By this time maize seeds should have been sown but, fields are dry and barren. However, I do not want these young green garlic leaves to wither of dryness.

"When are you going to Daya's house? Go early and return back soon", *muma* says loudly from veranda.

"Don't let the rice get cold, return soon".

Since I am not habituated to such field work; watering the plants, I get tired soon. While resting on *muda*[64], I see beautiful butterflies; butterflies of different kinds. Those butterflies fly around our orange tree. I climb the tree to have closer look at those butterflies hovering over the young flowers of orange. I take off my camera from my pocket to click some good shots. As I reach near the top of the tree, I see big ripen oranges. From the ground we could see only few. Since they are at the top perhaps no one tried to get them down. I climb higher to pick those oranges. I pick up

[64] *Muda* is traditional stool made up of bamboo and leather; nowadays parachute ropes are used instead of leather

the nearest orange. It is big and tight. I remember *muma* saying, "Tight oranges are sweet and juicy". I peel it off and try the fruit.

"Ahh, it is sweet and juicy!"

"*Santu*[65] are you in the tree? Be careful. And, don't shake the tree, the flowers are delicate. If they fell, there would be no oranges on October", *muma* says seeing me standing on branches of the tree and picking oranges.

After dropping down all of the oranges, I climb down the tree. The twigs are small but quit strong to hold me. But, sometimes I step on thorns and that hurts my barefoot. I collect the oranges from the ground in a *dalo*[66]. The *dalo* is filled.

"*Muma,* try these oranges"

"Oh! You did well by dropping down the oranges. I didn't know there were many oranges in that tree. But, oranges at this month would have lost their sweet juice. They might be tasteless."

"No *muma,* please try one"

"Incredible! By *Chaitra* (i.e., March/April), oranges used to dry or become tasteless. This year, they are still so fresh and juicy!"

Muma becomes surprised by the taste of orange. I gaze at the tree. It is beautiful, covered by small and white flowers; the fragrance of flowers is attracting bees and butterflies. These insects are helping in pollination while helping themselves with the nectar.

"Ecosystem Services; insects helping in pollination of flowers and biodiversity", ring in my ears. "Are these butterflies in the collection of *Putali Baje*[67]?

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[65] *Santu* is my home name; an abbreviation of Santosh

[66] *Dalo* is a traditional basket made up of *choya*

Are these butterflies identified or some of them do not fall on six thousand plus butterflies species of Nepal?" I wonder and question to myself.

"*Santu*, when are you going to Daya Ram's home? Don't delay. Your hosts need to go to *mela*. Hurry up! I have prepared *koseli* for them on your behalf. It's on the *khopi*[68]".

Along with the *koseli* prepared by *muma,* I put a dozen of oranges in my bag. Now, I am not empty handed like *muma* warned last night. I have heavy *koseli* for my host of lunch today. However, do I have abundant *koseli* left for the next generation? On the way to Daya's house, myriad thoughts intersect in my mind. In the past, except from some cruel years, we never had to water the vegetables; nature did as a part of hydrological cycle. What might happen if the dryness prolonged, and springs disappeared? Water for irrigating vegetables would be the third option, drinking and household purposes being the first and second. A dreadful deserted scenario of Senegal (Sylla, 2012) where drought has prolonged for many decades, food and water are scarce for both people and animals, and everyone is fighting against the crisis alarms me of the kind of *koseli* we are restraining for our younger generation. We grew up in the orange orchards; they might never get a shade of an orange tree or a taste of the first ripened oranges like we did.

Disaster Preparedness: Null

"In 1981, we faced one of the longest droughts in Champe. During that time the cost of rice had inflated to NRs 90 per kg. Very few could afford to purchase rice.

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[67] *Putali Baje,* literally Butterfly Grandpa is the British national Colin Philip Smith who has collected 25,000 butterflies visiting 40 districts during his 45 years of stay in Nepal.

[68] *Khopi* is a small shelf on the wall of the house

So, most of us depended upon government's compensation distribution. During that time, grains had even come from India.

In 1994 hailstorm destroyed paddy in the field before harvesting in Eastern and Northern parts of Champe. It destroyed most of the crops. Two third of the ripen crops was dropped down by the hail. Remaining crops did not yield good harvest. Every farmer was affected. To provide aid to the victims, even we had raised fund through Village Development Committee in the village, and even among staffs in Champe High School. Farmers around here also got some portion of their loss compensated. But, we did not get any compensation. The reason behind was my source of income in the school.

On 16th May 1995, around quarter past one in the afternoon, there was heavy downpour and lightening. Due to the lightening, the old building got collapsed. Many students, teachers and supporting staffs got injured. Even their clothes caught fire. The injured were shifted to the new building. The whole building was full of students getting medical care and saline water. One of the supportive staffs had become unconscious for a week."

Tulsi Kumari Rai shared her experiences of natural catastrophes. Her experiences are evident about vulnerability of Rai people due to climate change induced catastrophes.

According to Suresh Rai, once in November 2005, due to hailstorm the entire crops of the village were destroyed. In the leadership of Balbhadra Rai, every farmer from Champe Village Development Committee had gone to demonstrate agitation in front of CDO's office (Chief District Officer's office i.e., District Administration Office) in Bhojpur demanding compensation from the government. We had no choice, but to join the crowd, as all of our hard works had been destroyed. The government

announced one million rupees as compensation to the victims of the hailstorm disaster. But, those ten lakhs did not reach the poor farmers. The leaders said that 'road for village is more important', so huge chunk of the amount was spent for construction of road.

"In later decades, we experienced many natural disasters like earthquake in 2045 B.S. (i.e., 1988 A.D.), disastrous hailstorm in 2048, 2051, 2058 and 2063 (i.e., 1991, 1994, 2001, and 2005), and prolonged droughts." Sherey *fupa* had shared with me.

Similarly, Bam Bahadur Rai (55) said, "In 2028 B.S (i.e., 1971). During *Asoj* (i.e., September/October) and *Kartik* (i.e., October/November) there was extremely intense blowing of wind, hailstorm and downpour. In 2049 B.S. (i.e., 1992) due to *Andhi*[69] blew away entire roofs of Champe High School and roofs of many houses in the village. In 2055 B.S. (i.e., 1998) during *Asar* (i.e., June) and *Shrawan* (i.e., July) there was flash flood in Champe. The flood had swept away *khet* land of Hari Bahadur Rai."

Since Champe, a small village in Nepal suffers from increasing flood due to hydrological changes (Cruz, et al., 2007) there is increase in loss of life and decrease in crop yields. In a country where majority of the population is directly dependent upon agriculture, would not the low crop yield devastate economy and increase vulnerability of Rai people?

Table 1: Annual Precipitation in Bhojpur

Year	1999	2000	2001	2002	2003 onwards
Rainfall/mm	1528	932	1305	1178	Not Available

Source: Department of Hydrology and Meteorology as cited in CBS (2010)

[69] *Andhi* is whirlpool of wind

Fluctuation in precipitation pattern is an evidence of climate change. Above table 1, shows the annual precipitation in Bhojpur. Bhojpur faced irregular rainfall in late 1990s and early 2000s. In last decade 2000 seems to have least rainfall, however, I did not find any data regarding the annual rainfall in the region after 2002. Isn't it height of negligence of Department of Hydrology and Meteorology for not maintaining the station in order to keep updated meteorological information? Had there been weather forecast, measurement of precipitation and other climatic study, farmers not only in Champe but in whole Nepal would have been prepared for predictable consequences of climate change. That could further minimize the risks of climate change vulnerability.

Human systems act and interact with earth systems in countless ways. So, the impact of climate change on human, and vice versa, is felt at the interface of these two systems (TERI, 2010). The Kyoto Protocol, 1997, the Copenhagen summit (COP 15) held in 2009 in Denmark, Bali Action Plan 2007, the Cancun Summit (COP 16) held in 2010 in Mexico, and the COP 17 recently held in Durban of South Africa are the endeavors at global scale to tackle climate change. However, these global endeavors fail to address the environmental self-determination rights of indigenous people (Tsosie, 2007).

Preparedness for climate catastrophes. "Climate change is happening naturally. Natural calamities like draught, hailstorm, heavy downpour, flood et cetera might occur. But, what can we do if nature herself deceives us? For irrigation purpose, at most what we can try is to locate source of water and channel it to our field. If water resources dried out, if temperature increased tremendously, then, alternatives will be considered then. Now, we have not faced extreme crises so, life is going on." Tulsi Kumari Rai said.

Various radio programs, workshops organized in Champe High School by Red Cross, Agriculture Department and other stake holders have created awareness about draught, flood, epidemics and other consequences of climate change along with mitigation strategies. However, they do not seem to be highly effective due to lack of genuine participation of local people. Only some educated and wise Rai people seem to participate and take severe climate change consequences seriously. Others regard it as 'act of God'.

To observe the evidences of climate change, I visited Langtang National Park, Rasuwa on October 2010 accompanied by Dr. Jianzhong Xu and Dr. Qianggong Zhang, researchers from Institute of Tibetan Plateau Research, Chinese Academy of Sciences. Along with the experts who collected the ice samples from Yala glaciers to study Mercury deposition, I stepped on High Camp of Yala peak. From the height of about 5,300 m, I could closely observe the evidences of climate change; glacier retreats (Yala and Lirung glaciers), newly born moraines and acidic water in streams. Although till Kyanging Gompa, being tourist area, there were better facilities for livelihood. However, the situation in non-touristic remote areas like Champe is painful. There has been lesser awareness of climate change resilience, and no resilience strategies are developed by local authorities.

Chapter Summary

In this chapter, socio-cultural and ecological impacts of climate change on Rai people of Champe have been disseminated. Climate change has directly affected agricultural production. Not only farmers cultivating cardamom as cash crops are adversely affected but subsistence farmers who cultivate rice, maize, potato, wheat, et cetera are also suffering due to increasing pest population induced by climate change. Government has become the only source of compensation for the loss caused by

natural calamities like hailstorm. Most of my participants were speechless when I enquired them what would they do if natural disasters like hailstorm destroyed entire harvest and government did not compensate. Tulsi Kumari's answer, "Let's see what will happen then, if such situation came", clearly shows that Rai people of Champe are unprepared to climate change disasters. People have experienced frequent sickness, new diseases in plants, changing social structure, downpour followed by flash floods, drought, decrease in crop yielding, loss of floral and faunal species and other dramatic ecological changes. However, they are unaware about the ground causes of local climate change, their socio-cultural, economic and ecological vulnerability and urgency of adapting and mitigating climate change.

CHAPTER VI

INDIGENOUS KNOWLEDGE OF FOOD SECURITY FOR CLIMATE RESILIENCE

An Overview

Till now I have discussed about climate change experiences of Rai people and its socio-cultural and ecological impacts on Rai people. What often gets shadowed is indigenous knowledge that shapes the indigenous ways of lifestyle. To incorporate indigenous knowledge of every nook and corner in lives of Rai people is complicated and complex to me. Therefore, I am focusing on indigenous knowledge related to food security in this chapter. This chapter explains my third research question, "How does indigenous knowledge of food security of Rai people support climate resilience?" I am going to interpret how indigenous technologies and methods of harvesting, preserving and storing food helps to develop climate resilience.

Khetala[70]: Labor Sharing

Today is Monday, 2nd April, 2012. Unlike last week, I am not watering the plants. Since last Friday, it has started raining. The day before yesterday, *muma* went around village to summon *khetala*. "Tomorrow, everyone is going to *Danda Ghare*'s for *mela*." *Muma* had told me being upset. But, today from early morning, *muma* is busy preparing *jaad* and rice to pay as wage for *khetala.*

In the past, we did not pay wage in any form; grains or money to our *khetala*. We had a dozen of family members in the house so we used to go *khetala* in return for those who came to help us. But, now, only five of us stay in village. My *fupa* expired,

[70] *Khetala* is a Nepali word meaning laborers; instead of wage, either labor is shared or certain amount of grains is given.

all seven *fupu*s got married, *muma, maili fupu* and *kaka* have grown old, *kaki* is occupied with chores and young children. So, these days, either we pay money for *khetala* or provide them food grains.

At around ten, one by one *khetala* arrive. Among them were young boys who seemed to be below 16 and few middle aged women. As soon as they come, they ask for *muma. Muma* brings big bowls full of *jaad* for them. "*Muma,* thank you, thank you. Without this we do not get charged to work." *Muma* nods her head, smiling in between her fallen teeth, and pours more *jaad* to those who already drank a bowl in one breath. Thereafter, we go in the field.

The middle aged women and few other young girls carried manure from shed and dumped in different places of our field. Two *hali*[71], boys whom I had noticed at Champe School in Science Practical Exam of ninth grade, drive their pair of oxen. Following them are two young girls of about 11-13 years old carrying bags full of maize seeds that *muma* had bought from *Danda Ghare,* and dropping maize seeds from the bags in certain intervals of time and distance behind the *halis*. Being enthusiast to work, I ask one of the little girls to lend me her bag for a while. Well, I admit I am pathetic at sowing seeds. So, I return back her bag and go to fetch water instead.

In fact, *khetala* is an indigenous way of sharing labor (Sherpa, 2005). But, in recent days, this indigenous system of harvesting is being slowly extinct as most of the men in the house have migrated outside village, district, country or continent for earning a livelihood. Only, aged people, women who are already occupied of household chores and children are left in the village. So there is scarcity of *khetala.* Sharing *khetala* is a smart indigenous way of cultivating and harvesting food on time.

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[71] *Hali* is a person who ploughs field with the help of oxen

Since, the number of working age people is limited in countryside, the culture of inviting *khetala* and accepting others invitation, and supporting each other during pick harvest period helps timely harvesting. When food is harvested on time, there is lesser possibility of food loss due to delay in harvesting or inefficient harvesting.

Bhakari; Indigenous Seed Bank

I still remember that my *muma* used to restrict me to play in *buikal*[72], I never understood why it was prohibited to go up. One day when everyone was in *mela*, I sneaked into *buikal.* It was dark, I blazed a *tuki* my feet knocked a *khadkulo*[73], I nearly fell down. I was sweating of fear, if someone heard the noise or knew I was wandering upstairs. Nevertheless, I was extensively curious about the *buikal*. I looked around; there were tall wooden shapes, *bhakari* and large *theki*s. I could not move those large solid shapes, so I decided to see what is inside. I brought a *muda*. Holding the *tuki* carefully with left hand and climbing on the *muda* with the support of right hand, and stretching my toes I managed to peep what was inside the 'shapes'!

I could not believe my eyes, I saw ocean of paddy grains. I even shoveled my little fingers into the container and played for a while. Suddenly, I was curious about other 'shapes' as well. Each 'shape' turned out to be container having *dhan* or *chamal*[74] or wheat or buckwheat or millet or maize or beaten rice. Later, I learned those store chambers were called *bhakari*. I wondered where the entire paddy collected in *dalos* during *daain*[75] vanished.

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[72] *Buikal* is upper storey which is usually used as store for grains

[73] *Khadkulo* is large vessel made up of Copper; used to cook food for dozens of people especially during festivals or rituals or ceremonies

[74] *Chamal* is processed rice grains i.e., without husks

[75] *Daain* is a process of harvesting of paddy in *aagan* with the help of cattle tied on a pole rotating around the pole and treading on the paddy plants

In the past we were not only the farmers to store surplus harvest in *bhakari*, every farmer in the village stored food grains. We used to have four five *thakras* of maize outside our house, so did everyone in village. Therefore, all of us could sustain even if crop production failed the following year due to climatic catastrophes. Also, the seeds were stored so that seedlings of paddy or other grains could be cultivated in the next season of cultivation. But, in recent days

Indigenous Ways of Food Preservation

Gundruk, achar[76]of radish, *philingeko achar, sukuti*[77], pork boiled in turmeric, *cheura* (i.e., beaten rice), tomato's *sinki*, radish's *sinki, tama*'s *mesu* et cetera are foods that are preserved in indigenous ways. These ways prevent the wastage or loss of food.

Milk products. As we used to have about thirty or more buffalo at home, fresh milk was never a problem. Early in the morning I usually drank two glasses of fresh milk without boiling. *Muma* used to pour milk from *dudhero*[78] into *kude*[79] to boil the milk. From the milk, *muma* prepared rice pudding, *khurauni*, *khuwa*, and curd.

"Santu let *fupa* work, it would be difficult for him to rotate *madani*[80]", *muma* often warned me. The way *fupa* moved his hands in to and fro motion fascinated me. Curd in *theki*[81], *mohi*[82], *swoldar*[83], *sergem* (i.e., like thick *mohi*) and *Ghee* are what I

[76] *Achar* means pickle

[77] *Sukuti* is like dry meat

[78] *Dudhero* is a wooden vessel used to store milk while milking cow or buffalo

[79] *Kude* is a big pot usually of silver, copper or alloy

[80] *Madani* is cylindrical wooden vessel used to saturate curd into Ghee by rotating it to and fro with rope

[81] *Theki* is a wooden vessel where *Dahi* meaning curd is stored

grew up with. By preparing these milk products, Rai people are preventing the loss of surplus milk. *Ghee* is like butter, it has long self-life so it does not need refrigeration.

Gundruk. When I was child, I wondered why *muma* and *fupa* used to order *fupus* to gather piles of radish in *aagan* and together they separated leaves in one corner and roots in another corner. They crushed the leaves. I found it exciting to beat the leaves with *musli*[84] in *okhali*[85]. *Gundruk* is prepared by crushing and beating green leafy vegetables or leaves of radish or cauliflower, squeezing liquid off the crushed leaves, storing the raw in vessel for weeks for fermentation and finally drying it under sunlight to dehydrate. One of my favorite curries is *Gundruk* mixed with egg. Likewise, it can be cooked with fish or potato or make *achar*.

Sinki. Another favorite dish of mine is *sinki* of radish. I adored watching at my mother preparing *sinki*. She brought radishes from the field and dried then under sunlight, after they withered, she beat them in *achana*[86] with *mungro*[87]. Looking at the amount of radishes, she dug a pit. To warm up the pit, she blazed hay, dried leaves or firewood. At the bottom of the pit she put a flat stone, and surrounded the stone with bunch of hay. Over them, she arranged bamboo's *thammela*[88]. *Muma* entered the pit. Gradually dropping the radishes over the *thammela* in pit she pressed radishes with

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[82] *Mohi* is a fermented milk product i.e., sour in taste. It is generally prepared by adding water in fermented curd.

[83] *Swoldar* is prepared by frying paste of garlic and chilly in Ghee or oil with salt, *mohi* is poured in it.

[84] *Musli* is a cylindrical tool made up of wood which is used to beat raw materials in okhali

[85] *Okhali* is a hollow, biconcave like cylinder made up of wood i.e., used to keep raw materials and beat with *musli*

[86] *Achana* is base of stone or wood on which something is beaten up

[87] *Mungro* is wooden tool used to beat something

[88] *Thammela* is broad leaf like structure that arises from nodes of bamboo

her washed legs "We must not let air in between the radishes, otherwise they would rote." *Muma* said to me as I made an unwelcoming expression to her use of legs to compress the radishes. After filling the pit, she covered the compressed radishes with *thammela* and hay. Thereafter, she put earth over it to cover the pit. She used either tin or *ghum* over the pit. "Finally, this would not let water enter the pit." After fortnight, she unearthed the radishes and scattered on *mandro* to dry. After drying under sunlight, the radishes were cut into pieces. Finally, *sinki* was ready. Similarly, she also prepares *sinki* of tomatoes. During the season of tomatoes, they are cut and dried. During off season, the stored *sinki* of tomatoes provide tomato's flavour in curries.

Kinama. *Kinama* is prepared from soybean. Honestly, in my childhood, I loathed *kinama*'s curry. It smelled exactly like sweaty socks to me. But, while living in hostel, far away from home, I adored *kinama*'s aroma. Smelling the aroma of *kinama*, I felt being at home. I missed *muma*. *Kinama* made me nostalgic about her. It reminded me how she prepared it back in home. She dries soybean under sun, fries dried soybean in *handi*[89], boils the fried soybean scattering ashes over it until the water evaporates, scatters it on *mandro*[90] for cooling, but before it completely cools down, i.e., keeping it warm gathers and keeps it on broad leaves, either of banana or *Sal* or *Nibaro*, or in unavailability of leaves surrounds it by hay before storing in *dalo*, covers the *dalo* with old clothes, and puts the *dalo* near *agena*[91]for about three days. This process is called preparing *suum*. As it starts smelling, *muma* disperse it in *mandro* and dries in sunlight. Finally, *kinama* is ready.

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[89] *Handi* is pot of clay used to fry maize or soybean without using oil.

[90] *Mandro* is a mat made by bamboo's *choya*, widely used while drying grains

[91] *Agena* is surrounding of *chula*; fire place in kitchen where food is cooked.

Sukuti. Pigs or Buffalo are slaughtered only in special occasions like festivals, rituals or ceremonies. Entire meat is not consumed at that moment. The pork meat that could not be finished consuming is boiled in turmeric for good deal of time. Turmeric not only adds color but helps to preserve the meat for long period *muma* had told me many times when I sat by her while she would be flipping the meat in boiling water at intervals. Such boiled pork can be consumed even after a month. The legs of pork are often boiled and mixed with pepper, oil, salt and spices, and stored in bottles. After few months, that would be a delicious *achar*.

Lemon's achar. Champe is suitable for growing lemons. During season, a lot of lemons grow, but due to lack of proper transportation facilities and suitable market, lemons get dried in trees. However, that is not everyone's case in Champe. Rai people of Champe harvest the ripen lemons. The excess numbers of lemons are rubbed against rough stone to mechanically peel the covers. Thereafter those lemons are mixed with salt and kept in bottle making it air-tight. After few months, lemon's *achar* is ready! Similarly, another way of preparing the pickle is to boil lemons, keep in sunlight, cut lemons into pieces, mix with radish or carrot or chilly; based on availability, mix salt, bottle the mixture, keep in sunlight, after few weeks, another variety of lemon's *achar* is prepared!

Similarly, the surplus meat of buffalo is sliced into a long chain like structure, hung on stick above *chula*. The sliced meat is smoked for few days and once it gets dried *sukuti* is ready. *Sukuti* can be kept throughout the year. Another way of preparing *sukuti* is after slicing meat by its length, it is mixed with spices like cardamom, paste of garlic, ginger, red chilies and salt, and finally smoked till it dries and hardens.

Tama[92]'s mesu. "*Tama* is brought form bamboo bushes, cleaned and sliced into pieces. *Tama* is mixed with turmeric powder and stored in an air tight *ghaila*. After keeping it for about fortnight *mesu* is ready. *Tama*'s *mesu* can be cooked with meat or potato or it can be used to make sour pickle. One should be careful while using *mesu*. One should not use hand. Air would enter and it would be fermented. So, spatula or spoon should be used to take out *mesu*." *Ma* instructed me about preparing *mesu* from *tama*.

Maize's Khosta[93]; Nothing Goes Waste

"Look around, by this time, seeds of maize should have already been sown. Last year, during this time, maize plants had grown up to our knees. This year, there is not a drop of rain. Fields are barren. Maize kept in *thankro*[94]", Suresh had said.

I remembered few days back, *muma* had asked me to help her take down the maize stored in *thankro*. The ladder she gave me to reach the *thankro* was made up by carving a big bamboo steam. 'Indigenous knowledge' clicked on my mind while stepping on those steps beautifully carved on the bamboo. As I started hurling down the bundles of maize, insects (e.g. *ghun*) flew off some were still in the corn. When the bundles of maize knocked *aagan,* chickens, hens and cocks came around to devour the insects. After dropping down half of the maize from the *thankro, muma* and I started peeling off the corn. A pile of maize's *khosta* was like a huge 'buffet lunch' party for the chickens.

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[92] *Tama* is young shoot of bamboo that is edible. However, *tama* also means copper that is used to make vessels or alloys.

[93] *Khosta* is residue of the maize's peeling; skin or outer cover of maize

[94] *Thankro* is an indigenous way of storing surplus maize for future use on tall stands of bamboo with thatched roof below of which maize are tied up with the outer cover, piled up and stored; usually built outside of the house in *aagan*

"Eat the insects that destroy our corn," *muma* said enjoying the sight of chickens partying. She continued, "There had never been so much of *ghun* in corn like this time. Now it is tough for us to have good *beu* (i.e., seeds) to sow. May be we should buy better seeds from others in the village for this year".

After peeling off the *khosta* (i.e., outermost cover) of the maize, *muma* segregated the maize based on the quality of the seeds. Thereafter, the seeds were detached from *khoya* (i.e., the innermost part of maize that is solid, white and slightly conical). Seeds destroyed by *ghun* were for animal feeds, seeds of medium quality; not destroyed by *ghun* but not good enough for sowing, were for humans, and the good quality seeds were for sowing.

One thing that I realized was; not a single thing of maize becomes waste. Mature green stem of maize is consumed like sugarcane. It is juicy and sweet; not as sweet as sugarcane itself, but sweet enough to quench the thirst while working in the maize field. The *khosta* of maize is used as fibre for making traditional mats like *sukul*, *pira,* et cetera and sometimes as feed for domestic animals. The grains have wide range of uses. The *khoya* is used for making corks in bottles. Moreover, it is a wonderful fuel in *chula*. *Khoya* while burning does not emit smoke like firewood.

Nevertheless, maize's *khosta,* leaves of maize, and maize's *dhod* (i.e., stem) which were used as feeds and fodder for cattle have 70.63%, 50.23%, and 48.47% Acid Detergent Fibre (ADF) content respectively (Upreti & Shrestha, 2006). Similarly these crop residues had more than 60% of Neutral Detergent Fibre (NDF) content (Upreti & Shrestha, 2006).According to senior scientist Dr. Upreti and technical officer Mr. Shrestha of Nepal Agricultural Research Council (NARC), higher the ADF content in feed indicated that the crop residues were lower in digestibility, and higher the NDF content, the crop residues had lower feeding value. However, these

maize residues were low (below 10%) in Acid Detergent Lignin (ADL) indicating that there was no decline in digestibility of plant cells of crop residue.

Hence, maize's *khosta,* leaves of maize, maize's *dhod* have low feeding value. Cattle cannot digest these crop residues properly but their digestive capacity does not decrease on consuming those residues. Although the Rai people in Champe are unaware about the nutrient content, digestibility and consequences of feeding the maize residues, they are conscious about not letting anything go waste!

Indigenous Knowledge of Pest Management

According to Sherey *fupa*, Rai people have indigenous knowledge of pest management. They use ash in fields if vegetables get infected by *lai* (i.e., a type of insect). Similarly, if insects infect roots of vegetables like eggplant lime water is poured in the roots. To prevent infection of paddy seedlings or garlic organic pesticide is prepared from wild *Siris* having narrow leaf. Similarly *khirra* or *titepati* are used for buckwheat and *suthuni* (i.e., a type of edible root). However, with the hope of better yield, many farmers replaced these indigenous pest management techniques and adopted using chemical insecticides and pesticides. Majority of my participants claimed that usage of chemical insecticides and pesticides did not control pest in long run.

"We thought farming would be luxurious. We were more than happy when the crop yield increased the first few years of using chemical insecticides and pesticides. We did not have to go to forest to fetch leaves of *siris* or collect *titepati* to prepare organic pesticides. Organic pesticides required more labour and time while preparing than buying chemical pesticides. So, we went for an easy meat. But, we regret now. The pests have grown stronger. Even if we increased the frequency of using the

chemical pesticides, the productivity is adversely affected. These chemical pesticides do not have any significant influence over the pests", Min Bahadur Rai (18) said.

He continued, "Since plants started being infected by different diseases, we became sure about the inefficiency of chemical pesticides we were using. Comparatively plants were being more infected. So we stopped using chemical pesticides. Instead we manually pick up unwanted grasses in the field and planted *titepati,* and coriander near vegetables."

This experience of Min Bahadur reminded me about a documentary 'A study of agricultural intensification in Ashikhola Watershed of Central Nepal' (Pudasainee, 2007). This documentary shows how agricultural intensification has led to excessive use of chemical insecticides and pesticides in farm. Aren't we feeding ourselves chemicals by using chemical pesticides explicitly? The chemicals we use return back to us through the food chain. Unscientific and haphazard use of chemical pesticides not only pollutes environment but causes chronic health hazards to human beings like respiratory tract infection and mutation.

The idea of coupling excess use of chemical pesticides and increasing crop yielding has turned out to be Dutch Disease phenomenon. This Romantic Movement; returning back to rustic lifestyle, is an example of constructive notion among Rai farmers like Min Bahadur. This construction emerges from reflection of understanding through the experiences of discarding indigenous knowledge of pest management for so-called modern technology of chemical pesticides (Smyth, 2006). Farmers like Min Bahadur make constructive judgment after facing various hurdles in their lifeworld. Thus, it is not just practice that makes a person skillful but praxis; practice with understanding, does.

Dhiki[95] Janto[96]: Indigenous Technology for Food Processing

It is 31st March, 2012, five o'clock in the morning. I am still lying on bed. I can hear *muma* grinding the maize in *Janto*, traditional grinder. I wonder how she is so active even in her late eighties. Every morning she wakes up at around three and starts doing the chores. In my twenties, I feel lethargic of waking up early. With a little embarrassment, I get off my bed, use toilet, wash my face and go to our *Dhiki-Janto* hut. My beautiful *muma,* is rotating the *Janto* with her right hand and with her left hand she is pouring a fistful of maize grains in the *Janto*.

"Finally, you woke up? Wait some minutes; I will prepare tea for you".

"*Muma*, why don't you take the maize for grinding in mill? The mill is not so far like it used to be!"

I remember that my aunts, mother and two other helpers used to take rice grains to grind in a mill at Pyauli; about two hours far from our house. Now, *Shiktele* brother-in-law has opened a mill near our house. It's five minute walk. The other day he was teasing me, "You people have money but, usually don't bring grains for milling and grinding. *Muma* chooses *Dhiki-Janto* to save money".

"*Muma,* it does not take much money in the mill and in addition the work is done faster there"

Muma does not stop rotating *Janto,* she smiles at me and says that she is habituated of working and she needs to exercise otherwise her muscles would freeze.

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[95] *Dhiki* is a see-saw like traditional crusher, it's a first class lever where fulcrum is in the middle, effort is applied in one end; usually by one's feet, and the other end beats the load.

[96] *Janto* is traditional grinder having two dishes; the lower one is fixed whereas the upper one can be rotated holding a handling, in the middle there's a small hole to input grains, the grinded product comes out from sides of the dishes.

"There are other works too that are easier than rotating a huge disc of stone!" strikes on my mind so I insist, "*Muma*, the mill is cheaper, faster, easier and more convenient." No sooner I could finish my sentence; she stops rotating the *Janto*, stares at me, and shows me the floor.

"Behold this, when I grind maize in *Janto* I obtain floor of maize for cattle, smaller grains to mix with rice, medium sized grains for *jaad* liquor and bigger sized grains to store as future stock. The mill either grinds the maize into floor or into small grains." She shows me the four categories of outcome of the maize grinded in the *Janto*. She also shows me how she could separate them by sheaving in *nanglo*.

I became nostalgic about the *sel roti* that my mother cooked from the rice grinded in the *Janto*. It had a distinct taste. No floor obtained by grinding rice in mill could compete the taste of home grinded floor!

"Go to your room to study", *muma* says.

"*Muma*, let me try to grind"

"Stay away, you won't know!"

But, she leaves the *Janto*'s handle to me. As I rotate the *Janto*, she teaches me how to feed maize to it and how to maintain the pace of its rotation so that intended categories of outputs would be obtained. She laughs at me when I fail to properly feed maize to *Janto*. Nevertheless, I grind for about half an hour. Thereafter, I try sheaving. I knew sheaving a bit but, *muma* says I do very clumsily and asks me to leave because instead of helping her complete the work faster, I am delaying her.

"This is not men's work. Women should learn how to grind in *Janto* and how to sheave" *muma* tells me. Although after my *fupa*'s demise, *muma* is in-charge of our house and she always played major role in decision making along with *fupa*, she

distinguishes between men and women and their roles. Gender biasness has been rooted in my family, society and whole village.

"Aren't women obliged to do more stressful chores at home and works in the field in my society? Why is it obvious that females are cultured if they are dexterous to do chores?" I find women contributing more to unpaid labors at home like grinding and crushing in *Dhiki-Janto.* Moreover, if there is food crisis due to climate change then, in our village, women are more affected than anyone. Their responsibility to manage food grains is very high. Therefore, my *muma*, is keeping the larger maize grains as stock for future.

*"*In case of *anikal*, food scarcity, we will grind these larger grains again and have *chyankhla*[97]," *muma* tells me as I gaze at the *dalo* filled with larger maize grains.

"You might be hungry"

"No, I am not, *muma*"

Following *muma* I enter in the kitchen. She kindles a *tuki*, sprays some kerosene over firewood and lights the fire. I pass her a kettle filled with water that she puts on *chula*. *Muma*, reaches for fermented wheat and maize to prepare *Jandh* for herself.

"If I didn't drink *jaad*, I cannot work"

She pulls off the firewood, pours a glass full of water, mixes tea dust and two spoons of sugar. She goes upstairs, brings a small *dalo* full of beaten rice.

"Taste this beaten rice and tell me which one tastes better; the one from my *Dhiki* or that one crushed in your mill?"

I feel huge sarcasm because the beaten rice crushed in *Dhiki* tastes far better than the one crushed in mill. Which technology to adapt? Indigenous ones like *Dhiki-*

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[97] *Chyankhla* is like rice of grinded maize

Janto or modern technologies like diesel mills? *Dhiki-Janto* are time and energy consuming, but they can be a part of regular exercise. These indigenous technologies are blended with human involvement. They are environment friendly as no fossil fuels are burnt to run them. The crushing sound of *Dhiki* creates a rhythmic beating like that of drum, and the grinding sound of *Janto* makes music unlike the unpleasant sound of engine of mill. Modern technologies are efficient, less time consuming and require less usage of manual energy. However, they have drawbacks such as consumption of fossil fuels, emission of greenhouse gases, noise, heating of river water used for cooling, higher dependency of human beings towards machines and other hidden problems like black market of oil. Thus the debate goes on, which technology is better for us? To me *Dhiki-Janto* are more relevant and sustainable technologies than the intervening so-called modern technologies which are not only creating environmental pollution but are making us more lethargic.

Ambrosia beyond *Chintaloong*: Allegory of Environmental Ethics

Once upon a time, a very hard working and honest farmer came to a stream to quench his thirst. After, drinking handfuls of water, he noticed an eccentric cleavage of rock which was later called Chintaloong at the origin of the fountain. His curiosity allured him to enter through the cleavage. No sooner had he reached the end of a narrow passage through the rocks, he reached mesmerizing orchards of orange trees growing on the banks of a river. Each tree was covered by golden oranges. The twigs were hanging low nearly embracing the lawn. He spent hours, days and weeks there resting on the cradle of nature under orange shades at day and below the twinkling stars at night, devouring sweet oranges and rejoicing the aesthetic pleasures in the orchards. Each orange he ate was juicy. The orange juice turned out to be elixir of his life. Every day turned into his red letter day. Wrinkles in his skin, skin cracks on his

feet and scars of wounds on his body which he had got in the forest when he had fallen down from trees while collecting fodder were gradually fading. Each day he felt younger, energetic and refreshed.

Nevertheless, the farmer who had almost forgotten his family, home and farms, realized that it was time he returned home. He did not remember how long it had been that he left home. He began worrying about his family. He picked up pocketful oranges before heading towards the cleavage of the rock. Neither he had gained fat nor the passage through the cleavage had narrowed down, but he merely got stuck at the opening. He tried accommodating his body into the passage by making it flexible. But, he failed to enter the passage. He even tried moving few meters back to run with speed into the narrow passage. But, he crashed against the rock and got wounded. All of his efforts went in vain. First he was startled, then gradually frustrated at his plight. Getting in and walking by the passage had not been so tough when he made his entrance. However, when all of his consciences deceived him, his sixth sense served him well. His futile attempts had tired him. He felt a crunch in stomach. Then, a faint voice echoed in his ears "orange orange orange!" He fished all of the oranges out of his pockets. He started unpeeling the oranges and devoured them all. After having his diet and resting for a while, once again he became nostalgic about his home. He headed towards the rock barrier. This time, he walked out of the cleavage without any effort as if the passage had widened. Also he surprised the thirsty people who were about to drink water from their hand-made cups. At that moment, his pockets were empty.

The orchards belong to God, if a sinner tries to get into the cleavage, s/he would be stuck and die of hunger in the passage. Only, a righteous person can pass through the passage and enjoy the ambrosia; size of the person does not matter. The

person is permitted to stay in the gardens of God enjoying the fragrance of orange flowers and devouring ambrosia as long as s/he wishes. However, s/he is forbidden to take away the ambrosia, if one dared s/he would be cursed, punished and never be allowed to escape the orchards.

Once, my *fupa* had told me this story while we were going to *dhara pooja* in *Chintaloong*. "We must not be greedy and mean. We should only bite as much as we can chew. Mother Nature has plentiful to meet our need but not greed. Therefore, we should utilize the resources wisely" *fupa* said.

During the *dhara pooja* we used to hear stories after stories about people who attempted to go beyond the rocks after the incident of the farmer. Some succeeded and some failed. Despite of various versions of the stories, everyone was convinced to have *prasad* at *Chintaloong*. No one would take it home believing that if *prasad* was taken there s/he would be blessed else a catastrophe would come in his/her life.

When we were children, thoughts of going into the cleavage often came in our minds. Like Alice falls in the wonderland while following a hare into a burrow, we dreamed of stepping through the cleavage and rejoice the mythical orchards of oranges that were believed to exist beyond the huge rocks! But, those stories of sinner meeting their traumatic fate scared us. Even if we came in peer pressure to prove ourselves as an honest and uncorrupted, our guilt of stealing *sukka or mohor* (i.e., 25 paisa or 50 paisa) from the house during *hatiya* to play *roteping*[98] or have sweets stopped our steps towards the cleavage.

In the above story, the point is not wheather there are perenial fruit ripenning orchards or not beyond the cleaved rocks. The major point is its significance on advicing people to become wise, warning people against their greedy usage of

[98] *Roteping* is wooden Ferris wheel

resources and prohibiting selfish anthropocentric acts which is successful in sowing environmental conciousness in meadow-mind of young people (Kelbessa, 2001 as cited in Plessis, 2005).

Eat Once, Work Thrice; Reducing Human Foodprint!

The God is unable to bear the fathomless greed and sins of human beings. If there is no earth, no water and no atmosphere where could we step and how could we grow plants?

Once the God asked ox to deliver a message to human on earth, "eat once, work thrice" but the ox conveyed wrong message, "eat thrice, work once". Then, the God cursed the ox, "Now, you go and serve human!" so the ox works like a slave for human for conveying wrong message.

If the ox had not done the mistake, human would have obeyed the God. People would work more, produce more, eat less and preserve the food. But, since the ox gave fallacious message, human became lethargic so, ox got punishment to serve human for its whole life.

This folklore is not just a message of consequence faced for disobeying God. It is a suggestion for not consuming food more than necessity; else we need to work tough like ox. Similarly, it also relays a message of lesser consumption of food. It is inevitable that people having mal nutrition have poor health and suffer from different diseases; some diseases could be fatal. However, I was surprised to hear in a radio program that in this world there are more people dying of eating surplus than people dying of hunger. This folklore provides a message similar to theme of United Nations Environment Programme (UNEP) i.e., 'Think. Eat. Save. Reduce Your Foodprint' as it suggests us to eat wisely and reduce our foodprint; i.e., the amount of food we eat and energies required to produce the food.

There are many such folklores and phrases that teach us about environmental ethics. For examples;

'*Churi*[99] *kinne paisa le chura*[100] *aucha*' (With the money to buy *churi* one can buy *chura*)

'Matoko ghaila le tamako gagri satcha' (Vessel made up of ceramics i.e., *ghaila* exchanges *gagri* made up of Copper.)

These sayings metaphorically teach us not to focus on short term benefits. *Churi* and *ghaila* are cheap in price but they are brittle and not long lasting. However, metallic *chura* and *gagri* are expensive but they are ductile and long lasting. With the price of buying many *churis* and *ghailas* as they keep breaking easily, one could invest on *chura* and *gagri*, once and for all.

We could relate these metaphors *churi, chura, ghaila* and *gagri* to our ways of living. We often have myopic visions because they are cheap and easily feasible. What we miss is far sightedness and sustainability in our daily practice. Once we could understand the meanings of these folk phrases, we could differentiate between short term and long term benefits; leading us to use resources wisely.

Cock-A-Doodle-Do: An Alarm of Change

Kukuri ka	COCK-A-DOODLE-DO
Basibhat kha	Have stale rice
Khoi basibhat?	Where is the stale rice?
Biralole khayo	Meow! Eaten by tom
Khoi biralo?	Where is tom?
Muso marna gayo	Chasing a mouse

[99] *Churi* is bangle of glass

[100] *Chura* is bangle of gold or silver

Khai muso?	Where is the mouse?
Dulo vitra pasyo	Hidden in a hole
Khai dulo?	Where is the hole?
Gaile kilchiyo	Stepped on by a cow's feet
Khoi gai?	Where is the cow?
Kholale bagayo	Swept by a river
Khoi khola?	Where is the river?
Sukyo!	Dried! Dried! Dried!

Grandson of Daya Ram *daju* was chanting this folk poem from his Nepali book one early morning when I had gone to meet Suresh. The page had pictures of a cock, a cat, a mouse, a hole, a cow, and a river. I became nostalgic about my childhood; felt guilt of cheating my *fupa*. We used to bunk our school and go to *Lekh* to collect hazel nuts. At home, I would recite "*Kukuri ka…"* with all of my might to my grand parents. Although I knew the poem by heart, I obviously could not identify the alphabets and the words, but I would turn the right page; page where there was a picture of a large cock, a cow in river flowing down from the gorges of hills and mountains. Suddenly, images of ecological cycle and entire food web; human beings being awaken by cock-a-doodle-do of cocks, cocks eating stale rice (e.g. rice that is usually left over if people could not finish eating), that rice eaten not only eaten by chicken but by a cat as well, the cat not only depending upon stale rice but follow its innate behaviour of making mice its prey, all of the mice do not become mere prey of cats, they hide in holes and burrows-Charles Darwin's 'struggle for existence' and Herbert Spencer's 'survival of the fittest', such holes being stepped by cattle like cow, some cattle being swept away by floods in rivers, and those rivers that could sweep away animals as big as cow finally drying!

Superficially, such folk poems or songs may seem to be ordinary rhymes for kindergarten kids, but deep inside such rhymes teach ecosystem values and aware children about ecological cycles and possibilities of disasters. Don't these folk lores, tales, poems, songs and sayings transmit environmental knowledge to young generation?

The folklores and folktales that seem to be amusing, exciting and interesting to listen to, despite of unrealistic and mythical tone, still impart environmental ethics from generation to generation. Folktales play a vital role in building personality of people (Mota, 2009). They help to create environmental consciousness. According to Workineh Kelbessa (2001), oral traditions are one of the sources of social, economic, environmental and philosophical knowledge in non-literature cultures which help non-literate people to acquire a wide range of knowledge (as cited in Plessis, 2005). Most of the Rai people of Champe are illiterate in terms of reading and writing, however, they are highly literate in terms of verbal transmission of knowledge which has been synthesized by lived experiences.

Similarly, traditions like *dhara pooja* (i.e., worshiping of tap),*ban pooja* (i.e., worshipping of forest), *bhoome pooja* (i.e., worshiping of soil), and *pitri pooja* (i.e., worshipping ancestors) not only provide opportunities for Rai people to share the folktales to dessiminate knowledge and moral lessons regarding wise use of natural resources, but they equally help the younger generation to respect the sources of water, timber, fresh air, fruits and crops. For an instance, my *fupa* warned me of *Sime bhoome*[101] if I tried to bring beautiful peebles from the river.

[101] *Sime bhoome* is a belief of Rai people that nothing belonging to the wild should be brought at home, else catastrophe or unluck would reside in that house.

Environmental education begins in each and every family. Fathers and mothers teach their children how to behave and live with the natural environment so that their understandings start at an early age and develop gradually (Kelbessa, 2001 as cited in Plessis, 2005). Similarly, Rai people while entertaining the children with folktales, riddles and phrases transmit wisdom and instruction regarding the interdependency of human beings with other animals and natural environment.Rai people are subsistance farmers, they still depend upon natural resources for survival. Some of the Kiranti folk stories are collected and published by writers like Iman Singh Chemjong (1966) and Shiva Kumar Shrestha (1990).

Intersubjective ethical theories like Hobbes' conventionalism and Habermas' communicative actions (Bhattarai, 2010) intersect in my mind while listening to these folklores. Environmental ethics is transmitted through agreed moral values, norms and practices in a society through conventional ways (Hinman, 1994, as cited Bhattarai, 2010, p. 148). Therefore, the ethical codes are what our ancestors as a society were and we as society are accepting and practicing in our day to day life. Nevertheless conventionalism alone does not clarify establishment of environmental ethics in larger picture of a society. Habermas' communicative theory that defines 'ethics through dialogue' (Bhattarai, 2010) provides legitimacy to the moral values like 'don't waste food', 'preserve seeds for future', 'eat wisely', et cetera in Rai society.

As Habermas probes deep linkages of knowledge, experience and human purpose (Doughty, 2003), folk tales and traditional beliefs bear epistemological values to Rai people. Ideal speech sitauation of Habermas prepares an ethical playgorund where meanings are given birth to, practiced and tested (Doughty, 2003). Meanwhile, he leads us to an emancipatory ground where in we are completely free to think and

act. However, our folk lores that have deeper impression on us guide us to make a choice and decide our fate which is in our own hands.

Chapter Summary

In this chapter, I have portrayed indigenous knowledge for food security and briefly shared prevailing folktales which develop environmental ethics among Rai people. There is a strong bondage between indigenous ways of securing food for long term and climate resilience. Indigenous knowledge of food cultivation, harvesting, preservation and storing prevent food wastage or loss which further prevent food turning into organic waste which emits Methane gas. Also, storing food for long term supports Rai people to survive even at hard times like situation when natural calamities destroy entire food production. However, associated to this knowledge system are; anthropogenic challenges like intervention of chemical fertilizers, chemical pesticides, new varieties of commercial seeds which are probably genetically modified, new diseases in plants and transforming societal structure. In conclusion, Rai people have enriched knowledge for food preservation and folktales which probe environmental ethics to young generation through conventionalism and communicative actions. This knowledge system can support Rai people to build climate resilience by preserving food and developing environmental friendly behaviors.

CHAPTER VII

MY CONCLUDING INSIGHTS

What gets us into trouble is not what we don't know

It's what we know for sure that just ain't so.

-*Mark Twain* (Guggenheim, 2006)

An Overview of this Chapter

"If we were ignorant about something, it would not be a problem. The problem is our hypocrisies. First hypocrisy, not trying to know and second having a permanent attitude towards something which we think we know but, in reality is different. We should become transformative like a fluid. Behold how this water changes its shape according to the shape of its container!" One of my favorite teachers in school had once told us in classroom. My teacher's inspirational words are pretty similar to Mark Twain's. Our hypocrisies of being the most intelligent and powerful beings on earth have created numerous problems. What we often forget is; this planet is a common home. I have encountered with similar troubles which came across not because we do not know, but because we think we know but the truth has a different story.

"When you go to research field expect the unexpected," Professor Subodh Sharma often suggested us. I was mentally prepared for days long *Bandh*[102] or delayed road journey due to tyre puncture. But, nothing like that happened on the way to Champe. Instead, many unexpected incidents happened in Champe. Similarly, moments came when I felt identity crisis or felt lost in myriad thoughts or felt

[102] *Bandh* is a Nepali term for 'closure strike' when transportation is affected on the first place, thereafter market is shut down and other institutions are closed

excitement. Thus, in this chapter I share my frustrations, challenges, achievements and ambiguities during this research period.

In Search of my Roots

"Do you know who you are?" was Jay Bahadur's question to me when he encountered me in his courtyard. Actually I had gone to his house for gathering 'thick descriptions' about his climate change perspectives. He was mending a *doko* with fresh *choya.* Perhaps I was gazing at him because all over my mind queries about his peculiar climate change theory was hovering. I wanted to ask him; how does climate change devastate social structure; marital relationship in particular? But, before I grasped that opportunity, he hurled a straight forward question towards me; who am I? It made me speechless. My face blushed into red. I had never imagined that this study could lead me towards scratching my head back and forth in search of self-identity.

"Vijaya Tamla? I am Vijaya Tamla." My first thought. *"No that is just my official name used in certificates, citizenship and passport! How about Santosh or my muma fupa's adorable Santu? No, that is my pet name. Err…Teacher in a school or student of Kathmandu University? No, those are my professions."*

The right answer did not click in my mind. As I was babbling, "Aa ba ba..." in between my monologues, Jay Bahadur giggled and teased me, "See, symptoms of climate change!"

"Why does this person try to explain everything as climate change? If a pregnant woman did not give birth to a desired child, who is universally son in Champe, this man might explain it as a consequence of climate change!" I thought and giggled within; feeling relieved for being able to avenge his mistreat.

"Today's generation like you barely care about who you are, what your history is, who your ancestors are. Do you know how to speak *Dungmali*? Verses of *mundhum* to cite during, well forget about other rituals, say in *pitri pooja*? How will you get blessings and spiritual protection from your ancestors?"

I felt guilt inside. My giggling that had almost burst out stopped. Was I pinched by his words or my own identity crisis? I could not decide, but I was moved by his words. My plan of enquiring him more about his perceptions on climate change vanished. If it was of ancestors, he talked about then I knew my father's name and grand father's name because I need to fill their names in legal papers or forms. Nevertheless, I did not know my ancestors. I was there to study on interrelationship of Rai people and Climate change. It was time, I asked to myself; did I just go to 'find out' what were 'out there' without knowing about myself.

"What do you study in boarding schools if you did not know your own roots?" is Jay Bahadur's last question I remember. He was telling me more but I could not/did not want to understand, and perhaps I turned into a deaf while contemplating about my own identity. At home, I spent my evening with *muma* inquiring about our language and lineage. I thought we were supposed to speak *Bantawa* language but we have our own language, i.e., *Dungmali* language. Also, I was glad to know that I am seventh generation of our genes. "We cannot marry our own lineage until seventh generation. In seventh generation's gap, we can establish marital relationship. If we didn't, the gap would merge the latter generation as own siblings. Thereafter, we need to wait for the next seven generations," *muma* said to me.

Who could have established such genetic laws? Since when? May be even before Mendel[103] found his three laws of genetics. Didn't our ancestors live with these laws merely unwritten but transmitted orally from generation to generation? Neither Charles Darwin nor Herbert Spencer taught them to apply theories of natural selection biologically or socially, but these ontological facts and axiological values have been imparted generation wise through hermeneutic epistemology. Also, this study helped me understand the interdependence of society and culture over ecological changes and vise-versa. Enquiries of Jay Bahadur knocked me to rethink about climate change endangering cultural entities like language and rituals along with having an impact on ecology and socio-economy of Rai people.

Although, I have discovered myself partially, the larger picture of mine is yet to be experienced. Nevertheless, I have gathered an answer of Jay Bahadur's question about who I am. I would like to borrow Jostein Gaarder's words from Sophie's World to describe about me; I am one of the smallest drops of shower but an imagination infinitely larger. Nevertheless, this research has assisted me locate myself in my personal, academic and professional life.

Sinks and Emergence

Hereby I put forward concluding insights of my research. I substantiate my understanding on each research question one after another in order to briefly disseminate my research insights. Also, I share my experiences in the study area and some challenges that I faced during data collection and production.

[103] Mendel's full name is Gregor Johann Mendel (1822-1884), known as the father of genetics

Snapshots of my Insights on Climate Change Experiences of Rai People

In order to address my first research question 'What sort of lived experiences about climate change do Rai people have?' I attempted to encourage my participants to share their perceptions, understandings and lived experiences of climate change. I am successful to gather multitude climate change perceptions and experiences of Rai people. In order to produce their experiences and perceptions, rivers have played important roles in Chapter IV. Rivers are taken as trustworthy witnesses for decades long climate change. Drying of rivers, untimely precipitation, occurrence of flash floods, hailstorms, unavailability of adequate amount water for drinking, household and irrigation purpose, loss of biodiversity, seasonal changes, et cetera are the evidences of climate change which can be traced through lived experiences of Rai people. Together with my participants' experiences I have blended mine as well.

Major cause of climate change for my *muma* is mountain of sins committed by human beings such as rise in egocentrism, selfishness, greed, and social evils and dying of ethics, social norms and values in human race. Similarly, for Jay Bahadur it was Rain God's business. However, such understandings varied from one participant to another. In the twenty first century, a person relying on a priest for precipitation forecast is incredible. Thence, the perceptions about climate change have been constructed both by inscribed values and ascribed lived experiences of my participants.

Impacts on Socio-Cultural and Ecological Dimensions of Rai Society

Addressing to my second research question; how has climate change affected socio-cultural and ecological dimensions (e.g. lifestyle, health, agriculture, social dis/harmony) of Rai people? Every time I visit my village, sight of hills opposite to *Kunakharka* always upsets me. *Siktele* brother-in-law and Suddhi *depa* told me about

failure of local authority to implement law and order to control forest fire. According to the local government's law, a convict of forest fire on those hilly forests are subjected to be imprisoned and charged fine. However, some villagers still go to the forests and ablaze.

On windy evening of 28th March, when I was returning back from Champe bazar to home, on my way I saw forest fire running towards North-West. The sky was covered by dark clouds, wind blowing hither-thither was enhancing the fire to spread, but it did not rain. There is a traditional (mal)practice of kindling fire in grassland near forest or pile of grasses and withered leaves in field as the sky gets covered by black clouds. Many people blaze the dried leaves with the hope of water showering as rain extinguishes the fire and helps the ashes mix in soil. This is a traditional way for fertilizing land so that *khar* would grow quickly and intensely in the grassland near forest and adequate plant nutrition be mixed in field for higher food production.

According to *Siktele* brother-in-law and Suddhi *depa*, last year uncontrollable forest fire spread in *Tin Taley* forest causing loss of large number of trees, deer, birds whose nests were built in those trees and burning of other wild animals and insects.

In Champe I have witnessed other forest fires during dry seasons. Forest fire in North and South-East Asia were largely related to three factors; rises in temperature, lesser precipitation and higher intensity of land uses (Cruz, et al., 2007). I could find relative causes for forest fire in Champe. Based on my participants' experiences there have been rises in temperature and untimely precipitation, and people often use the land near forest as *khar bari*.

Feelings of heat wave, scorching sun unlike past, bitter experiences of mosquito bites in recent days, and entirely new and unidentified diseases in major cash crops like cardamom not only affect human health and plant health but causes

socio-economic losses. Since public health is an indicator of social wellbeing, climate change has possible threats on disrupting quality of life by causing diseases to people. Also, unidentified diseases in plants not only extort economy of Rai people but also socio-cultural aspects, as socio-culture is closely linked with financial soundness.

Climate change has affected on availability of resources which is clearly noticed through the experiences of Rai people. Due to inadequate availability and accessibility of resources such as water, Rai people are having social conflicts and disharmony among neighbors. The struggles for access to resources cause loss of tolerance in society, and blocks sustainability of the society.

The ecological challenges brought by climate change have caused loss of traditional culture of hunting and fishing. The big games in forests are extinct, and there are no fishes in the rivers. Due to people's unpreparedness to cope up with (un)predictable climate calamities, Rai people are vulnerable to climate change induced catastrophes. Thus, the meteorological station in Bhojpur should be upgraded (i.e., apart from precipitation station, other stations like climatology, agro-meteorology, and synoptic stations other stations should also be established) and climatologists have to be appointed to look after possible climate extortion in order to prevent any kind of loss of life or property. Similarly, awareness programs, training and workshops about building resilience to climate change hazards should be organized for local people of Champe. Since, Rai people are facing common problems and climate change threat, they need to show a collective effort to tackle the challenges.

Indigenous Knowledge of Food Security for Climate Resilience

Addressing my third and final research question; how does indigenous knowledge of food security of Rai people support climate resilience? I discussed

indigenous way of food production like terrace farming, sharing labors for cultivation and harvesting, food processing technology and techniques like *Dhiki Janto, Daain* and food preservation like *Sukuti, Kinama*, et cetera. Our indigenous knowledge helps to prevent food loss or waste. According to Food and Agricultural Organization, one third of entire food production is either wasted or lost annually on earth. The figure comes around 1.3 billion tons. Food wastage or loss induces climate change. Food waste or loss creates higher demand of food; putting pressure on burning of more fossil fuels during production, and transportation of foods. It also increases higher use of chemical fertilizers and pesticides, promotes agricultural intensification and accelerates the rate of people dying of hunger. Moreover, the food wasted or lost turns to be garbage releasing Methane; one of the worst greenhouse gases which is about twenty three times effective than Carbon dioxide. Similarly, higher use of chemical fertilizers and pesticides increases various ecological pollutions and release greenhouse gases in atmosphere. Also, burning of fossil fuels during cultivation, harvesting and transportation of food emits extensive amount of Carbon dioxide.

Indigenous knowledge of terrace farming, sharing labor for food cultivation and harvesting, storing food grains for long run, processing food using indigenous technologies like *Dhiki- Janto* and food preservation methods have knowingly or unknowingly contributed in maintaining food security and building climate resilience. Had there been no culture of *khetala*, neither the crops would have been timely cultivated nor timely harvested. The production would have been adversely affected. Similarly, the indigenous technologies process the food in completely environment friendly environment unlike so-called modern technologies which emit greenhouse gases by burning fossil fuels. Moreover, the knowledge of preparing *sukuti*, *gundruk*, *kinama,* and pickles of vegetables like radish, carrot or lemon preserve food for future

use. By preserving food using such knowledge, Rai people are preventing formation of organic wastes which release Methane gas; one of the culprit gases causing over greenhouse effect, global warming and climate change.

Also, in Chapter VI, I have mentioned role of folktales in generating environmental ethics. For instance, the story of *Chintaloong* suggests us to bite as much as we can chew; else there would be food wastage. Also, different rituals encourage us to embrace nature. Embracing nature is developing climate resilience among us.

Further Insights

I was fortunate to attend two days mobile training on Cardamom Farming Management organized by District Agriculture Development Office in Champe High School on April 2 and 3, 2012. Experts from Agriculture Department facilitated discussion among cardamom farmers regarding challenges faced in cardamom farming. Since, the unidentified disease in cardamom was spreading rapidly; most of the farmers were despair about future in cardamom farming. Nevertheless, the experts shared a better strategy of cardamom farming. Traditionally, farmers have been using vegetative propagation of stem of cardamom for planting new plants. Experts trained farmers about how disease resistive plants could be produced through selection of healthy cardamom plants for sexual reproduction. The procedures of managing nursery of healthier cardamom were discussed. However, the experts did not have high confidence about the cause of rapid dispersal of disease in cardamom and remedy apart from sexually reproducing cardamom plants which is lesser convenient in terms of cost, time and labor consumption. So, if agriculture department does adequate research on finding out causes of massive disease infections in cash crops like cardamom, farmers could be benefited socially and economically.

Similarly disease and pest resistive crop varieties could be introduced in Champe. It is time agriculture department and other stakeholders conducted research in altered farm management (Cruz, et al., 2007) so that alternative methodologies in agricultural system could be introduced in order to adapt with ongoing climate change.

Although there are many community forest user groups, they are concentrated mostly in fodder and firewood collection. The orientation of objectives of community forestry needs to be directed towards REDD (i.e., Reducing Emissions from Deforestation and Forest Degradation), $REDD^{+}$, $REDD^{++}$, carbon trading and other ecosystem services (e.g. wild plant species with medicinal values, timber, wild fruits, aesthetic values, habitats for birds and animals, et cetera) of forests.

Although some organizations like Nepal Red Cross organized trainings for teachers and students in Champe, and there are some awareness radio programs regarding climate change mitigation and adaptation, they seemed to be superficial to help Rai people develop pragmatic skills in ground level. Therefore, government of Nepal and other stakeholders ought to apply bottom up approach in planning and implementing policies regarding climate change risk management and developing climate resilience. If indigenous Rai people became aware about risk management and adaptation strategies they could reduce harm due to climate change induced disasters.

Road access has eased livelihood of Rai people. They can easily migrate, import and export agricultural and other products. Unlike our *fupa*'s time, people do not have to carry quintals of cardamom for weeks on their back all the way down to Dharan to sell. Now, due to road access such cash crops could be exported within hours. However, the roadway becomes dysfunctional during monsoon or any disaster like landslides or soil erosions. Due to which people are compelled to use same old

method of carrying goods for miles where means of transportation cannot run. Thus, roadway has to be made smoother. It should be well engineered and constructed with long term vision. The roadways in Champe are built with myopic vision; this year it's constructed, it's swept away by the next monsoon which causes periodic wastage of annual budget on same road's construction every year. If the roadway became smoother throughout the year, even if climate change disaster destroyed entire crops' yield, through the roadway immediate support could be supplied to villagers in Champe. Thus, together with awareness to general public, specific strategic risk management trainings to them and improvised agriculture management, climate change disaster harm reducing technologies and infrastructures have to be constructed in Champe.

In conclusion, the local government needs to focus on issues of sustainable development. It should run non-formal gatherings to disseminate knowledge and aware aboriginal people of Champe about climate change, its causes, evidences, consequences, and bring a change in their perspectives so that they could think and practice sustainable livelihood. Similarly, the local people require training to develop skills on climate resilience and also skills to reduce harm from climate change catastrophes in Champe. Basic education system has to be made intense through reorientation of formal education system towards integration of environmental, economic and societal issues while harnessing young minds. Lastly, if indigenous knowledge system could be integrated with formal education, then it would together build a continuous system of dissemination of indigenous knowledge and transmission of values and ethics to younger generation.

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