

## Traditional Knowledge on Disaster Management: A preliminary study of the *Lepcha* Community of Sikkim, India

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Traditional knowledge has only recently touched the scientific chord of western academic knowledge. More and more researchers today are turning towards it not only to fill gaps in existing societal knowledge but also to find novel knowledge concepts and viewpoints for application in a contemporary context. Since tribal groups have lived within their local environments since time immemorial it is obvious that they do possess a rich knowledge about nature. Hence, research on nature and environments is enriched by incorporating traditional knowledge of indigenous and tribal peoples. Such knowledge is a precious national resource that can facilitate the processes of disaster prevention, preparedness and response in cost-effective, participatory and sustainable ways. This paper explores the traditional knowledge on disaster management of the *Lepcha* tribal people of Sikkim. It establishes that in the guise of folklore, the *Lepcha* have developed an elaborate understanding of the nature and causes of disasters and have identified accurate and precise indicators to assist in predicting disasters, as well as ways and means of mitigating their effects. *Lepcha* traditional knowledge finds echoes in some of the current principles of disaster management. We conclude that traditional knowledge of tribal groups all over the world not only needs to be recognized, conserved and documented but also is to be incorporated into efforts to formulate effective disaster management strategies.

**Keywords:** Sikkim Himalayas, Disaster awareness, Disaster preparedness, Disaster indicators, Effect and response to disasters, Disaster mitigation

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Comparison between western knowledge systems and indigenous knowledge systems has seldom not explored the epistemological foundations of the latter<sup>1</sup>. As a result, there has been a widespread monolithic approach to knowledge and learning. Thankfully, in India and elsewhere, experience has increasingly renewed a respect for traditional knowledge systems of local and indigenous communities. Indigenous knowledge is being recognized as at par with and complementary to scientific knowledge. More and more researchers are turning towards traditional knowledge systems, not only to fill gaps in existing knowledge but also to “discover” novel knowledge concepts and viewpoints. The value of diversity of knowledge systems, therefore, has redefined the human quest for truth. Today, the orally transmitted and experientially based knowledge of local and Indigenous peoples compares well against the experimental science of the technological era. Since tribal groups have

lived within their local environments since time immemorial, they possess a rich knowledge of nature and natural phenomena. Hence, current environmental research can be enriched through exploring the traditional knowledge systems of such groups of people.

The term “disaster” is difficult to define, but despite the “blurred edges” of the definition, it is still a useful concept<sup>2</sup>. A disaster can be regarded as a severe, relatively sudden, and unexpected disruption of normal structural arrangements within a social system over which the system has no firm control<sup>3</sup>. It is also defined as a crisis situation that outstrips the capacity of a society to cope with<sup>4</sup>. A disaster occurs when a significant number of vulnerable people experience a hazard and suffer severe damage and/or disruption of their livelihood systems in such a way that recovery is unlikely without external aid<sup>5</sup>. It is argued that while hazards are natural, disasters are not. Social processes generate unequal exposure to risk by making some people more prone to disaster than others, and these inequalities are largely a

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function of the power relations operative in a society. Critical to discerning the nature of disasters, then, is an appreciation of the ways in which human systems place people at risk in relation to each other and to their environment—a relationship that can best be understood in terms of an individual's, a household's, a community's, or a society's *vulnerability*<sup>6</sup>. Disasters could be natural or human-caused. In the former category are geological hazards (earthquakes, tsunamis/seismic sea waves, volcanic eruptions, mud flows), atmospheric hazards (hurricanes, tropical cyclones or typhoons, tornadoes, lightning-caused fires), hydrological hazards (e.g. river or coastal floods). Human-caused disasters include heavy environmental pollution, industrial and technological disasters, major traffic accidents, epidemics, and many fires. Sometimes disasters can be triggered by combinations of human activity and major natural disturbance. Disasters can also be acute (e.g. volcanoes eruptions, earthquakes, tsunamis, floods, hurricanes) or chronic (e.g. drought, famines, environmental breakdowns, pollution, toxic exposures) and can be focused in geographic scale or widespread. Whatever the cause or extent, coping with disasters is an ongoing human endeavor, obviously related to our collective survival.

Indigenous knowledge is a precious national resource that can facilitate the process of disaster prevention, preparedness and response in cost-effective, participatory and sustainable ways. Hence, a blend of approaches and methods from science and technology and from traditional knowledge opens avenues towards better disaster prevention, preparedness, response and mitigation<sup>7</sup>. Environmental conservation and natural disaster management are important in the livelihoods of indigenous people who often live in hazard-prone areas and have built up, through thousands of years of experience and intimate contact with the environment, a vast body of knowledge on disastrous events. This knowledge is a precious resource that continues to contribute to environmental conservation and natural disaster management in these regions<sup>8</sup>. In this study, we focus on documentation of the traditional knowledge of the *Lepcha* people of Sikkim vis-à-vis disaster management and mitigation.

Sikkim is the second smallest state of India, located between 27°5' N to 28°9' N and 87°59' E to 88°56' E, with an area of 7,096 km<sup>2</sup>. The *Lepcha* people of Sikkim are, a cultured people, with their own

particular knowledge system, worldview and oral history. Despite the underlying similarity of tribal ethos they share with the numerous tribes of Northeast India, their cultural and religious beliefs have a distinctive character. Notably, the oldest surviving names of various mountains, hills, gorges, rivers, lakes and caves in Sikkim are *Lepcha* in origin. These people are mostly Buddhist (a religion embraced in 15<sup>th</sup> century) but many of them have now adopted Christianity (embraced in 19<sup>th</sup> - 20<sup>th</sup> century). *Lepcha* folklore is rich with elaborate narratives, which are often a reflection of scientific reality. Their language and biological classification systems are also unique. Almost all of the *Lepcha* names of animals start with the letter 'Sa', and the names of different types of snakes and various bamboo products start with the letters 'Ta' and 'Pa', respectively. Hence, *surya*, *suthong*, *su-chyak*, *sunu*, *suko*, *sangi*, *sattim*, *sahu* are the names of tiger, leopard, bear, deer, lion, porcupine and monkey, respectively. *Panu-bu*, *pamol-bu*, *panul-bu*, and *palong-bu* are some of the names for various kinds of snakes. Similarly, *ta-zyang*, *tangar*, *tangjung*, *tafu*, *takchim*, and *talyung* are the names of different bamboo products. The *Lepcha* also have an extraordinary understanding of birds and bird-behaviour<sup>9</sup>.

The rationale of the study is that it is important to document this knowledge as it highlights the complex traditional knowledge of an important group of people whose contribution to the general knowledge base has not been well recognized or appreciated. Our study has high significance because such traditional knowledge is being lost at a rapid pace. Traditions such as story-telling are disappearing altogether, making their documentation particularly crucial. Traditional knowledge can be a useful input in our endeavor to face the challenges posed by disasters. It is also expected to be more effective as it has been consolidated through a process of socio-cultural evolution.

### Research methodology

The study is based on general observations and data collection over a period of 14 yrs (1996-2010). The study area pertains to Sikkim Himalayas in general. It includes areas falling within the state of Sikkim and hilly areas of the Darjeeling district. The study is largely exploratory in design and is based on literature reviews and participatory surveys. Primary data was collected from the indigenous

*Lepcha* people. For the purpose key *Lepcha* individuals were identified. Their details are as follows:

- Mr PO Pazo, Former conservator of Forest Department, Government of Sikkim.
- Mr Sonam Lepcha, Asst. Director, Department of Human Resource Development, Government of Sikkim.
- Mr S T Lepcha, Padmashree Awardee and a renowned *Lepcha* musician and folklorist.
- Ms Pamin Lepcha, Former Student, SIKKIM Manipal Institute of Technology
- Mr Lyangsong Tamsang, president, Indigenous *Lepcha* Tribal Association

The researchers used structured and unstructured interviews that were mostly comprised of open-ended questions and were discussion oriented. The questions were open-ended, seeking detailed folklores. The language used in the interviews was English or Nepali, depending upon the preference of the interviewees. At times local interpreters also helped. In some cases the interview schedule was handed over to a resident of Dzongu (North Sikkim) for information documentation.

As no apparent formal or structured traditional knowledge exists on disaster management amongst the *Lepcha* people, the researchers attempted to put the information collected into right context. Rather than being quantified, the data are presented in text form for easier understanding.

## Results and discussion

**Socio-philosophical interpretation of Disasters:** Philosophical aspects of a natural phenomenon assume importance in the context of disaster management<sup>10</sup>. The perceived cause of a disaster is an important philosophical inquiry if an effective management plan is to be envisaged.

The *Lepcha* people have no real concept of sin. When an individual does something terrible, such as indulging in incest, fraud, murder, violating accepted norms of hunting/food-gathering or showing disrespect, he/she invites no individual divine punishment. Such acts by individuals produce horror rather than revulsion from others because each one could result in *a whole year of disaster and collective suffering by the entire village* via a series of divine acts reflected as a natural calamity. This socio-philosophical construct is known as *nam-toak*.

Disasters in *Lepcha* culture, therefore, have been traced back to evil intents of human-beings. Such an interpretation demands that individuals always behave appropriately and responsibly to avoid causing disasters. Leaving aside the scientific veracity of such a belief, it can still be argued that this approach helps to promote a strong social fabric and effectively neutralizes the selfish, malicious and wicked impulses of individuals. It fosters a spirit of *camaraderie*, unity and harmony that is so essential for disaster management. It is perhaps not an accident that there is no historical instance of *Lepchas* invading other lands. Even when others began to settle down in their territory through invasion or migration there have been hardly any instances depicting *Lepcha* aggression, although bitterness at losing precious resources to others is visible.

It is also important to determine whether such a philosophy can be validated through any underlying principle. Do our greed, jealousy, maliciousness, arrogance, fear, hatred and other evil intents cause disasters? They do. Mahatma Gandhi once observed, in the context of European colonization, that *Earth has enough for our need but not for our greed*. Thus, greed can lead to disaster – especially human caused environmental disasters. Terrible wars have been fought because of fear, hatred, greed and arrogance. Noted economist and Nobel Laureate Amartya Sen holds the view that there was actually no overall shortage of rice in Bengal in 1943 when an estimated three million people died of famine. He showed empirically that availability of rice was actually slightly higher than in 1941, when there was no famine<sup>11</sup>.

Greed, corruption and exploitation not only result in disasters but also seriously compromise our ability to manage disasters. Most disaster management efforts remain just pretence because of inherent human weaknesses. Hence, their relationship with disaster is not a figment of imagination but a sad reality. There are several examples<sup>12</sup> of how corruption can harm those affected by disaster, including aid workers exchanging food for sex in West Africa, survivors of the tsunami in Aceh losing their homes when contractors built them without foundations and village chiefs diverting food from the most vulnerable in India in 2001. Most recently in Pakistan the greatest challenge to the flood relief that hit the country in 2010 was posed by the prevailing corruption in that beleaguered country. Is there any *Lepcha* knowledge that

supports such an interpretation? According to one of the traditional stories,<sup>13</sup> once there lived seven brothers with seven wives, seven daughters, seven sons, seven daughters-in-law and seven sons-in-law. They had to work hard day in and day out. Yet their widowed sister, along with one daughter, lived in prosperity not far away. The brothers and their wives grew very jealous and decided to kill the sister and her daughter and take away their property. As per their plans one day the brothers and their wives attacked the helpless sister and cut her into pieces. The sister, however, was a powerful *Mun* (priestess) and hence she was able to rearrange all her chopped-up parts into a coherent whole once again. She told her daughter everything and advised her to not to resist her maternal uncles when they came to take away their property. The uncles did just that, leaving only a hen and a calf for the daughter. The dead sister, meanwhile, went and entered a cliff and prayed to divine beings for revenge. Her prayers were answered. Seven days later a handsome man came and married her daughter and they began to live happily. For the seven brothers and their families, however, they followed a year of disaster and all but two sisters-in-law died. Even these women suffered from disease and soon they too died. Since then, the *Lepchas* believe that one should not show off his/her or wealth as otherwise *Ginoo mung* (the ghosts of the seven brothers and their families), invoked by the envy/jealousy of others, would play havoc in their lives. *Ginoo mung* is in a way an incarnation of other people's envious thoughts. Similarly, the jealous and malicious ones also go through a year of disaster as a divine punishment for their wicked thoughts.

According to one of the versions of this story we encountered, once the invocation by the dead sister inside the cliff was over, an earthquake ensued, destroying the evil brothers and their village. Thus, earthquakes too are believed by the *Lepcha* people to be caused by evil acts of human beings.

In yet another story,<sup>14</sup> once the *Lepchas* living in Sikkim were attacked by invaders from Bhutan. They fought back bravely. The war lasted longer than twelve years and as a result agricultural chores were neglected. This resulted in a prolonged famine. There was no respite and people had to travel long distances to find meager food. One day a boy and his grandfather were searching for food, but they found nothing. At last the grandfather requested a bird to help them. The bird took them to a tree having

a large honeycomb. The boy was happy but the grandfather said that the honey on that hill was poisonous. Both were disappointed until a bear came and taught them to how neutralize the poison and make honey edible. This story establishes that famine occurred primarily because of wars and not as a natural calamity. This folklore also teaches us the principles of resilience, diversification of our resources and behavioural modification to seek help in the face of disaster.

**Preparedness:** It is expected that traditional knowledge systems of indigenous people of any region will have some distinct elements relating to pre-disaster preparedness. Awareness of disasters is the first step in preparedness. Natural disasters are often region specific. A particular region generally has a definite set of natural disasters occurring within the area. Which natural disasters generally occur within the geographical boundaries of Sikkim Himalayas? *Lepcha* traditional memories of disasters (as recounted in their folklore) are of flash-floods, earthquakes, forest fires, landslides, draught, famine, high-velocity winds, hailstorms and avalanches.

We have already narrated the story depicting famine as one of the disasters *Lepchas* have faced. They also have a very strong memory of flash floods as is told the story, *The Great Flood*. According to this story, the two major rivers of Sikkim – Rungeet and Teesta – happened to be husband and wife who in the ancient times had eloped to get married. Once it so happened that because of some silly misunderstanding the husband and the wife had a big quarrel. To outdo each other in fury they began to swell beyond themselves. The water in the rivers began to rise higher and higher. Soon the entire *Nye-ma-yel* (Sikkim) was flooded. All the animals and human-beings cried for help, requesting the husband and the wife to have pity on them and to stop quarreling. But Teesta and Rungeet paid no attention to the distress they were causing to others and kept on pouring their wrath on each other.

Soon the situation became impossible. Wherever, one looked, only water could be seen. Not only the villages situated in the lush green valleys, but those located over mountain-tops too were now under water. The animals and the common folk panicked and ran towards the crest of the tall mountains. The rivers kept on swelling and the water continued to rise and at last only mounts *Tendong* and *Montom* stood above water. These two peaks were brother and sister. Both were unhappy

about the plight of innocent lives and took it upon themselves to protect the poor animals and the human-kind from the fury of the quarreling couple.

But the water was still rising. To keep them safe, the brother and sister peaks rose higher and higher above the water. It was a difficult feat; both were terribly exhausted and grew weaker with every passing moment. Only the welfare of the animals and people kept them going. But how long could this continue? The sister, unable to endure any more, sank under the water even as she prayed, frantically calling out to the gods to protect her dear brother. All the people and animals who had taken shelter with her thus went under water and died.

The death of his sister came as a great shock to *Mount Tendong*. Yet, he could not afford to shed tears as that would have increased the flood. With great effort he held back his tears and kept rising higher and higher. Those who had sought shelter on him were sure that they were doomed. The fate of those who died with *Montom* made them more frightened than ever. They prayed with all the sincerity, invoking the Goddess *Na-zong-nyo* to come and protect them. *Na-zong-nyo* too was distressed by what she saw. She knew there was no point in trying to restrain the fighting couple who obviously were beyond any reason now.

She called the blood pheasant and asked him to go and protect them. The blood pheasant flew down to the *Mount Tendong* and perched on its peak. All eyes looked towards him with hope. He thought for a while. Then, he accepted *chi* (a local drink) from those trapped over the mountain and drank it. The *chi* made him thirsty as never before. He dipped its beak in the floodwater and began to drink it up in great gulps. Soon the water began to recede. Everyone heaved a sigh of relief. The water went down further and not much later other mountains, lush green valleys and the *Lepcha* villages and homes that were submerged emerged. It was only after seven days that the blood pheasant stopped drinking. By now it was normal everywhere. *Teesta* and *Rungeet* had stopped quarreling and were ashamed of their foolish behaviour. The story underlines another vital disaster management tenet – *It is up to the individual to know what to do in an emergency.*

Story of the *Utis* Tree (Himalayan alder) that we recount later depicts that *Lepchas* have been familiar with landslides since time immemorial. Forest fires have also been mentioned by *Lepcha* people again and again in our discussion with them. Some of the

fires, they say, are natural whereas others are caused by people. The *Lepchas* have been practicing shifting cultivation for centuries, for which they clear new land by burning over a patch of forest. Sometimes these fires get out of control and this can lead to disaster.

The first instance of forest fire appears in the *Lepcha* narrative about how fire was brought to the earth. According to this story of the first marriage<sup>15</sup>, *Narip Nom* asked *Tarbong* to bring gifts for her before she consented to marry him. This task was difficult as it required fire also to be stolen from a *mung* (an evil supernatural being) called *Deut mung* who hid in a place called *Mashyok Matel*. *Ka-krhyak fo* (a black-backed Kaleej Pheasant agreed to steal fire so that the marriage could be solemnized. He succeeded in stealing the fire but while he was returning he put the fire on a chestnut tree and went away to find food for himself. A strong wind blew and the fire spread in the forest. *Ka-krhyak fo*, unfortunately was caught in it and as a result he lost his wings and had peeled off patches of reddish skin around his eyes.

The *Lepcha* also tell stories of earthquakes that rocked their land and resulted in destruction of property and lives. They also share their experiences and oral histories on avalanches and hailstorms. But we do not come across any *Lepcha* story or experience of tsunamis, volcanoes, or hurricanes, as such natural disasters do not occur in Sikkim Himalayas.

The *Lepcha* also possess knowledge of the annual timing around when such natural disasters are expected to occur. Thus landslides and flash floods occur during the monsoon season (June to September), and forest fires in summer (April-May). A drought is related to rain-less winter and hailstorms happen in March. High velocity winds occur in April-May. One of the *Lepcha* songs (personal communication, Mr S T Lepcha) is as follows:

*The hills are silent*  
*The valleys are hushed*  
*The cuckoos are back to Mayel Place\**  
*It is the month of Num-kum\*\**  
*Rains are violent and incessant*  
*Time to harvest wet paddy.*  
 \*Mayel Place, Paradise  
 \*\*Num-kum (July-August)

*Lepcha* traditional knowledge of disaster indicators is also substantial. We have already mentioned that

a rainless winter indicates local drought. Famine is indicated when bears (*Ursus thibetanus*) begin to raid villages, as well as when langurs (*Presbytis entellus*) move around in smaller groups. Both suggestions are logical, since when there is not enough food in the forest the bears will invade villages for food, and langurs benefit by moving around in smaller groups as this way they can cover far bigger areas and find sufficient food during scarcity. Lepchas living in the higher reaches believe that harsh weather and consequent famine are indicated well in advance by wolves (*Canis lupus chanco*). Wolves, according to them, do not breed at these times, in anticipation of such conditions. Such views are also reflected in Indigenous wisdom of Siberia and Canada<sup>16</sup>. Wolves, too, are extremely sensitive to the weather and environmental conditions and hence it is quite possible that they sense an impending shortage of food and accordingly, hormones controlling mating behaviour are not released into their system. This hypothesis, of course, needs to be corroborated.

The Lepcha believe that if the birds are silent, rain and storms are due. Alternately, if the birds are singing loudly and flocking together happily on the ground, good weather will continue.

One of the common beliefs prevailing in Northeast India<sup>17</sup>, East Asia<sup>18</sup>, Bangladesh<sup>19</sup>, China<sup>20</sup> and also shared by the Lepcha<sup>21</sup> is that in the year when particular bamboo species bloom *en masse*, a famine will occur. This is believed to happen every 48 yrs. The bamboo flowering cycle is called "Mautam" by the Mizo people of Mizoram and the related Chin people of Burma. It is called "Yu Li Hku" (rat famine) by the people of northern Burma's Kachin State. Such beliefs do have a scientific basis<sup>22</sup> since, after blossoming, the bamboo produces fruit, then dies off. The fruit is a large seed, resembling an avocado, and is packed with protein and other nutrients. During the fruiting stage, local species of forest rats feed on the bamboo fruits. With this nutrient boost, the rats cease cannibalizing their young and begin to reproduce in an accelerated birth surge, producing a new rat generation as often as every three months. Once the burgeoning population of rats has stripped the forest of bamboo fruit/seeds, however, nocturnal rat swarms quietly invade farms and villages to devour crops and stored rice, maize and other grains, potatoes and other vegetables, chili, and sesame. The rodents often grow to exceptionally large size and can grow through bamboo and wood floors, walls, storage containers and granaries.

It is not surprising that wild animals have evolved to respond to their natural environment, coping with seasonal flooding, wild fires, landslides and earthquakes. In Sri Lanka, Asian elephants carrying tourists on the beach ran away minutes before the tsunami struck. Many locals spoke of being saved as they chased their dogs, which were also fleeing from the wall of water. This response reduced losses<sup>23</sup>. There are other such observations too<sup>24,25,26</sup>. The Lepcha people believe that the behavior of various pheasants (cries and nervousness) as displayed right before a major earthquake is an important indicator. Such a belief prevails in China also<sup>27</sup>. The most important earthquake bio-indicators, according to the Lepcha, are weasels, martens and shrews – animals with high metabolism and rapid heartbeat. Their unusual behavior (panic and confused movements) in animals, in response to earthquakes, may be triggered by ground tilting, groundwater changes, electrical or magnetic field variations<sup>28</sup>.

Forest fires are said to be indicated by sudden movements of birds. Such a belief is understandable as unlike earth-bound creatures it is the birds that will move out first. But as the actual-time of forest fires is known to the Lepchas they keep vigil during this time, particularly at night when fires are easily visible from a great distance. Landslide prone areas can be identified easily by a visual inspection, and Lepcha people know well to not to construct houses in landslide zones.

Lepchas hold an interesting view on migration of birds. They believe<sup>29</sup> that Mayel fo (migratory birds) bring messages sent by Mayel Gods to inform people of the right time to sow, weed and harvest crops. An approximate English translation of a Lepcha song<sup>30</sup> is as follows:

*Tsuk dun dun, Tsuk dun dun*

*Tsuk dun dun, Tuk bo jo*

*Tuk bo jo, Tuk bo jo*

*Tuk fyel jo, Tuk fyel jo*

*Tuk fyel jo, nam du tsat*

*The proper time to sow*

*Rice has arrived*

*It is Jing month (March-April)*

*Let us sow*

*My family and friends*

*Let us join our hands for this task*

*If we do it will bring happiness for us.*

We come across names of three cuckoos in the song: *Tsuk dun* (Himalayan Cuckoo), *Tuk bo* (Indian Cuckoo) and *Tuk fyel* (Brain fever bird).

Similarly, the song for weeding is as follows (personal communication, Mr S T Lepcha):

*Time is for new flowers to bloom  
Time is for new leaves to sprout  
Time is for shifting seasons now  
for the rushing gales and rumbling thunder  
Time is for weeding now  
Cuckoo it is proper time to weed  
The season has now come to us  
Time to weed paddy Riao-Riao*

This song also mentions cuckoo, as well as an unknown bird with a call “*Riao-Riao*”.

How is this tradition related to natural disasters? The *Lepcha* believe that that any preponement or postponement in the arrival of *Mayel fo* (migrating birds) indicates the possibility of natural disasters such as hailstorms that can adversely affect agricultural activities.

#### **Effect of disasters and responses to them:**

Disasters have seriously detrimental effects on living beings. They disrupt normal life, as depicted well in the story of the great flood recounted previously. Some groups of people, however, are more vulnerable than others. According to one *Lepcha* folktale (personal communication Mr P O Pazo), once upon a time there were a brother and a sister. Unfortunately they were orphaned while they were still young. The sister, being the elder, went around in the wilderness gathering food for herself and her brother. Once it so happened that the sister found nothing to eat for many a days. She could see that her brother would soon die of starvation. Then, just to keep his hope alive, she pretended to have found some sweet potatoes and began to dig for them. It went on for a long while with the brother asking every now and then for *kew* (sweet potatoes) and sister replying *kyon* (Yes I give). The sister kept on digging in despair but found nothing. The hole in the ground where she dug got bigger and bigger until its wall caved in and the unfortunate sister was buried alive. Meanwhile the brother, too, died. After their death both were transformed into *yongo-hu-pho* (Sikkim Rusty-cheeked Scimitar Babbler). Even today, the *Lepchas* believe that the brother keeps on calling *kew* – asking for sweet potatoes from his sister and she keeps on replying *kyon* – “I am giving”.

Children, particularly the orphaned ones, are thus especially vulnerable to the painful effects of disasters. Even the story recounted previously of the Bhutanese invasion implies that the main

sufferers were children and the aged. In yet another folktale (personal communication Mr PO Pazo), once there lived a husband-and-wife pair of *mati-tap-pho* (White-capped Red start (*Chaimarrornis leucocephalus*)). They were very fond of each other. One day the wife fell ill. The husband put her in bed and began completing the domestic chores. A little later he went down to the riverbank to wash clothes. While he was washing, there was a flash flood and he drowned in it. Later the wife came out to look for her husband. She went near the river but by then the flash flood was over and everything appeared normal – there was no sign that her husband had been washed away. The wife began searching for her husband, calling out *cee-bee*, meaning *where are you*. She can still be seen flying alone near rivers and streams and crying out *cee-bee!* *Lepchas* call the bird *Cee-Bee-Pho* also and insist that it is the only bird to move towards high altitudes even during the severest part of winter. This story indicates that those living or working in areas susceptible to disasters are more vulnerable than the others.

The story of great flood underlines yet another important issue. When a disaster strikes, common people are left to fend themselves with no hope for outside intervention. In this story, the Goddess intervened much later to save some of the *Lepcha* people. The story is repeated today also. Governments and other agencies respond to disaster much later, even though most destruction and loss of lives takes place in the first few hours of a disaster. The common people, therefore, should be provided with knowledge, ability, skills and resources to take care of themselves in the face of disasters. The story also highlights that the *Lepcha* people knew that they had to climb high in the mountains to escape the great flood. Knowledge of safe areas during and just after disasters is crucial for survival.

#### **Mitigation**

Many strategies employed by the *Lepcha* to help them to overcome the after effects of a disaster can be identified. The people make their houses of timber (from a tree called *sambrang kung*) and bamboo. Such houses are known to be quite stable in the face of earthquakes. Even if such houses break, they do not usually result in loss of lives. This could be one reason why earthquakes tend cause greater damage in modern settlements with heavier house construction than in traditional *Lepcha* settlements.

Traditional *Lepcha* houses are built on rock and on the higher reaches, avoiding floods and flash floods. The floor of a *Lepcha* house is built up to a meter (2-3 feet) higher than the ground, with some space, called *tanhanp*, left below. This is done to protect the house from the turbulent rainwater that might flow beneath the dwelling. The houses, we have already indicated, are not built in landslide prone areas.

Continual availability of food during and after a disaster remains an important aspect of mitigation. The *Lepcha* have evolved a sophisticated philosophy to engender conserving food. They show restraint in the killing of game or gathering of plant material protected by taboos, which are invariably a veneer over a practical measure. The *Lepcha* socio-ethical norm, called "*buk-rup*", conveys a unique philosophy. It essentially involves avoidance of unnecessary wastage, destruction of nature and employment of simple techniques for its improvement. This entire belief is reflected in many *Lepcha* traditions.

Even the story where Bear teaches people about detoxification of poisoned honey is not merely an idea. The *Lepchas* practiced it widely. The *Lepcha* elders embarked upon the process of neutralizing the toxic contents of otherwise edible items for their consumption as food. This required an investigative task of some magnitude. After many efforts, the *Lepcha* priests succeeded in converting many otherwise poisonous plants into harmless edible food sources. The philosophy and the technique of neutralizing the toxic content of edible plants for their consumption as food is called '*Sim-Anyu-Mun*<sup>31</sup>'. This indicates that disasters often pose unique problems rarely faced in daily emergencies. Human response needs to be equally innovative.

We come across another interesting folktale of *Lepchas*, in which a male Rhododendron tree once fell in love with a lady *Utis* Tree (Himalayan Alder) and approached to her father to communicate his intentions to marry her. Father *Utis* tree found his proposal ridiculous because Rhododendron tree was a dwarf and very shabby looking. He rebuked him and took a promise that he will never come up with such a proposal. A sad Rhododendron tree returned home. This happened in the autumn. A few months passed by and it was time for spring season. The father *Utis* tree recalled the ugly rhododendron and laughingly told his daughter about the ridiculous offer made by the ugly and shabby rhododendron. His daughter did not share his sentiments however and she went looking for the rejected suitor. There stood the

Rhododendron tree in full bloom and looking heavenly. Lady *Utis* tree fell in love with him and begged him to marry her. The Rhododendron tree told her that as he has already made a promise to her father, now he cannot marry her. The lady *Utis* tree was crestfallen and in intense agony she jumped from the mountain and died. Since then, the *Lepchas* believe that the *Utis* tree grows in landslide prone areas. Every time a *Utis* tree is swept down in a landslide the *Lepchas* repeat this story.

This knowledge, reflected in the story, about which trees grow in landslide prone areas, can be useful to control landslides by planting herbaceous plants (rather than hardwood trees) over fresh landslides. Once these plants take root and hold the topsoil, gradually hardwood plants can be planted to convert the landslide into a forested area.

The *Lepcha* also associate certain flora particularly with forest fires. This may have a scientific basis as certain plants capitalize of lack of competition in forest areas that are burned over. The people also tell about plants that recover first after a fire. Ecologists call them "resprouters". Knowledge of such plants can consolidate efforts to mitigate the after effects of forest fires. Certain plants are known to be resilient to forest fires. These include mostly large trees whose inflammable crown are high up, far away from the effect of fires, and whose roots run deep inside the earth – again safe from fires. This type of knowledge of the *Lepcha* and other Indigenous people needs to be documented in a structured manner and incorporated, with appropriate permission and benefits, into a region's general afforestation plans and policies.

### Conclusion

From the information presented here, it is apparent that the *Lepcha* people of Sikkim have experienced a range of disasters since the time immemorial. They have evolved elaborate philosophies to help explain the nature and causes of disasters. These beliefs, as reflected in their stories, appear folkloristic but they are based on sound principles that help to guide actions and behaviours that can help anticipate and limit the impacts of disasters. Also, these philosophies help people to develop close-knit social structures that make them more resilient in the event of a disaster. The importance of these social relationships and institutions can be expressed by the maxim that *those who work together well on a daily basis tend to work together well at times of disaster*.

Our study has high significance because such traditional knowledge is being lost at a rapid pace. Traditions such as story-telling are disappearing altogether, making their documentation particularly crucial. Traditional knowledge can be a useful input in our endeavor to face the challenges posed by disasters. It is also expected to be more effective as it has been consolidated through a process of socio-cultural evolution. The *Lepcha* also possess detailed knowledge of their natural environments which makes them well aware of the potential disasters facing them as well as of the indicators that help provide sufficient warning. They have evolved various ways and means to avoid and escape unpleasant aspects of disasters. Even their seemingly compromising posture in relation to disasters could be rather interpreted as their silent courage to bear what nature offers them.

Their knowledge needs to be recognized and incorporated in our general efforts to formulate a comprehensive and holistic approach to disaster management in India and elsewhere in the world. It has been understood that disaster management should be based on what people are “likely to do” rather than what they “should do”. Traditional knowledge, therefore, will provide more effective measures in coping with, enduring and managing disasters as they are “known” and “understood” by specific group of people. The knowledge gained from local community- as from *Lepchas*, could be great depositories to complement with the formal programmes of Government. This kind of information could be of more use in making local plans for the region. The knowledge held of local community could either be blended or can be grafted over scientific knowledge on climate change to mitigate the climate change/ weather anomalies in order to mitigate the disasters.

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### References

- 1 Personal Communication, Darshan Shankar, Foundation for Revitalisation of Local Health Traditions, 2007.
- 2 Oliver-Smith, Anthony & Susanna M Hoffman, *The Angry Earth. Disaster in Anthropological Perspective*, (New York/ London: Routledge), 1999.
- 3 Nashreen Mahbuba, 'Disaster Research: Exploring Sociological Approach to Disaster in Bangladesh'. [Online] in *Bangladesh e-journal of Sociology Vol.1 No. 2 July 2004*: 1–8 [online] <http://www.bangladeshsociology.org/Nasreen%20-%20Sociology%20of%20Disaster,%20PDF.pdf> [2 December 2005]
- 4 Anderson Mary & Peter Woodrow, *Rising From the Ashes: Developing Strategies in Times of Disaster*, (Boulder, Colorado: Westview Press), 1989.
- 5 Blaikie Piers, Terry Cannon, Ian Davis & Ben Wisner, *At Risk: Natural Hazards, People's Vulnerability, and Disasters*, (London: Routledge), 1994.
- 6 Hilhorst Dorothea & Greg Bankhoff, 'Introduction: Mapping Vulnerability,' In *Mapping Vulnerability, Disasters, Development and People*, edited by Greg Bankhoff, Georg Frerks & Dorothea Hilhorst, (London: Earthscan), 2004.
- 7 Kamara James, *Indigenous knowledge in natural disaster reduction in Africa*
- 8 Anonymous, *Knowing Nature - Indigenous Knowledge Helps In Disaster Management*, 2006, <http://www.grida.no/polar/news/2404.aspx>
- 9 Jha A., *Ornithoscopic norms of Lepchas of Sikkim*, (Amrita Bazar Patrika), 1995.
- 10 Bankhoff Greg, *Cultures of Disaster. Society and Natural Hazard in the Philippine*, (London and New York: Routledge Curzon), 2003.
- 11 Sen A, *Poverty and Famines: An Essay on Entitlement and Deprivation*, (Oxford University Press), 1981.
- 12 Anonymous, (2010) *Fighting Corruption in disaster response*, Integrated Regional Information Networks (IRIN) <http://www.preventionweb.net/english/professional/news/v.php?id=12581>
- 13 Gorer G, *The Lepchas of Sikkim*, 1938, reprinted by Gyan Publishing house, 1996.
- 14 Jha V & Jha A, *Bird Behaviour as Depicted in Lepcha Folklores*, paper presented at Pan-African Ornithological Congress in South Africa, September, 2008.
- 15 Doma Yishey, *Legends of the Lepchas*, (Tranquebar Press of Westland Ltd.), 2010.
- 16 Farley Mowat, (1963) *Never Cry Wolf Study Guide*, 2010.

- 17 "Mizo Diaspora on Mautam Mission" The Telegraph India, June 13, 2008. [http://www.telegraphindia.com/1080613/jsp/northeast/story\\_9402912.jsp](http://www.telegraphindia.com/1080613/jsp/northeast/story_9402912.jsp)
- 18 "Gigantic Rodents Attack Paddy Farm and Stocks," Konumthung News, October 27, 2007. <http://83.143.83.35:36080/VirtualHostBase/http/www.khonumthung.com:80/kng/VirtualHostRoot/kng-news/07-news-archive/oct-07-news/gigantic-rodents-attack-paddy-farm-and-stocks/>
- 19 "Rat Invasion Fuels Famine Fears in Remote Bangladesh" AFP, Feb 9, 2008. [http://afp.google.com/article/ALeqM5jkzeqnrBjs\\_BRfNVWbN1Lh2kld6g](http://afp.google.com/article/ALeqM5jkzeqnrBjs_BRfNVWbN1Lh2kld6g)
- 20 "Swarms of rats destroy crops in townships in Chin State" Zalat May, Mizzima News, July 28, 2008. <http://www.mizzima.com/news/inside-burma/4-inside-burma/831-swarms-of-rats-destroy-crops-in-townships-in-chin-state>
- 21 Tamsang K P, The Unknow and Untold reality about the *Lepchas*, IInd edn, (Lyansang Tamsang), 1998, 68.
- 22 Anonymous, *Rats and Kyats: Bamboo Flowering Causes a Hunger Belt in Chin State, Burma*
- 23 Dawn M Smith, *How do Natural Disasters Affect Wildlife?*, 2010.
- 24 Kirschvink Joseph L, Earthquake Prediction by Animals: Evolution and Sensory Perception, *Bull Seism Soc Am*, 90(2000)312-323.
- 25 Quammen D, Animals and earthquakes: This World, San Francisco Chronicle, 1985, 15-16.
- 26 Schaal Rand B, An Evaluation of the Animal Behavior Theory for Earthquake Prediction, *California Geol*, 41(2) (1988).
- 27 Anonymous, *Earthquakes: Prediction* <http://library.thinkquest.org/C003603/english/earthquakes/prediction.shtml>.
- 28 Anonymous, *Animals and Earthquake prediction*, 2010, [http://earthquake.usgs.gov/learn/topics/animal\\_eqs.php](http://earthquake.usgs.gov/learn/topics/animal_eqs.php)
- 29 Jha A, *Nature Folktales from Sikkim and Arunachal Pradesh*, (World Wide Fund for Nature India), 1999.
- 30 Siiger, Halfdan, 'The Lepchas, Culture and Religion of a Himalayan People, Part I, Results of Anthropological Field Work in Sikkim, Kalimpong, and Git,' *Publications of the National Museum. Ethnographical Series*, XI: 1, 1967a.
- 31 Jha A, 'Ecological Prudence of Lepchas of Sikkim', Tiger Paper 29:1, FAO Bangkok, 2001.