

TOWARDS SUSTAINABLE COMMUNITY AND INSTITUTIONAL RESPONSE TO CLIMATE EXTREMES: A SITUATIONAL ANALYSIS OF INSTITUTIONS, COMMUNITIES AND THEIR RESPONSE TO CLIMATE CHANGE INDUCED DISASTERS IN UTTARAKHAND

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Abstract

This paper presents a situational analysis of disaster in 2013 and issues related to the preparation of mountain communities in Uttarakhand with specific reference to Bhatwari Block in Uttarkashi District and their adaptation and response. It also analyses the response of the institutions in the light of needs of the communities. The paper argues that the determinants for such a response are located in the information flow and access, resource access and governance. The need for looking at these responses in the light of Mountain vulnerability frameworks and sensitivity aspects which include both gender and social marginality issues are emphasized. The issues of gendered vulnerability of the mountain communities located in a fragile eco system and inequitous social system with specific reference to agricultural and forest based livelihoods are discussed. The paper also focuses on how these vulnerabilities are impacted by climate change. The paper argues that institutional contexts also influence the responses of adaptation and mitigation. The paper concludes with suggesting some mechanisms for preparation of the communities and institutions for a sustainable response.

Keywords: Gendered vulnerabilities, Climate change impacts, institutional contexts, Adaptation

Introduction

Climate change induced disasters are increasing and these are affecting mountain communities adversely. There is a need to locate these

impacts in the context of vulnerabilities of communities as well in the resource access, information flow and governance processes.

Climate change has been described as ‘significant changes in the measures of climate lasting for an extended period of time’ Thus it could mean ‘major changes in temperature, precipitation, wind patterns occurring over several decades or longer’.USEPA (2015)

Climate extremes increasing in the decade since IPCC 4 Report has been noted (IPCC 2014) “There are likely more land regions where the number of heavy precipitation events has increased than where it has decreased. Recent detection of increasing trends in extreme precipitation and discharge in some catchments implies greater risks of flooding at regional scale (*medium confidence*)’.(p-8) IPCC 2014.

Such extremes have a serious impact on the lives and livelihoods of the communities, more so of the poor and marginalised in these communities. Vulnerability and capacities for adaptation and mitigation are ‘strongly influenced by livelihoods, lifestyles, behaviour and culture (medium evidence, medium agreement)’IPCC (2014). Further the institutional and social contexts are important in putting effective steps to combat extreme climate events and reduce vulnerability. The contextual underpinnings of vulnerability have been highlighted by many scholars (Cutter et al 2003; Machhi, 2011)

Hazards of place model of vulnerability spoken by Cutter (2003) reflects on the need to link social vulnerability. The model focuses on risk as an objective measure of the likelihood of a hazard event which interacts with mitigation – measures to lessen risks or reduce their impact. This produces the hazard potential. The hazard potential is either moderated or enhanced by a geographic filter (site and situation of the place , proximity as well as the social fabric of the place. The social fabric includes community experience with hazards, which in turn are influenced by economic, demographic and housing characteristics. It is believed that the social and bio-physical vulnerabilities interact to produce the overall place vulnerability (Cutter, 2003). There were also variations in measuring vulnerability which could be classified as either top down or bottom –up approach (CCA RAI, 2014). The issue of vulnerability of any system is seen as the outcome of three factors ‘ One of magnitude of climatic changes affecting a particular system(exposure) , the characteristics of the system(sensitivity) and the ability of people and eco systems to deal with resulting effects (adaptive capacities of the system)’ CCA RAI, 2014 p.15. Following Hinkel 2011, the CCA RAI (2014) speaks of the need for case specific vulnerability assessments as the impacts as well as vulnerabilities to climate change can vary across regions, economic secotes and social groups or types of systems considered (social , naturel, economic or socio-ecological). There are issues

concerning measurement of vulnerability as there is no agreed upon consensus in measuring vulnerability like temperature. Nevertheless it is agreed that the sensitivity of climatic change is considerably high when societies depend on natural resources or eco systems e.g. agriculture and coastal zones. Further the poor communities are especially vulnerabilities- (IPCC, 2014, and CCA RAI, 2014).

Thus as the latter report points out there is ‘ limited access to resources, secure housing, proper infrastructure, insurance, technology and information. Further it points out that ‘ almost the whole of India has a high or extreme degree of sensitivity to climate change, due to acute population pressure and a consequential strain on natural resources, which is further accentuated by the high degree of poverty, poor general health and the agricultural dependency of much of the populace (Maplecroft cited in CCA RAI, 2014)

Social vulnerability is considered as a multi-dimensional concept with 11 factors identified as key factors in determining the vulnerability. Cutter developed a social vulnerability Index consisting of 11 factors consisting of Personal wealth, age, density of the built in environment, single sector economic dependence, housing stock and tenancy, race, ethnicity, ethnicity, occupation and infrastructure dependence. While geographical specificities were also identified as key influencing factors in shaping vulnerability.

It has also been pointed out that assessment of vulnerabilities could be from ‘ top down approaches’ or ‘ bottom up approaches’. The former looking at vulnerability from the view point of impacts of a disaster, whereas the latter take analysis from the people view point. Bottom-up approaches are participatory in nature and are conducted at local levels like households or rural communities, which appears to be site specific and context specific and there are issues of ‘generalizability ‘ that have been mentioned (CCA RAI, 2014)

There are others who have spoken of mountain specific vulnerabilities. Prasad and Brodnig (2010) have combined two models of vulnerability one the IPCC vulnerability Framework and the mountain specificities framework developed by N.S Jodha (1992). Brodnig and Prasad contend that as developed by Jodha Mountain Specificities include either constraining features or enabling features. The constraining features are accessibility(involving distance, mobility and availability of risk management options);, marginality (relative endowments of a system such as slope/altitude, low resource productivity and reinforced by lack of social and political capital); fragility refers to the diminished capacity of a social or ecological system to sustain shocks. Diversity, niche and adaptive capacity are considered as the enabling factors that point to different coping strategies

that emerge from a natural resource management patterns, livelihood endowment and cultural practices. Thus Brodnig and Prasad (2010) emphasize that ‘ The Mountain Vulnerability Framework merges and aligns the IPCC and mountain specificities frameworks, thereby integrating global criteria for describing vulnerability with more contextual parameters for mountain ecosystems. It highlights the importance of both biophysical and socioeconomic factors in assessing vulnerability, and offers sample indicators that can be modified or expanded depending on the specific focus of the assessment. In addition, the framework is scalable both in terms of time and space and can thus be employed for different assessment purposes, from project to country level’

The gendered vulnerability is part of the social vulnerability. However this needs a special mention as the mountain women have huge roles and responsibilities in taking care of the household as well as participate in the ‘productive’ functions as well. The social marginality and social specificities also include gender aspects. Risk Assessments and adaptive capacities are further undertaken

Adaptation and mitigation responses are underpinned by common enabling factors. These include effective institutions and governance, innovation and investments in environmentally sound technologies and infrastructure, sustainable livelihoods and behavioural and lifestyle choices IPCC (2014)

Following Machhi(2011) Adaptive capacity is considered as ‘The capabilities, resources or institutional capacities of systems, organisations or (individual) actors that enable them to adapt to climatic conditions that have altered or will alter in future and their possible impacts, to take effective adaptation measures and, by these means, to reduce their own vulnerability’.

Tuana and Cuomo (2011) have indicated that climate change debate is dominated by western scholars with a complete absence of gender, race and colonialism. There is need for gender differentiated impacts of climate change, and this is especially important in Indian Himalayan societies, where women carry the largest burden of agricultural work. Scholars have rejected the separation of development and climate change adaptation as two separate and competing objectives and recognising the agency of women and the poor in understanding the impacts (McGregor, 2005).

Study Site

The Rapid Assessment study site was the Upari Tok area of Block Bhatwari in Uttarkashi District, Uttarakhand. The state of Uttarakhand was ravaged by the 2013 disaster with unseasonal and heavy rain(a climate extreme event).The majority of people in Uttarakhand are dependent on subsistence agriculture coupled with seasonal tourism as the major means of

survival, with tourism and its connected occupations providing over 25% of state income and a large chunk of employments/ livelihoods. The road network built for pilgrim tourism was crucial in linking the village/local economies with the regional economies. It ensured the flow of essential goods and services including crop produce, seasonal vegetables and fruits from and to far off places, including Delhi. Further Tourism, largely Pilgrim Tourism was a major contributor to the local economy as well as state economy. According to the Uttarakhand Tourism Department, the total loss to the tourism sector from the 2013 disaster is about INR 12,000 Crores. But the flow of tourists being massive (at about 2.7 crore people in 2012, about 2.5 times the local residents) and unevenly distributed – due to the presence of the famous “*char dham*” pilgrim centres - in only three districts (Chamoli, Rudraprayag and Uttarkashi), these three mountain districts (along with the plains district of Haridwar) bear the major burden of massive mountain-blasted big-road construction, huge hotel infrastructure (often blocking the path of rivers) etc. Road cutting by blasting in steep hill-sides has caused massive land-slides with heavy rains, with the state losing nearly 15,000 KMs of roads to slides till 2011, with 200 lives lost & 5600 houses damaged in 2012 alone (Disaster Mitigation & Management Centre, Uttarakhand). This shows that the 2013 disaster (where over 6,000 lives were lost) is not /will not be a one-off catastrophe, and hence there is no way out but to prepare on all fronts of knowledge, community involvement and developing & implementing participatory response mechanisms.

However the disruption of road network by extreme climate event like very heavy/ unprecedented rainfall has resulted in tremendous misery and put the people under severe strain. Further in the absence of road connectivity, the distribution of relief was affected and the relief for communities that were located even 8-10 km was difficult to reach. Preliminary assessments carried out spoke of the long commute and hardship for communities located far away from Uttarkashi town, in carrying the relief load to their homes from the distribution points (A.Malathi & Dutta, 2013). Further this is compounded by huge loss of produce from subsistence agriculture. The crops that have been badly affected are the *Asade Aloo* (early maturing Potato), Apples and to a lesser extent - the paddy produce, both on account of water logging and the loss of agricultural land as also the destruction of the terraced land. In such situations the food security of mountain communities is compromised in availability, access and utilization. In fact it is fairly well recognized that climate change caused food and livelihood insecurity (CFS, 2012; FAO, 2011; ECB, 2013).

Tools and Methods

Rapid Assessment

Rapid assessments are done when quick understanding regarding disaster and its impacts are to be understood. The methodology includes transect walks within the village to understand loss and damage to infrastructure, loss of life to human and animals, as well as damage to agricultural lands/crops and their impacts on livelihoods of the people. The quick assessment would also understand the relief distributed so far.

Rapid Assessments using participatory approaches requires a certain philosophical stance. These are concerned with how communities are recognised, respected and partnered with in undertaking such research work. In all these efforts it is recognised that the community voice needs to be represented as accurately as possible. Independence from official authority structures also ensures that such a representation is free from inherent biases in over exaggeration of the sufferings and underplaying the relief reached. In building instant rapport and in presenting oneself as people of concern and openly sharing the purposes of the assessment and the identity of the researcher, the information sharing process becomes more transparent as well as ensures validity. The reliance on different sources for information hopes to ensure data triangulation.

Participatory assessments of vulnerability and sensitivity would ensure transparency to the process of vulnerability assessments as well as ensure that such knowledge is empowering(ECB, 2012) and would include Disaster Response by communities /institutions (government and non-government) which would identify the knowledge and capacities regarding climate change impacts and their adaptive capacities would be another area for assessments.

Tools used

Focus Group Discussions were used with key informants to get an understanding of the issues. Sometimes the focus group discussions were held on the main street of the village for e.g. Bagori.

Interviews with key informants like *Patwari* and *Pradhans*(*elected village council Head*) of the villages, as well as with elderly people and shop keepers were also conducted. Some of the village level associations like *Mahila Mandals* (Women's groups) and Youth groups were also included in the discussions regarding the impacts of disaster, the relief distributed, their current needs and future concerns as also their preparation for such events. Shop keepers, teachers etc were also included in the research process.

Observations were done regarding loss and damage to housing and other infrastructure within the village. Observations were done during transect walks and while conducting interviews. Visits to families with

damaged houses, agricultural and horticultural land as well as the village level infrastructure including drinking water channels/sources. Observations were also done with regard to approach roads to the village, land slide areas and their impact on water channels and housing and other infrastructure.

A brief profile of the study area

Uttarkashi was originally a part of district Tehri Garhwal. Soon after independence, when Tehri Garhwal kingdom merged with India, it was made a border district with the district headquarter at Uttarkashi. Uttarkashi district was created on 24 February 1960 out of what then constituted the parganas of Rawain and Uttarkashi of Rawain tehsil of erstwhile Tehri Garhwal district. It sprawls in the extreme northwest corner of the state over an area of 8016 sq. km. On its north lie Himachal Pradesh State and the territory of Tibet and the district of Chamoli in the east. Topographically, the district is mountainous but a network of roads has made all parts easily accessible. The district at present comprises of 4 tehsils and 6 Community Development Blocks. It has 3 towns and 686 villages (678 inhabited villages and 8 uninhabited villages). The Bhatwari Block of Uttarkashi District has been ravaged by the recent disaster in June 2013.

The villagers in the Bhagirathi valley practice horticulture, agriculture and pastoralism. The area is famous for apples, though production has been declining in recent years. The villagers practice transhumance, with the cultivators moving lower down the valley to Dunda from November to March, while the shepherds move between the high-altitude meadows and the forests in the Terai. Tourism is confined to a very short pilgrimage season.

There have been reports of climate change leading to decrease in the rainfall during winters and warmer winters as also the relative frequency in the happening of extreme weather events both in summers and winters. These changes have brought tremendous stress to the already fragile environment as also the social situation of the communities increasing their vulnerability. Some of the mitigation measures they are resorting to are increasing migration to the plain areas or lower hills and or remittance economy – depending less and less on agriculture and horticulture for their livelihoods.

Agriculture and Irrigation: Agriculture in these areas suffers from many constraints. The availability of cultivable land itself is the greatest restricting factor. As much as 88 percent of the area is either covered by forests or is barren and uncultivable. The land is low in fertility except in the valleys and even land is too few and far between. Shorter agricultural season, low temperature, high altitude, smallness of land holding, perpetual problem of soil erosion due to steep gradients etc. are other inhibiting factors

effecting agriculture. Sheep rearing for production of wool and meat, orchard raising, spinning and weaving of wool and other cottage industries etc. offer much scope for livelihood generation. The cultivation in these areas is carried on largely by making terraces on the sloping hillsides. Some cultivation is done on steep hills also where terracing and tilling cannot be done and the place is cleared by burning scrubs and bushes. The seeds are sown with the help of a hoe. This practice of cultivation is known as *Katil*. The main Kharif crops are paddy, small millets and potato while the chief Rabi crops are wheat and barley. These crops account for over 80 percent of the total cropped area. Horticulture is another field that can boost up the economy of the district. However, it has not made much headway due to difficulties in marketing the produce, arising from poor communications and remoteness of areas.

Mahajan (2008) speaks of sustainable mountain agriculture and lists about 40 species that are grown by farmers in the region using mixed cropping patterns. He also shares that this primary livelihood is characterised by very high levels of bio diversity and use of organic cultivation methods. Such farming is based on the evolved and tested knowledge of farming systems and the uncanny sense of what grows best for the soils and the ecology in concern.

The major emphasis is that the people of Uttarakhand have been living in ecologically fragile environments in a way that ensured both ecological and economic sustainability- however the impact of climate change have altered the ecological situation drastically. This set in motion certain ways of coping – chief among them is migration and resorting to remittance economy.

Such copings have altered the family structure and have altered the community social structure too. A number of villages are having populations less than what they were before- increasing instability in the livelihood scenario that was dependent on forest and agriculture has made it imperative for families to seek greener pastures in search of employment and education.

Animal husbandry: Animal husbandry is an important source of supplementing income of the rural population. Of the total livestock, bovine population and that of sheep accounted for almost one third each. The production of milk per milch animal is very low. Efforts are under way for introducing high yielding strain. Sheep rearing is an important industry in the district. Yet it does not provide full time employment and it is only a vocation for those who are engaged in its pursuit. As many as sixteen sheep development centres are functioning (Statistical Patrika, 2013).

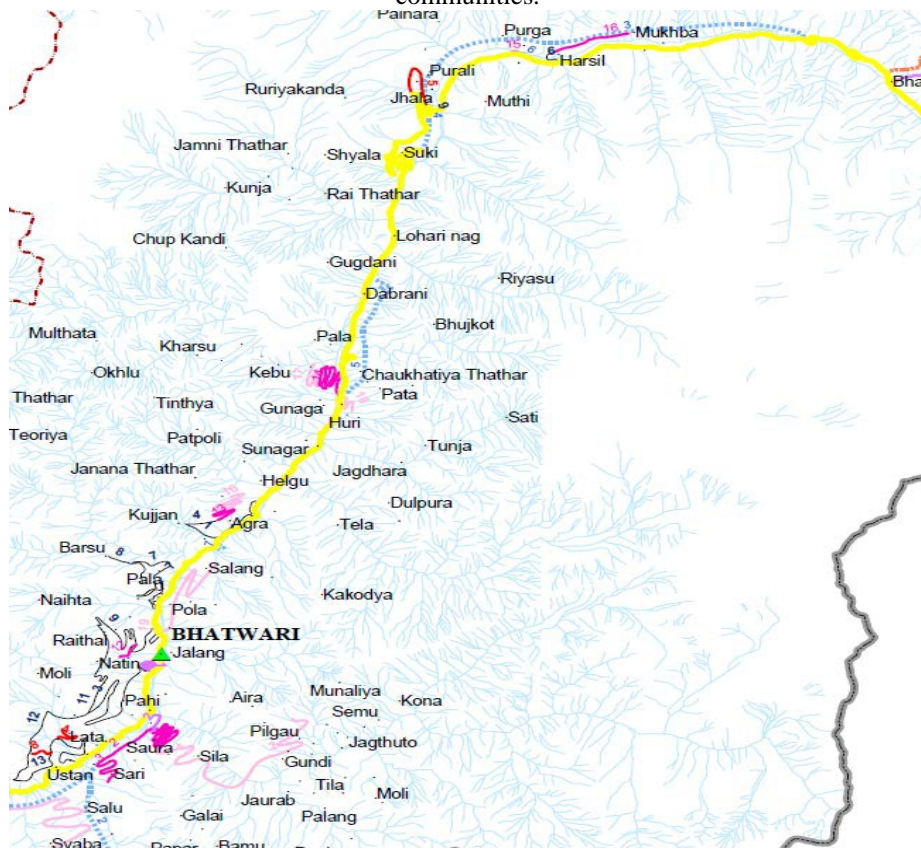
Industries: The cottage and village industries play an important role in the economy of the district. The most important cottage industry is the production of wool and woollen goods. Sheep are reared in a large number

and the industry flourishes at an altitude between 1525 m and 2440 m. Carpets (namdas), tweeds, blankets etc. are produced. Other cottage industries are basket-making, mat weaving and wood craft (Statistical Patrika, 2013).

Tourism and Hospitality Industry: This is another major livelihood providing sector with many linkages with local economies that are yet to be seriously studied.

Migration and Remittance economy: It has been found that mountain communities are resorting to migration on a large scale because of un-remunerative agriculture compounded by the vagaries of the weather. The migration to the plains or elsewhere even outside the country is by able bodied young men –which means it is the women who bear the brunt of sustaining the agricultural based livelihoods. Such large scale migration makes the hill communities comment that about sixty percent of the population has moved to the plains seeking education or employment. This poses serious concerns to the issue of sustainable livelihoods.

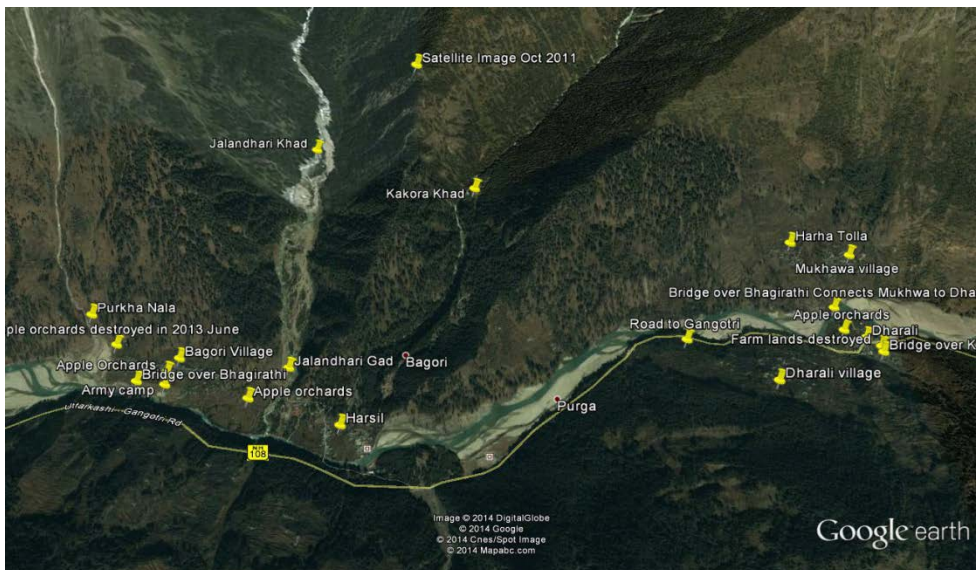
Two villages of Dharali and Bagori are illustrative of the destruction suffered by these communities.



Source: Department of Disaster Management, 2004, GOI, Uttarakhand
Section of the map showing Bhatwari Block with border villages Mukhba and Harsil.

The Bhatwari Block has been affected in multiple ways. One of the most important is the road network being affected and the communities in remote areas being unable to get supplies of essential goods. The border villages have special issues and concerns because of their remoteness and travel involved, as also villagers from Harsil, Bagori, Mukhba and Dharali move to the lower altitudes at Duda to escape from harsh winters, that is they practice transhumance.

The natural resource base of village communities living close to border areas consists of vast mountains with the Bhagirathi. The villages are just 30 km from the main pilgrim centre Gangotri, which is considered as one of the ‘*char dham yatra* ‘ pilgrim spots. The impacts of these villagers have been extreme – they have lost many of their apple orchards and Kidney beans harvest, besides being cut-off from essential supplies for well over 2 months. The relief distributed to them was meagre and it was the military station in Harsil areas that helped these villages to cope up with the disaster.



Villages in the Border areas of Bhatwari Block of Uttarkashi District
Source Google Earth Map

Two villages of Dharali and Bagori are illustrative of the destruction suffered by these communities. Bagori village is close to Harsil and Dharali is on the bank opposite Mukhba as seen in the Google earth map above.

Village Bagori is close to Harsil with access from Harsil village. It is largely composed of ST population. The village has well over 300 families of whom at least 50% stay in the Dunda area of Uttarkashi district. The movement of the villagers to this area is common as they seek to move their

cattle and sheep away from the snow bound areas in winter to Dunda for six months every year from November to April.

The villagers are largely dependent on sheep rearing and processing of wool and knitting and weaving of woollen products. The other major livelihood occupations are raising apple orchards, cultivation of kidney bean(local name *Rajma*). In addition many of the families have milch animals for which fodder requirements are a major concern. They also support these livelihood ventures with additional income from their labour.

Impacts

Livelihoods

The major impacts on livelihoods are when the impacts were on land and orchard.

Orchard land affected

Many in the village suffered silt deposition in their orchard land, backyards, or some orchards being washed away

Protection walls around orchards were also found to be damaged. They had to cut through the boundary walls to make way for the water to drain out from the roads and from their homes.

Damage to the orchards near Jalandhari Nala- one can see the remaining fence structures with white silt and stones. This will take lot of effort to clear and make it available for growing Rajma or raise Apple saplings.



The silt and rock deposition in the backyards and in the area close to the river needs to be removed for reclaiming land. Such efforts were already on where people had removed the stone and silt from in and around trees – they had cleared these to put manure as they usually do before the onset of winter- when all the trees get covered in snow.

- * Young saplings planted could not withstand the onslaught of flood and for a few families that got them only this year and planted these with the hope that this will stand them in good stead- found to their dismay that everything was lost. It usually takes about 8-10 years for their apple tree to mature and give them returns.

- * Many families also complained of the loss of *Rajma* plants and harvest in the floods in Jalandhari and Purkha Nala. One can see virtually a white layer with silt and stone on the fields of the villagers. In some cases the harvest is very small. Potato cultivation is also affected. For many the potato harvest got submerged in water. It needs to be emphasized that large number of families grow *Rajma* and Potato for their own consumption and very little of it is sold outside.
- * Hence these have impacted on their food security
- * Wet conditions have made it difficult to cook food and increased the domestic work load on women, in the absence of natural gas cylinder supply that was affected because of road network being damaged.

Livestock

- * No major loss of livestock was reported. One instance of a loss of a cow was reported for which compensation could not be received because of lack of evidence. Evidence of the tail or an ear of the cow was asked by the Patwari which the family could not cut because of religious and personal sentiment. Hence no compensation could be provided.
- * They had also mentioned that many of their sheep could be saved because they were at the higher altitudes during the floods and remained safely there.
- * Fodder issues were a major concern as the fodder is to be brought by the women folk who bear the major brunt of arranging for fodder and taking care of livestock. They were seen collecting fodder and loading these on trucks to move out to Dunda area in Uttarkashi district.
- * Moving to Dunda is a major effort as it involves the relocation of the families along with milch and other animals. The last group of villagers were seen loading their belongings or waiting for transport at Harsil, when the research team visited the village.

Weaving and other activities

Some of the families depend on weaving woollen products. Since many families possess sheep- the wool is available in plenty- this is then taken by some of the families that are traditionally dependent on weaving to make woollen products. But the major complaint of these families which live close to the river bank are that many of their machines and their houses were lying in water for quite some time. They also go to Dunda area during the winters. There they continue with their weaving activities. They make a range of products from weaving such as socks, sweaters, caps, shawls, gloves and their traditional '*pankhi*' (a large woollen piece in the size of a bed sheet that is wrapped around by women during winters. These products

are then sold in the local markets in Harsil and sometimes one or two women act as sales persons taking these products to close by villages like Harsil, Dharali and Mukhba. When they move to Dunda they also sell their products in the local markets.

Special Features

In the Harsil area called *Upari Tok*, there are four villages that move down to the lower altitudes in Uttarkashi area during the harsh winters. Bagori villagers have traditionally moved down to Dunda in Uttarkashi area during winter months. In this case the entire infrastructure seems to move to the lower altitudes to serve the needs of the transhumans. Thus the schools and the Anganwadi also move out to Dunda, where the Anganwadi worker and the school teachers also move with their families to be with the children.

They take their livestock and supplies for winter – move with bag and baggage to their Dunda location where they have a house too. Here they carry out their daily life activities and when the severity of the winter abates, they move back in May. During their absence in order to oversee security issues, one or two villagers act as the security and do '*chowkidari*'. They are nominally paid by the villagers.

It has been found that while majority of the families do this seasonal migration, others have moved permanently to the lower areas of Uttarkashi and other areas of Uttarakhand for the education of their children. Thus those who stay back avail of the houses of others to stay and pay them some nominal amount. Thus it was found that at least 50 to 70 families do not have house of their own and stay in rented accommodation in their relatives/neighbours houses. When the research team reached the village, it was found that many households have already left and only 15-20 families were there to interact with.

It was also found that the villagers helped to serve the pilgrims/tourists during the disaster- taking care to organise community kitchens (Nichenametla, 2013). Further they also contributed whatever they have to run a relief camp and later they themselves benefited from a relief camp run by ITBP.

Water facilities

Water availability- they used to get their supplies from water source located at a distance. But the pipeline from this source got damaged. There are water channels within the village (cemented structures) and points where hand pumps/taps from piped water are located. Most of them are in working condition.

Public Distribution System facilities

The rations through PDS were found to be irregular in supply even in normal times. The supplies come once in 3 months. During the disaster, they have used whatever rations they had to support the tourists. For almost one month they had to depend on their own. The relief supply was inadequate. There was no organisation other than government to provide relief material. After the disaster they were supplied only once with relief material consisting of food items: 15 kg rice, 15kg wheat, 5 litres kerosene, 5 kg pulse and 3 kg sugar.

Once they exhausted their relief they depended on the Army and ITBP's relief camps to fend for themselves. In the middle of October, Bagori villagers got their rations for the winter. Most families had left by then to Dunda.

Supply of Natural Gas

Supply of natural gas was affected because of the disruption in road network. The villagers had to now rely on fuel wood. It was very hard immediately aftermath of the relief. LPG cylinders of many households were lost in the flood waters, especially for those families living close to the river (the weaving community).

Electricity Supply

The electricity supply was affected because of the disaster. It was restored after 1 ½ months.

Village Dharali

This village has approximately 260 families of whom 15-20 families live in the Cholmi area close to Harsil. Dharali is situated 3km away from Harsil enroute to the pilgrim centre of *Gangotri*

Major livelihoods

Apple Orchards

Apple orchards are the major sources of their livelihoods. They earn substantial amounts with this. However the damage to Apple orchards because of incessant rains and the Kheerganga Nala overflow was a major source of devastation.

Kidney Beans Rajma Cultivation

Most families also engage themselves in the production of Rajma.

Daily Wage labour

Many of them also engage in daily wage labour, especially those belonging to SC/ST families

Hotel & Restaurant Business

Most families also engage in hotel and restaurant business

Repair unit

Some families also engage in running of vehicle related repair units

Provisions and Grocery shops

Some of the families engage in petty trade and run small shops on the roadside

Impacts

Livelihood Impacts

Majority of the people have suffered damage to their apple orchards. In fact apple is the main source of livelihood. The apple harvest declined also because of the delay in securing pesticides and the inability of staff of horticultural department to reach the remote areas. There was also debris deposition in some of the orchard land and some orchards being affected by landslides.

House and hotel damage

There is partial damage to a number of houses. Some of the houses close to the Kheerganga Mountain stream (Nala) have their toilets washed away.

The hotels, shops and houses situated close to the Kheerganga Mountain Stream (Nala) were damaged and completely filled with silt and debris. Some of the hotels and petty businesses have suffered damage to their furniture and tradable goods respectively. At least 20-25 buildings were affected with debris deposition. 20 hotels were affected out of 22 hotels big and small in Dharali. The average costs for the removal of debris from one shop alone came to Rs 50-60,000/-

Approach roads to the Village

The village is situated on a major national Highway 108 on the way to Gangotri. The approach roads are two – one for the old village and the other for the new village which was built after the fire hazard in 1972. They have constructed a new gate as the old gate has been washed away and also the approach road to the old village of Dharali. The approach to the new village is a recent construction and is not affected much.

Roads within the village

Within the village roads affected especially in the old village. The new village has much better pathways within the village.

There are two Nalas one Kheerganga and the other Mukhol Nala.

The Bridge on the Kheerganga side needs to be constructed again as the stream has flown way beyond the bridge boundaries and the length of the bridge falls short of the new stream length. The Kheerganga Nala floods have eroded the fields in the area and completely destroyed the apple orchards close to the Nala. In addition some of the toilets located close to the Nala were washed away. There is not much damage seen on the Mukhol Nala side.

Public Distribution Supply(PDS)

The PDS shop is located in Dharali itself near the main Bazaar. There is irregular supply of rations even in normal times (once in 3 months). Hence during the disaster, the supply was severely affected because of damaged road network.

Relief- After the disaster they were supplied only once with relief material consisting of the following food items. Relief provided by government to the villagers included 15 kg rice, 15kg wheat, 5 litres kerosene, 5 kg pulse and 3 kg sugar. There was no other relief supply from any other organisation. They also had run shelters for the tourists.

Water supply

Their mulshrot (for safe water) was affected as the pipes were damaged. They used to have pipes carrying water from the Kheerganga Nala. But now they have to carry water directly from the Nala which entails lot of hardships. This has further increased the work loads of women.

Electricity supply

The supply of electricity was affected during the disaster. The supply is restored now.

Special Features

The villagers move to lower areas during winter months. But some families do stay back. Many households have already left and only 15-20 families were there to interact with-in each of the two hamlets of the village. The villagers took shelter in a cave during the disaster. They stayed there for about 3-4 days.

They also took care of about 1200 tourists and took them to higher places to protect them from the deluge of *Kheerganga Nala*

They were cut off from the supplies and markets because of the devastation of road network. For four months they did not have connectivity by road and had to trek the whole distance to get supplies.

Garhwal Mandal Vikas Nigam has purchased the apples from them but so far no money has been paid till then (Ramola, 2013).

They have themselves cleared through *shramdan* the 10-15 feet debris in which the *Kalpveda* Temple which was deeply buried in the silt.

Major Needs

Some of the major needs expressed by the villagers of Dharali are:

1. Need for Regular income generation activities related with knitting and weaving or even processing of apples for juice and jams.
2. They are also willing to undertake training related to herbs and medicinal plants and the processing of the same.
3. They have also expressed the need for a proper communication tower by any service provider as the reach of BSNL tower located in Harsil village is limited.
4. Since their houses and hotels were damaged in the Kheerganga Nala floods, they would like some sort of protection walls built around the housing side of the Nala. They have also lost toilet facilities, land which was laden with fruit trees and Rajma plants. They also want the debris removed from the Nala so that next year they will not face similar such flood situation. They are also concerned that if this does not happen next year rains will lead to increased level in the Nala waters which might wipe out the entire village on the Kheerganga side. They also feel strongly that they will move out next year to safer places and not stay in the village at all if debris is not removed to ensure that Nala waters do not overflow and affect their village.
5. They also strongly desire to have adequate compensation for the apple trees lost and the Rajma harvest lost. Rs 300/- per Nali compensation offered for their orchard land is grossly inadequate-need for increase in compensation.
6. Further, they would like support as their terraced land is damaged and this requires much more effort both financially and physically. For this they demand at least Rs.10,000/- per Nali.
7. At least 30-35 families have suffered damage to their orchards or land in this way
8. They would like some sort of mechanism where debris removal from their homes and hotels could be supported as it is a costly venture
9. 70- 80% families live in Uttarkashi because of the lack of quality education services. If the quality of schooling improves – settling down of families in lower regions could be avoided. They want a

good standard English medium school in their area that could serve the eight border villages.

10. Compensation received by 5-4 families for damage suffered and in case of an owner of a building who used to rent it for a tyre repair shop- he received compensation of Rs 3 lakhs but the renter himself did not receive any compensation for the loss of his repair equipment and loss of livelihood.
11. Since the road network was cut-off they could not get the required dosage of pesticide for their apple orchards, which used to be provided by the Horticultural Department. Because of this their apple harvest was affected- apples were small and some trees white fungus type infection was seen. Hence they want timely treatment for their trees and plants

Institutional concerns

1. Remoteness in distance also seems to ensure remoteness to power structures.
2. Their closeness to the Border areas also ensures military presence which also affects their lives both positively and negatively. During the aftermath of disaster, the villagers have recounted stories of how the military helped them survive. They also tend to use the military hospital located at Harsil instead of the government service. The conditions of health infrastructure is very poor, compelling them to travel all the way to Uttarkashi(76km away or to Dehradun or Rishikesh for treatment).
3. Governance structures, mechanisms are inadequate and there is an inordinate delay in ensuring the success of the programmes. Remoteness – also means the administrative personnel show apathy and do not physically reach the areas to assess the loss and damage or offer compensation. Even in non-disaster times, the personnel are inadequately represented. These call for immediate steps to step up the governance mechanisms and systems. Governance systems apathy also means that what little is available of infrastructure is under-utilised – and there is an increasing reliance on private operatives for both welfare and other needs.
4. There is a tremendous effort by the villagers to continue with their lives despite the adverse and harsh climatic conditions. Villagers continue to eke out their subsistence agriculture and it is the tourist season that offers them the space to manage their lives. Since agriculture based livelihoods are in doldrums both because of vagaries of weather and the instability of incomes as also because many of the ‘hands’ are missing-

5. Health and educational services are poor and this compels families to move out in search of ensuring a proper future for their children
6. Livelihoods based on agriculture and horticulture that is dependent on natural eco-systems suffers in the light of dramatically changing climatic conditions. This requires them to continually adopt themselves. Dwindling social capital in terms of more and more people moving out of the village and disruption in families because of movement of young people to towns and cities means that natural livelihood systems are facing crisis of personnel and support. The efforts of the elderly and those left behind in the villages means that agriculture remains only at the subsistent level.
7. Further there could be value addition of the existing natural produce that has immense potential for raising the living standards of the people in these villages
8. Poor infrastructural facilities and lack of technical support in improving their facilities also makes village dwelling less attractive.
9. Ensuring basic supply of goods and services and effective implementation of government programmes and schemes will not only raise the trust but also raise standards of governance and ensure people's participation.

Conclusion

Towards Sustainable Response

Drawing from the two village illustrations related to Disaster, it becomes quite clear that the disaster response requires a strong governance system to be in place. Remote areas suffer from lack of response from governance during normal periods of time and in disasters this problem gets accentuated in reaching relief to the affected. Further the disaster preparation of the system seems to be in shambles as it was only in end March 2014 that a team from Block Head Quarters visited the village. The villagers have demonstrated coping abilities in facing disasters and even in taking care of tourists trapped in the disaster. However one other coping that they are doing is flight response, locating their families in the lower altitudes in Uttarkashi District or moving to Dehradun the capital where infrastructural support in terms of health and education are available. Thus disasters are not the only ones to create damage. It is the apathy and indifference of governance systems that enhances the effect. The mechanisms of disaster preparedness and response thus needs to be institutionalized to reduce the impacts and promote the adaptive capacities of the mountain communities. Further support for livelihoods in terms of cold storage facilities, value additions and market linkages for the foods cultivated, storage of food grains and essential items in a food storage depot within villages and locally managed, proper

and timely weather advisory with linkages to possible agricultural activity for which community controlled and monitored weather stations could be put in place. Along with these there is a need to strengthen the health and educational infrastructure.

End notes

1. The area researched is referred to as *Upari Tok* which refers to the eight border villages.
2. The land is usually referred to in *Nalis* a term which indicates 240 sq. Yards or 1 hectare is equivalent to 49.8 *nalis*

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