Water Equity and Tourism: A Case of Nainital District, Uttarakhand

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Introduction

This study is based on fieldwork that was carried out in the North Indian state of Uttarakhand over the course of a few years since 2014 under two projects. The first project was the Himalayan, Adaptation, Water and Resilience, where I was involved in the capacity of a research intern. The objective of the working package I was a part of aimed at exploring the impact of climate change on the livelihoods of communities living in the Upper Ganga Basin. The second project, carried out in the Kumaon region of Uttarakhand mapped the impact of multiple stressors (both climatic and non-climatic) on mountain farmers in two blocks of the Nainital district. This paper draws from both field experiences and data, but focusses primarily on observations and on-field narratives from Ramgarh and Dhari blocks of Nainital district in Uttarakhand.

Urbanization and the increase in tourism infrastructure in the district over the past decade has resulted in a conflict over water access and equity. An increase in tourism operators in the region has led to a change in the social and cultural fabric of the norms that had been in place for decades. The development of tourism infrastructure has put an incredible amount of pressure on an already fragile mountain ecosystem, and necessitates the inequitable sharing of an extremely limited natural resource. At the village level, the local self-government or the Panchayat is tasked with dealing with conflicts that arise from the mis-appropriation of water. The key resource relevant to the commons dilemma faced by the community is the availability and access to groundwater and spring water for irrigation and domestic purposes.

The structure of this document is as follows. The first section gives a biophysical context of the study area, the social dilemmas, and discusses in fair detail the impacts of climate change on the livelihoods of the local communities. The second section details the water equity and tourism conflict in the villages scoped, and lists a few of the laws and by-laws pertinent to this particular case of water availability, access and distribution.

1. Biophysical Context

1.1 Study Area:

The study sites were located in the Kumaon region of the North Indian state of Uttarakhand. A total of ten villages were scoped during the course of this study, spanning a total of two blocks in the district. The blocks in Nainital district have been indicated in the map below.

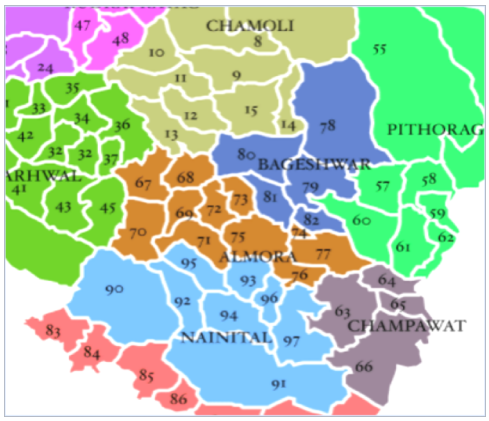

Fig 1: Map of Uttarakhand depicting districts and various blocks within each district. Blocks scoped: 93 - Ramgarh block, 96: Dhari block.

The villages visited in blocks were as follows Peora, Sitla, Satoli, Mona, Kherda, Kashyalekh, Takula, Parwada, Supi, Bana (located at an elevation of almost 4000 ft above sea level). The criterion behind the selection of study sites is part of the wider scope of the Indian Institute of Technology project and has not been explored as part of the current study.

1.2 Social Context, Stressors and Response Systems

1.2.1 Understanding the context of 'agriculture' in Ramgarh and Dhari blocks*:* Agriculture as a means of livelihood in these blocks includes, but is not limited to, the cultivation of crops. Mountain agriculture is predominantly rain-fed subsistence agriculture, and given the adverse impacts of climate change, cultivation of crops alone is not particularly remunerative. Hence, a mixed livelihood is usually practiced by farmers that involves livestock rearing, horticulture, forestry and labour, apart from cultivation of crops alone.

The types of crops grown include potatoes, cabbage, spinach and food grains, but this is a predominantly fruit growing belt such as : apples, plums, apricots and peaches.

Interactions across the ten villages in this phase of the field visit included subsistence and smallholder farmers, officials from the horticulture department posted in the district, civil society organisation representatives and locals.

Three broad livelihood categories can be identified from community interactions:

1. Only practicing farming, in possession of scattered small land holdings, usually comprising of older men and women.
2. Farming, labour and other smaller occupations (such as a snacks/ tea stall, driving during tourist season, guesthouses, etc.)
3. Richer tourism operators with larger, consolidated land holdings, almost entirely comprising of people from cities cultivating fruits and vegetables on land bought within the villages, that is intended for their tourism infrastructure.

1.2.2 Typology of stressors/ exposures and interactions experienced by the communities:

Interactions with communities including farmers across profiles, civil society organisations and certain government representatives about the kinds of stressors experienced can be divided into broadly into biophysical and socio-economic stressors on agricultural production.

Table 1: Biophysical and socio-economic stressors

DRIVERS		**STRESSORS/ EXPOSURES**	
Classification	**Sub-classification**	**Categories of exposure**	**Types of exposure**
Biophysical	Climate Change	Physical properties	Temperature
			Variable precipitation patterns

			Snowfall
			Extreme events
		Chemical Properties	Reduced soil quality
		Ecological responses	Upward movement (altitude shift)for certain species (e.g., apple)
			Increase in spread of invasive species
		Other environmental	Habitat destruction (forest fires, landslides)
			Water/ land availability issues
Socio-economic	Economic	Market demand and pricing	Lack of fixed market price for crops
			Lack of motorable roads
			Scattered and small land holdings
	Infrastructure	Tourism infrastructure	Building of resorts, guest houses
	Governance and Policy	Existing regulations and associated conflict	Access/ control over natural resources availability
		Human-wildlife conflict	

	Socio-cultural	Knowledge systems	Lack of knowledge and awareness about climate resilient agricultural practices.
			Lack of scientific research and dissemination of existing agricultural research.
		Power dynamics	Disproportionate impact on women as compared to men.

1.2.2.1 Biophysical stressors:

Climate change

The Kumaon region of Uttarakhand is predominantly characterized by tropical and sub-tropical temperature zones. The annual average rainfall in the basin varies between 39 cm to 200 cm, with an average of 110 cm. Eighty percent of the rainfall occurs during the monsoon months i.e. between June and October which largely governs the hydrologic cycle of the basin.

Temperature: India has been experiencing recurring periods of high and unusual temperatures in the past few years. The INCCA report indicates a warming trend in the last 100 years (1901-2007) in the mean, minimum and maximum temperature all over India including the Himalayan region (GoI, 2010). The warming trend has been more significant in the past three decades mainly attributed to rise in winter temperatures. As part of the INCCA Assessment Report published in 2010 (Indian Network for Climate Change Assessment (INCCA), 2010), PRECIS simulations Indicate that the Himalayan Region would be experiencing a net increase in temperature ranging from 1.7°C-2.2°C with respect to 1970's. Contrary to the rise in annual mean temperatures the winter temperatures would be experiencing a fall by as much as 2.6°C in the months of October, November and December with respect to 1970's.

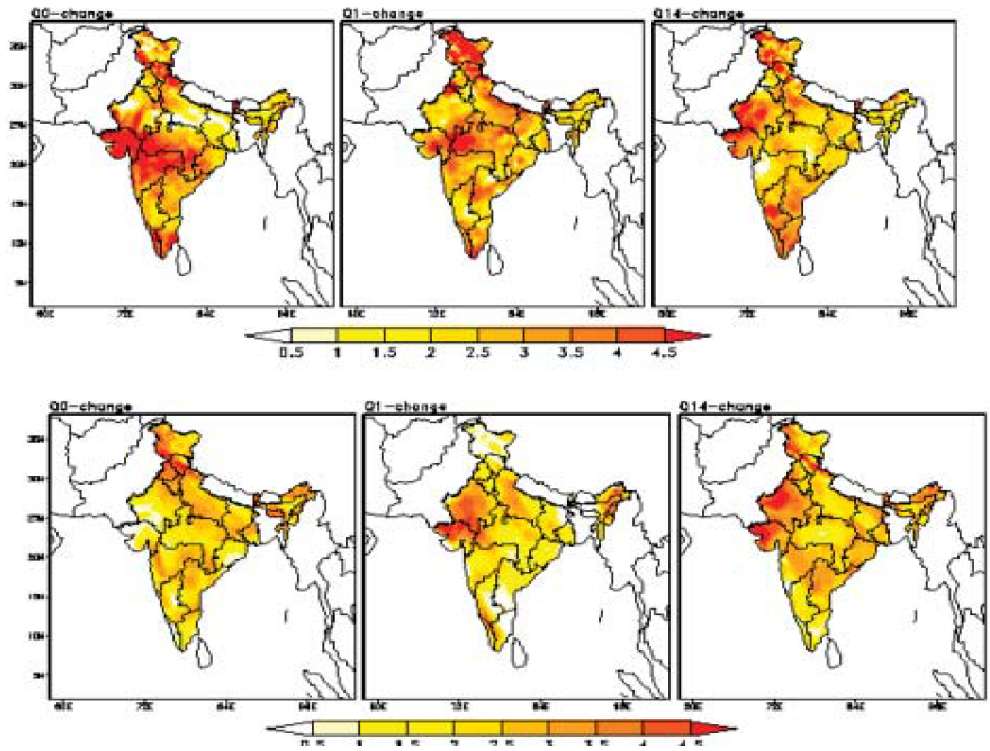

Fig 2: Changes in the minimum and maximum temperature in 2030s as compared to the base year (Source: GoI 2010)

Another study, EU High Noon (Moors, 2012), had projected through its Regional Climate Models that the Ganga Basin would warm at a rate faster than the global mean. The studies were carried out under SRES A1B scenario, in which temperatures were projected to increase by 1.5 to 3 °C by 2050, 2 °C on average between the RCM ensemble members. Thereafter, the temperatures were projected to rise by 4 °C on average, particularly if no global climate mitigation policy is enacted. The study had also pointed out that the mountainous regions would face pronounced warming.

The state action plan on climate change for the state of Uttarakhand indicates a continuous decreasing trend in the maximum temperature and increasing trend in minimum temperature in Pantnagar (in Udham Singh Nagar district) which has been taken as a representative of the plains of Uttarakhand. Another observation highlighted in the SAPCC is the reduction in bright sunshine hours due to increasing cloud cover. This reduction can adversely impact crops. Mishra et al., 2013 studied the temperature data of 102 years from 1901 to 2002 in the Upper Ganga Canal Command region and found an increasing trend in temperature for Haridwar city.

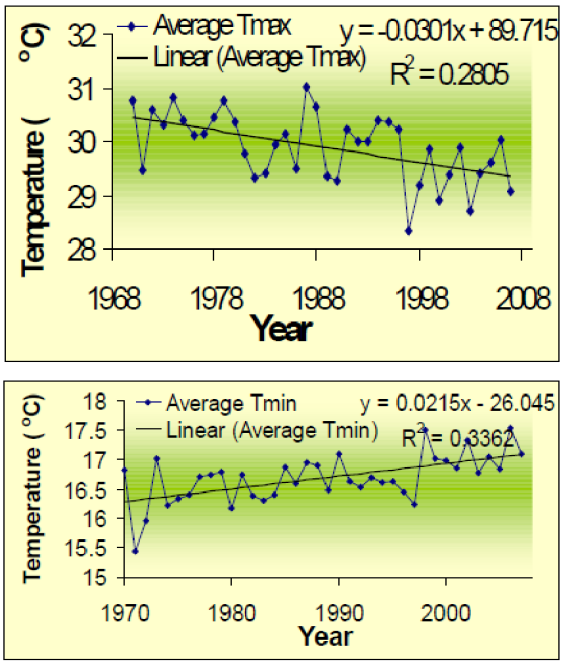

Fig.3: Observed temperature trends at Pantnagar (Source: GoU, 2012)

Rainfall: Given that the study area lies within the Himalayan region, PRECIS run for 2030's indicates that the annual rainfall in the Himalayan region may vary between 1268±225.2 mm to 1604±175.2 mm respectively (GoI, 2010). A net increase of 60 to 206 mm by 2030's with respect to the simulated rainfall of 1970's is indicated from the projected precipitation trends. All seasons in the Himalayan region indicate an increase in rainfall, with maximum increase in the monsoon months. The general implication of the increase in precipitation is expected to be an increase in the sediment yield. The increase in the sediment yield in the Himalayan region is up to 25%, which can prove to be detrimental for the existing water resources projects, apart from the inevitable damage to environment. The simulated seasonal and annual rainfall and mean temperature for the Himalayan region (baseline and A1B scenario) as simulated by PRECIS are presented in the table below.

Table 2: Characteristics of simulated seasonal and annual rainfall and temperature for the Himalayan region (Source: GoI, 2010)

Himalayan	Rainfall (mm)					Mean Temperature (oc)				
Q0	JF	MAM	JJAS	OND	Annual	JF	MAM	JJAS	OND	Annual
Means										
1970s	141	315	551	202	1208	-13.3	0.6	10.1	-7.0	-0.4
2030s	144	307	615	203	1268	-10.6	5.8	12.1	-4.4	1.3
Standard Deviations										
1970s	71.9	101.5	101.3	103.1	173.4	1.8	1.3	0.4	1.4	0.6
2030s	99.0	86.2	115.8	125.8	225.2	1.4	1.8	0.6	1.0	0.7

Himalayan	Rainfall (mm)					Mean Temperature (oc)				
Q1	JF	MAM	JJAS	OND	Annual	JF	MAM	JJAS	OND	Annual
Means										
1970s	176	346	412	221	1154	-11.8	-0.2	0.9	-6.8	-0.8
2030s	201	361	449	216	1227	-9.6	1.7	10.1	-5.2	0.9
Standard Deviations										
1970s	70.6	100.7	57	98.4	169.7	1.4	0.9	0.6	0.8	0.4
2030s	84.1	79.1	67.4	84.7	164.6	1.5	1.0	0.5	1.2	0.6

Himalayan	Rainfall (mm)					Mean Temperature (oc)				
Q14	JF	MAM	JJAS	OND	Annual	JF	MAM	JJAS	OND	Annual
Means										
1970s	232	355	527	284	1398	-12.0	0.9	10.9	-0.6	0.4
2030s	232	399	612	362	1604	-9.9	2.9	12.9	-3.2	2.6
Standard Deviations										
1970s	123	94.3	86.1	115.6	175.2	1.4	1.3	0.3	0.9	0.4
2030s	89.1	121.8	100.2	126.6	175.2	1.4	1.2	0.8	1.0	0.7

Typically, the distribution of precipitation over the various districts of the state of Uttarakhand can be seen from the map below:

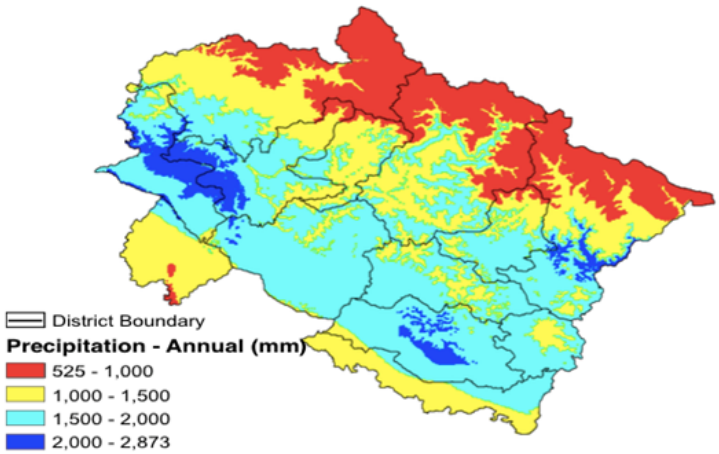

Fig 4: Precipitation over Uttarakhand Source: GoU, 2012

The rainfall records (2000–02) for Uttarakhand suggest that the peak of the annual hyetograph has been shifted from July to August and since the last two decades there are incidences when the peak of the annual hyetograph is being formed in the month of September. This indicates that in future the peak of the annual hyetograph may be shifted from August to September. The shifting of rainfall peak in the annual hyetograph reveals that the rainfall rhythm is gradually changing in Uttarakhand due to climate change (Government of Uttarakhand, 2014).

On field observations corroborate key climate trends and impacts on livelihoods of communities in the region. Variability in precipitation, increased summer temperatures, reduced snowfall and an increase in the incidence of extreme events (landslides, heavy rainfall, floods) pose a major threat to agricultural yield, which has considerably reduced over the years.

Impact on water availability: Climate change also adversely impacts soil and water quality and availability. Water availability becomes a critical issue in these altitudes, especially when springs and rivulets feeding the population start drying up.

Agriculturally, the mid-hills are characterised by minimal irrigation, with water sourced from canals and guls (man-made diversion channels to take water from the main river along natural terrain, mainly used for irrigation at higher altitudes) (GOI 2011b). Since river water cannot be easily accessed due to lack of sustainable water storage systems for farms, any fluctuations in the flow of the springs and rivulets for any reason will adversely affect the population. This leads to an dependence on timely rainfall for irrigation purposes, which is hampered by climate variability and change. Certain villages have greater access to spring water during monsoon than others due to their geographical proximity to natural water sources (for instance farmers in Kherda have access to more water than farmers in Sitla and Mona). Dependence on spring water was seen for livestock rearing and household activities. In addition to hampering aspects of their livelihood, drying up of springs and a lack of pumping or water storage systems across households in the villages serves to exacerbate inherent vulnerabilities.

Impact on agriculture: Erratic rainfall, increase in temperature, higher incidence of extreme events such as floods and cloudbursts, coupled with low soil productivity and lack of irrigation facilities makes hill agriculture less lucrative than that in the

plains. Hence, agriculture in the mid and high hills in the state is mostly subsistence. India is the second largest producer of fruits and vegetables in the world and Uttarakhand is known for its horticultural crops, including fruits, vegetables, off-season vegetables, floricultural crops, aromatic and medicinal plants.

The decrease in adequate snowfall in the region has adversely impacted the production and marketing of fruits in this belt. According to farmers, apples require a minimum of 90 days of snowfall to produce fruit that can be of market value. Due to a decrease in snowfall (last year only saw a week of snowfall), the altitude conducive for cultivation of apple has shifted upward and also affected the production and maturation of the fruit. Other fruits such as apricots, peaches and plums have also seen a decline in production over the years. The locals also believe that extension of pine forests in the recent past have also been contributing to decreased groundwater recharge, unlike the water holding capacity of oak forests. This, coupled with the damage caused to forests due to disasters like floods and landslides has led to lower base flows in natural springs, impacting water availability and access.

1.2.2.2 Socio-economic stressors, exposures and impacts:

Socioeconomic stressors consisted of levels of human and social capital, market linkages, lack of alternative livelihood options, urbanisation, human-wildlife conflict and the lack of knowledge systems to aid in understanding and responding to climate change impacts. These stressors could be said to co-determine and possibly exacerbate the prevalent impacts of climate change and lead to vulnerability of environmental systems and socio-economic structures.

Economic/ Market Linkages: Inherent vulnerability of farmers in the villages scoped comes from the far-flung, scattered land holdings of farmers, owing to mountain topology that allows for small stretches of cultivable land. Apart from climate variability adding to this vulnerability, the existing market structures leave the farmers with little to no power over their own produce. The poor road connectivity within villages hampers collection and marketing of agricultural produce. A truck operating from the villages to Haldwani is usually the mode of collection. However, there are no fixed days for collection of produce and if the fruits are not sent to the market two to three days after being harvested, they begin to rot, decreasing their market value significantly. Additionally, due to the lack of a fixed price or market rate

for fruits, vegetables and food grains, the middlemen (locally known as 'Bania') seem to have complete control over the compensation received by the farmers. Conversations with locals in the village Supi and Bana revealed that the farmers have a complicated relationship with the middlemen, in that a lot of farmers are known to take loans for personal reasons from them. In such an eventuality, they are not in a position to dispute or question the compensation rendered by the middlemen for their produce. This power dynamic between the farmers and the middlemen seems to be a major stressor in the belt. It was also observed that given that farming is predominantly subsistence, more often than not, there is insufficient yield per farmland. The locals were of the opinion that a provision for dedicated collection centres in each village (or every two villages), a common agricultural produce market for each block in the district, fixed government rate for agricultural produce and juice/ jam/ jelly making centres that would lead to utilisation of C-grade fruits and also generate opportunities for livelihood diversification into non-farming sector as a response to the vagaries of climate.

Urbanisation/ Access-Control Issues: Urbanization in Uttarakhand has been unplanned and rapid and is increasing. Rural settlements are being converted to small towns, and small towns into large cities. Tourism is one of the fastest growing sectors and is emerging as an important driving force for urban growth in the high elevations and mid-hills. In the Nainital district, a number of resorts and guest-houses, typically run by people from outside the state and the influx of tourists poses tremendous pressure on the available resources. The local population is extremely vulnerable to such changes, which is only exacerbated by climate change (GoU 2014a).

Another interesting observation emerging from the influx of 'richer outsiders' is the dynamic of access and control of the already scarce natural resource availability. It was observed that resorts and guesthouse establishments (as seen in Binsar, Sitla and Kashyalekh) are usually built around land with availability of water resources (groundwater and otherwise), thereby reducing the access of the same to owners the end nearby. It was also seen that these richer farmers have consolidated tracts of land and can afford irrigation or pumping if needed. Hence, a lot of the agricultural produce from these areas is not necessarily native to the region. For instance, Sitla Estate boasts of cultivation and marketing of snow peas, pumpkins, broccoli, cabbage, apple, plum and apricot. This is possible in the light of climate impacts because the owner

can afford local farm labour, pumping systems for irrigation, enclosures to protect crops from the threat of monkeys and wild boars, and a polyhouse for off season vegetable production.

Image 1: Polyhouse on the terraced farms of Seetla Estate (large scale, richer farmers and tourism operators)

Land use and urban development: Land holdings of subsistence and smallholder farmers are generally fragmented and scattered, adding their vulnerability. Repeated division of land over generations leaves some farmers close to landless. Girls/women do not inherit farmland.

There is also an observed decline in the productivity of horticultural crops, due to monkey and wild boar invasion (instance of human-wildlife conflict). The locals stated this as a concern across all the villages scoped. Experimentations with enclosure small areas within terraced land in an attempt to ward off wildlife has not shown successful results. One of the responses to this threat at a policy level would be to aim to retain the monkey and wild boar populations to forests. However, this would fall under the

jurisdiction of the Forest Department and not the departments that deal with agriculture, horticulture and livelihoods in general, leading to a deadlock in terms of how to respond to a cross-sectoral issue of this kind. Much of the land in the district comes under forestland, and is not owned by the panchayat but the state government. This restricts the rights that communities can exercise over the land in their villages. Sale of agricultural land is permitted to non-residents or non-locals.

Knowledge systems/ lack of awareness: There was an apparent lack of awareness among farmers surrounding climate resilient farming practices. Crops cultivated in a particular season are determined by market demand, usually resulting in an oversight of its implications for soil productivity. Farmers across villages agreed that there was a knowledge deficit in terms of research and knowledge dissemination. They maintained that while there is a preliminary understanding of climate impacts, there is a lack of understanding of how and when to alter cropping patterns (for vegetables and food grains), how to shift to climate resilient agriculture and how to tend to fruit trees so as to ensure marketable produce.

Local Responses Systems:

Responses to multiple stressors in the region are responsive or reactive, short-sighted and lack scientific evidence/ backing. In some villages, traditional crops such as buckwheat, hog millet and foxtail millet are being replaced by cash crops (such as potato and cabbage) that are in market demand. However, due to lack of an understanding of reasons for a reduction in yield and responses to combat the same, farmers choose to sought seeds for another cash crop, perpetuating the cycle of low agricultural productivity.

The major response strategy to stressors is out-migration from villages to supplement household income. Local labour migration in both blocks are usually seasonal and a short is observed from agriculture to wage labourers under MNREGA on bigger farms owned by people from the plains, driving and taxi services and support staff at resorts or guesthouses. The lack of avenues for livelihood diversification for people in the region further hampers response capabilities.

Responses to reduced water availability in Mona, Satoli, Perwada and Bana include farmers relying on scarce groundwater for irrigation. With the spread of the invasive pine cover, the water holding capacity of has reduced. Some communities have

undertaken the task of clearing pine and planting oak trees in an effort to rejuvenate groundwater. However, this response is not an institutionalised, organised effort and will take years before it can begin to contribute effectively to water management in the region.

Policies and Institutions:

There are a number of organizations involved in addressing issues surrounding agriculture in Nainital district. The Krishi Vigyan Kendra (KVK, a front-line agricultural extension centre financed by the Indian Council of Agricultural Research), is responsible for providing information about newer varieties of crops and better techniques for water management. However, the locals maintain that little to no effort is made to hold need-based training workshops that enable dissemination of knowledge and awareness for farmers to better cope with stresssors. Seed availability for remote villages is an issue because can only procured from Haldwani, which is close to 75 km from these blocks. There is a horticulture department representative stationed in Peora for Ramgarh and Dhari blocks, but was of the opinion that farmers do not seem very forthcoming in terms of seeking information, seeds or soil testing. NABARD, which is the national implementing entity for climate change adaptation and development initiatives has, a visible presence in water management and crop diversification programs in the district. However, as is the case with most pilots, the issue is with sustaining the intervention and devising mechanisms to upscale and out scale the same.

Comparison between Uttarakhand and Himachal Pradesh farmers:

Farming communities in the district drew a comparison between themselves and the farmers from Himachal Pradesh (based on their interactions with them during a few training workshops for mountain farmers). The general consensus in Uttarakhand was that farmers in Himachal Pradesh had more awareness, knowledge and state government support and were able to respond to stressors associated with the livelihood to a greater extent than farmers in Uttarakhand were. Additionally, Himachal Pradesh does not allow for land to be sold to ‘outsiders’ or people who are not natives of the state, and that could be one of the reasons that the mechanisms to deal with stressors is a natural priority for the state government.

2. Water, Land and Tourism: Equity Conflict

2.1 Tourism in Uttarakhand: The high elevation villages are bestowed with panoramic view from the magnificent and mighty Himalaya to the alpine meadows, lush green temperate forests of the highlands, terraced agricultural fields and sparsely located settlements of the mid-altitudes, waterfall, gorges and cascades of the river valleys and above them the pilgrimages, the symbol of the Hindu sanctity.

Urbanisation in Uttarakhand has been unplanned and rapid, leading to the conversion of rural settlements to small towns, initially owing to the fact that these regions were stopping points and centres for pilgrims visiting the major pilgrimage centres during the 'yatra season'. Slowly, these small hubs of commercial activity developed into small towns, then medium towns and subsequently into larger cities. This poses an immense pressure on resources and is a cause of concern. Additionally, the state is impacted by a huge influx of transient population every year (pilgrims and tourists) (Government of Uttarakhand, 2014). The table below shows the decadal growth rate for districts in Uttarakhand.

Table 3: Percentage Growth of Urban Population and Decadal Growth Rate in the districts of Uttarakhand

Districts	2001 (in thousand)	2011 (in thousand)	Decadal growth rate (%)
Uttarkashi	7.77	7.35	-5.67
Chamoli	13.69	15.11	16.54
Rudraprayag	1.20	4.19	263.03
Tehri	9.90	11.37	17.06
Dehradun	52.94	55.90	39.90
Pauri	12.89	16.41	25.37
Pithoragarh	12.94	14.31	16.26
Bageshwar	3.16	3.50	16.51
Almora	8.61	10.02	14.36
Champawat	15.04	14.79	13.52
Nainital	35.27	38.94	38.22
Udham Singh Nagar	32.62	35.58	45.33
Haridwar	30.84	37.77	63.11
Uttarakhand	25.67	30.55	45.27
India	27.81	31.16	31.80

Source: Uttarakhand Rural–Urban Distribution, COI, 2001–2011.

2.2 Water equity and Tourism in Nainital District

According to a vulnerability risk assessment study conducted by UNDP in 2017, an estimated 2.6 lakh springs provide 90% of the drinking water sources in Uttarakhand. With an increase in urbanisation and development of tourism infrastructure,

deforestation activities for projects like road construction continue, adversely impacting the availability of available water. As per National Water Policy (adopted in September, 1987, reviewed and updated in 2002 and later in 2012), the natural resource of water belongs to the nation as a whole and not to individual or groups. Uttarakhand's water resources notably water from the Himalayan glaciers and rivers address the water need of the people of the state in India as a whole. However despite the states multiple water reserves including 17 rivers several snow fed glaciers and 31 lakes many districts of Uttarakhand face acute water scarcity. The main industries using water include agriculture, energy and tourism. The agriculture sector is the greatest consumer of water in the state accounting for 75% of the total demand.

Glacial melt, rivers, lakes, numerous streams and springs contribute a major part of the surface water resources. Traditionally, water for domestic and irrigation purposes was obtained from these local sources: water from hill slopes (*naula, dhaaras*, lakes, small water bodies, etc). However, much of the state rural water supply system no longer meets community needs. In addition to the increased demand, an increased frequency and intensity of extreme events such as unprecedented rainfall and landslides damage infrastructure such as water pipes, handpumps, water storage systems and tubewells. The quality of water has deteriorated in some regions over time as well, forcing communities to be dependent on local springs which periodically dry up due to lack of recharge during the summer months. Designing and implementing pumping schemes is seen as costly.

Uttarakhand's geographical disposition exacerbates its acute water crisis. For instance, in one of the districts on the state, Champawat, the maximum number of villages (nearly 85%) are situated along the slope of the terrain, thereby making them vulnerable to water scarcity, climate-induced landslides and non-climatic hazards such as earthquakes (which the state is prone to). Dehradun and some districts in the Garhwal region, have some access to surface water and groundwater across the year, but the water crisis remains critical across the state. The State Action Plan for Climate Change claims that 20% of 16900 villages in Uttarakhand have a varied range of problems related to drinking water provisions and more than 180 villagers do not have a designated water source. A recent Government of India survey of natural springs () indicated that nearly 15000 water sources have dried up in the last decade.

Scientific literature around tourism and water availability, on-field observations and narratives make it increasingly evident that there is an intense water crisis in the state, exacerbated by climate change and urbanization. Since water is a national asset and no one individual can claim legal rights over water resources found on their land; historically sharing water as a common resource pool was a social norm in the villages of Uttarakhand. However, this scenario seems to be changing now with water availability becoming an issue. Interestingly, apart from the decrease in availability of water, there is a notable shift in the access to this scarce resource. Over the past decade, many city dwellers have been purchasing land in the mountains of Uttarakhand and turning them into either the "weekend homes", resorts and hotels for personal and economic use. With them, they also brought the practice of creating boundaries around their property and land, the process of demarcating it or fencing it off as private land. This is a prevalent practice in peri-urban and urban centres in the country, but was not observed in these mountain villages for centuries. This practice has changed the entire cultural and social scenario in a village. Fences imply that water sources or outlets on land within the boundaries belong to the people living within them.

Before concrete roads reached the interiors of the villages, the norm was two crisscross over each other's land to reach an agricultural land or a house. There was an absence of fencing or a boundary around houses or farmlands. The living was more communal and social norms prevailed that dealt with any conflicts arising from lack of access to water sources. However, the creation of boundaries by the city-bred dwellers created an unsaid divide of "us versus them", which had implications beyond just a demarcation of a piece of land. It created a deep social and cultural divide within these villages. Where once villagers could freely walk through another's land and access water, now no longer had the free will to do so. Given this shift from a sense of community ownership to individual ownership, the traditional practices of common and shared water sources were no longer feasible. With the growing water crisis this divide is not only between the outsiders and the insider's but also amongst the people living in the village who traditionally shared water without any dispute.

In a recent case as seen in Parwara village, Bishan Singh took water from a neighbour's natural spring source, after the person who owned the land had utilised water for his personal needs as well as use of water for drinking and irrigation purposes. The neighbour objected to this practice and termed it as an intrusion into his private land and water resource. He stopped Bishan Singh from taking water from the natural spring on his field. Knowing that water was the national property and nobody could claim individual ownership over it, Bishan Singh took the matter to a court of law. The court ruled in Bishan Singh's favour saying that even if the water source was on a private land , anybody else in the village could access the water after the owner of the land has utilized water for personal and irrigation use. In addition, any water spill or running water from a natural source could be utilised by other individuals.

The other notable issue arises during the summer months. When then natural springs dry up, tourism operators bribe the local officials to be able to install high quality pumps to lift up water from the small rivulets that may be flowing through the villages. While, the locals have started to object to this practice, the local self-government, or the *Panchayat* in the village is still not taking up this issue of water management in a serious capacity. This has led to a financially unjust situation of the locals having to buy water supplies from lower elevation towns and cities (Rs. 2 for 1 ltr of drinking water). However, there have been instances where the locals have protested to halt the construction of a private swimming pool by tourism operators 7000 feet above the sea level in the central Himalayan region with a severe water crisis.

This shift from community ownership of the common pool resource of water, to that of individual ownership has also been attributed to land tenure regime in the state. Unlike the neighbouring state of Himachal Pradesh, agricultural land in Uttarakhand can be sold to non-residents. A non-resident Himachali cannot buy land in Himachal Pradesh. In Uttarakhand, non-locals or non-residents can buy *1.25 naalis* of land but there are many ways to circumvent the law and people use loopholes to even buy upto 100 naalis or more (1 naali = 2160 sq ft)

2.3 Water Governance laws and by-laws: From 'Water Policy and Water Conservation' IIT Roorkee document (Ministry of Water Resources, 2002):

- Water allocation in an irrigation system should be done with due regard to equity and social justice. Disparities in the availability of water between head-reach and tail-end farms and between large and small farms should be obviated by adoption of a rotational water distribution system.
- Zoning: Economic development and activities including agricultural, industrial and urban development, should be planned with due regard to the constraints imposed by the configuration of water availability. There should be a water zoning of the country and the economic activities should be guided and regulated in accordance with such zoning.
- The water sharing / distribution amongst the states should be guided by a national perspective with due regard to water resources availability and needs within the river basin. Necessary guidelines, including for water short states even outside the basin, need to be evolved for facilitating future agreements amongst the basin states.
- **Kumaon Water Rules, 1930:** Government will raise no objection to the construction of new irrigation channels by any landholder. Such channels by any landholder. Such channels must not reduce of otherwise injuriously affect an existing right of user of water belonging to any other party.
- Dispute resolution: All dispute arising out of the working or construction of irrigation channels shall be tried exclusively by the revenue court.
- The maintenance of the natural water sources like springs *and gadheras and naula*s are the responsibility of the local self-government of the panchayats.

Conclusion

Historically, the villages in the two blocks scoped in the Nainital district had been faced with a varied water supply through the year, due to their geographical disposition. Given this situation of water scarcity, following the government by-laws and social norms that date back to centuries, the villagers followed a system of community ownership of the available water sources. The foundation of this strong social norm appears to have eroded over the past decade with the influx of tourism operators in the villages. These operators are usually city-dwellers, who buy land (predominantly agricultural land) form the locals and use it for personal and tourism enterprises. They

brought along with them a practice of building boundary walls demarcating their land, effectively fencing off the locals from accessing any water source that happened to be on their land. This led to a shift from a sense of community ownership to individual ownership of the limited resource. A great number of locals attribute this shift in attitude to aspects of land tenure in Uttarakhand. This has allowed for sale of agricultural land to non-locals, which, in some cases, threatens to erode the social and cultural fabric of community ownership and management of a common pool resource. With an unprecedented increase in frequency and intensity of climatic stressors, this aspect of urbanization puts an immense pressure on an already fragile mountain ecosystem.